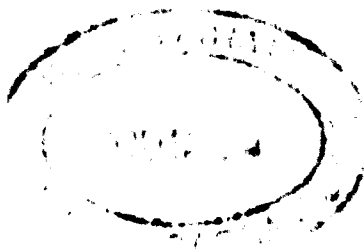


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EDITORIAL.

THE ZYMOTIC DEATH-RATE.

NOTWITHSTANDING frequent comments on the subject, we note that the "zymotic death-rate" still maintains its popularity in many quarters as an adequate test of the sanitary condition of a district. It is still preserved in the quarterly and annual summaries of the Registrar-General, though in this instance any fallacious conclusions that might otherwise be drawn from its statement in Column 6, Table II., of the annual summary are obviated by the statement, in Columns 7 to 13 inclusive, of the separate death-rate from small-pox, measles, scarlet fever, diphtheria, whooping-cough, fever, and diarrhoea respectively. In many reports, however, these separate rates are not given, and it appears to be assumed that the condition of a district as to infectious diseases can be gauged from the "zymotic death-rate" alone. Even in the Registrar-General's returns we should welcome the abolition of Column 6, especially if it could be replaced by a statement of the phthisis death-rate in each town. This, if practicable, would constitute an important advance in the value of these comparative returns.

The value of the zymotic death-rate clearly must depend on the relative magnitude of its seven constituents. A large epidemic of whooping-cough or measles, for instance, would temporarily magnify the rate, although its significance as an index of public health administration would be altogether different from that furnished by a high mortality from small-pox or enteric fever. A high mortality from diarrhoea again, continued over a series of years, gives an interesting insight into the social as well as the sanitary condition of a district, which is quite concealed when it is wrapped up in the zymotic death-rate. In this instance it is advantageous not only to separate the

mortality due to diarrhoea from that caused by the six other zymotic diseases, but also to state it, as recommended by Dr. Newsholme,* in terms of the infantile population, among whom the majority of the deaths from epidemic diarrhoea occur.

We look forward to the time when the "zymotic death-rate" will have disappeared from sight and use; when a careful study will be made in all annual reports of medical officers of health of the death-rate and of the sickness-rate from each infectious disease; when these rates will be compared with the corresponding rates for a long series of preceding years; when average rates for groups of years will be eschewed or used most sparingly; and when the death-rate and the sickness-rate from phthisis will take its place in every annual report as perhaps the most important index of the health conditions of a community.

LECTURING before the Society of Arts on the "Future of Gas Lighting," Professor Vivian B. Lewes said with regard to acetylene that this gas could be dissolved in acetone, and in this way 100 cubic feet of the gas could be compressed into 1 cubic foot of cylinder space, and that in this form the gas was admirably adapted for train, tram, and omnibus lighting. He also showed that with this compressed acetylene, in conjunction with the incandescent mantle, a light of 146 candles per cubic foot of gas could be obtained.

LEAD-POISONING IN HOUSE PAINTERS.—In my capacity as Certifying Factory Surgeon, I received instructions in November from H.M. Inspector of Factories to investigate and report upon the circumstances connected with the death of a resident of Llanelly, who died in that town as the result of lead-poisoning, contracted whilst engaged as a painter in Gorseinon. The unfortunate man was very rarely employed in the workshop, being scarcely ever required to mix paints, as he was a comparatively unskilled painter employed only in priming, and had only taken to painting about six months before his death, through having been compelled by an accident to one of his feet to quit his former occupation and seek light work. There can be no doubt that his death was due to his habitual extreme carelessness as to the cleansing of his hands and finger-nails before partaking of food. House-painters, as such, are outside the scope of the Factory Acts, and therefore nothing can be done by the Factory Inspectors to remove the conditions which conduce to lead-poisoning in them; the only power the Inspector possesses of exercising control is in regard to the comparatively short period during which a painter is employed in a workshop mixing lead paints. The prevention of lead-poisoning in house-painters, therefore, depends upon their own intelligent and conscientious use of the necessary precautions, and they should invariably exercise scrupulous care to secure thorough cleanliness of the hands before meals by the free use of soap and water and the vigorous use of the nail-brush.—DR. TRAFFORD MITCHELL, *Ann. Rep.*, 1901.

* Presidential Address, PUBLIC HEALTH, December, 1899.

A LIFE-TABLE FOR NEW ZEALAND :

BASED ON THE MORTALITY IN THE FIVE YEARS
1891-1895.*

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A LIFE-TABLE affords one of the best methods of testing the healthiness of the inhabitants of a country, since it eliminates any errors arising from peculiarities in the age and sex distribution of the population.

The following table is based on the official Government returns of population, of deaths, and of births in New Zealand.

MODE OF CONSTRUCTION OF LIFE-TABLE.

This life-table has been constructed by the use of the *graphic method*, first employed by Milne in his celebrated Carlisle table. I have followed for the most part the methods of life-table construction described by Dr. Newsholme in his "Vital Statistics," and employed by him in his Brighton life-table, 1881-1890. But in some important details, and notably in dealing with the *p_x* values for ages under five, I have availed myself of certain improvements suggested by Dr. T. E. Hayward (see *Journal of Hygiene*, vol. ii., Nos. 1 and 2).

DATA REQUIRED.

1. The population of New Zealand as enumerated at the census of 1891 and of 1896.
2. The number of deaths during the five calendar years most nearly corresponding to the interval between these two census years, viz., 1891-1895.
3. The deaths at certain ages for some years preceding, viz.:

Deaths at age 0-1 for each of the years 1887-1890 inclusive.

"	"	1-2	"	"	"	1888-1890	"
"	"	2-3	"	"	"	1889-1890	"
"	"	3-4	for the year	1890.			

4. The numbers of male and female births in each of the years 1886-1895 inclusive.

First of all, it is required to calculate from the above data—

1. The mean population or "number of lives at risk" for each year of age during the five years under consideration.
2. The number of deaths at each year of age during the same period.

* Part of a thesis submitted for the degree of Doctor of Medicine, University of Edinburgh.

POPULATION.

The census returns of 1891 and 1896 give the numbers for each sex at certain age-groups. By addition we obtain the following numbers for the quinquennial and decennial age-groups usually adopted in life-table construction.

Population of New Zealand.

Age.	Census 1891.		Census 1896.	
	Males.	Females.	Males.	Females.
0-5 ...	42,259	40,945	42,448	41,211
5-10 ...	43,494	42,586	43,561	42,464
10-15 ...	40,755	40,329	43,044	42,423
15-20 ...	32,579	32,658	40,364	40,370
20-25 ...	28,337	29,805	34,264	34,452
25-35 ...	45,725	40,266	54,352	50,456
35-45 ...	38,268	28,542	42,505	32,936
45-55 ...	33,798	21,754	33,033	24,248
55-65 ...	18,630	10,618	24,756	14,875
65-75 ...	6,427	4,441	9,678	5,986
75-85 ...	1,673	1,376	2,520	1,976
85+ ...	236	189	305	291
All Ages ...	332,181	293,509	370,830	331,688

These figures give the population at the time the census was taken, approximately at the end of March in 1891 and in 1896—i.e., at the end of the first quarter of the year. The next step is to determine the true mean population for each of these two census years; in other words, the population at the middle of 1891 and at the middle of 1896, the so-called "central populations."

The calculation is as follows: Assuming that population increases in geometrical progression, if by P we denote the population at the end of the first quarter, 1891, and by Q the population at the end of the first quarter, 1896, then

$$Q = PR^5;$$

where R = population resulting per unit per annum.

P and Q are given for each age-group in the above table, compiled from the census returns; hence we can determine the value of R for each age-group. For

$$Q = PR^5;$$

$$\therefore R^5 = \frac{Q}{P};$$

$$\therefore 5 \log. R = \log. Q - \log. P;$$

$$\therefore \log. R = \frac{1}{5} (\log. Q - \log. P).$$

This formula is applied for the values of P and Q for either sex, and at each age-period, as given in the preceding table. Hence are derived the following values of R , with their corresponding logarithms:

Age.	Males.		Females.	
	Log. R.	R.	Log. R.	R.
0-5 ...	0.0003874	1.0008924	0.00056246	1.001295
5-10 ...	0.0001334	1.0003000	1.99975082	0.999426
10-15 ...	0.0047466	1.0109893	0.00439676	1.010175
15-20 ...	0.0186112	1.0437853	0.01841382	1.043311
20-25 ...	0.0164968	1.0387154	0.01258506	1.029402
25-35 ...	0.0150128	1.0351728	0.01959486	1.046152
35-45 ...	0.0091206	1.0212230	0.0124373	1.029051
45-55 ...	1.9980114	0.9954316	0.00942736	1.021944
55-65 ...	0.0246934	1.0585061	0.02928286	1.069751
65-75 ...	0.035556	1.085317	0.02593118	1.061527
75-85 ...	0.0355806	1.085374	0.0314337	1.075062
85+ ...	0.0222774	1.052633	0.03748624	1.090149

With the help of these values of R we can determine the central populations for 1891 and 1896 from the formula—

$$Q = PR^5,$$

where Q = central population required,
and P = census population.

Thus, taking for example the first age-group (0-5) for males,

$$P = 42259, \text{ and } R = 1.0008924;$$

$$\text{but } Q = PR^5;$$

$$\therefore Q = 42259 \times (1.0008924)^5;$$

$$\begin{aligned} \therefore \log. Q &= \log. 42259 + \frac{1}{5} \log. (1.0008924) \\ &= 4.6259192 + 0.00009685 \\ &= 4.6260160; \end{aligned}$$

$\therefore Q = 42268$, the required central population for males aged 0-5 in the year 1891.

In the same manner the following central populations have been determined :

Age.	Central Population, 1891.		Central Population, 1896.	
	Males.	Females.	Males.	Females.
0-5	42,268	40,958	42,457	41,224
5-10	43,497	42,580	43,564	42,458
10-15	40,866	40,431	43,162	42,531
15-20	32,929	33,006	40,799	40,800
20-25	28,607	30,021	34,591	34,702
25-35	46,122	40,722	54,824	51,028
35-45	38,469	28,747	42,729	33,172
45-55	33,759	21,872	32,995	24,380
55-65	18,896	10,798	25,110	15,128
65-75	6,559	4,507	9,878	6,076
75-85	1,707	1,401	2,572	2,012
85 +	239	193	309	297

From these central populations is calculated, for each age-group, the total mean population for the five years under consideration. With the notation of a geometrical series, the central populations for the years 1891-1896 may be denoted by P , PR , PR^2 , PR^3 , PR^4 , PR^5 . Hence the total population for the quinquennium will be the sum of this series—

$$\begin{aligned}
 &= P \frac{R^6 - 1}{R - 1} = \frac{PR^6 - P}{R - 1} \\
 &= \frac{\text{Population, 1896} - \text{population, 1891}}{R - 1}
 \end{aligned}$$

But the central populations for 1891 and 1896 have been determined, together with the value of R , for each age-group. Hence we can find the total mean population or total number of lives at risk for each age-group.

Thus, for males aged 0-5 years, the total number of lives at risk will be—

$$\begin{aligned}
 &\frac{\text{Central population, 1896} - \text{central population, 1891}}{R - 1} \\
 &= \frac{42457 - 42268}{1.0008924 - 1} \\
 &= \frac{189}{.0008924} \\
 &= 211788.8.
 \end{aligned}$$

And in this manner were obtained the following :

Total Number of Lives at Risk, 1891-1896.

Age.	Males.	Females.
0-5	211,788	205,405
5-10	217,673	212,641
10-15	208,930	206,388
15-20	179,740	179,954
20-25	154,563	159,206
25-35	247,407	223,305
35-45	200,725	152,318
45-55	167,235	114,290
55-65	106,211	62,078
65-75	38,901	25,501
75-85	10,131	8,140
85 +	1,329	1,154

The age-periods stop at age eighty-five; but, in order to employ the graphic method of life-table construction, we need to further subdivide the residue of lives at risk. This has been accomplished by interpolation of finite differences.

For example, let us take the male population. We have then determined :

Age-group.	Number of Lives at Risk.
55-65	106,211
65-75	38,901
75-85	10,131
85 +	1,329

Hence, by addition, we find the number of lives at risk at ages fifty-five and upwards, sixty-six and upwards, etc. These numbers form a series, from which, by the method of finite differences, can be deduced the number of lives at risk for higher ages. It is advisable to use, not these numbers, but their logarithms for "differencing." The extended working is here given :

At Age and Upwards.	Lives at Risk.	Logarithms.	First Differences.	Second Differences.	Third Difference.
55 ...	156,572	5.1947141	-0.4926198	-0.1502899	-0.1424600
65 ...	50,361	4.7020943	-0.6429097	-0.2927499	
75 ...	11,460	4.0591846	-0.9356596		
85 ...	1,329	3.1235250			

Carrying down the differences,

- 0.2927499	- 0.9356596	3.1235250
- 0.1424600	- 0.4352099	- 1.3708695
- 0.4352099	- 1.3708695	1.7526555 = log. of 56.5790.
- 0.1424600	- 0.5776699	- 1.9485394
- 0.5776699	- 1.9485394	1.8041161 = log. of 0.636965.

Hence we may extend the series to

At Age and Upwards.	Lives at Risk.
55	156,572
65	50,361
75	11,460
85	1,329
95	56.579
105	0.636965

And from this we can find the number of lives at risk in age-groups of ten years, thus:

Age-group.	Lives at Risk.
55-65	106,211
65-75	38,901
75-85	10,131
85-95	1,272.4210 = 1,273 approximately
95-105	55.94204 = 56
105 +	0.63696

In other words, the 1,329 lives at risk for ages eighty-five and upwards (see table on p. 7) have been subdivided into 1,273 for ages 85-95, and 56 for ages 95-105.

A similar method has been employed to subdivide the lives at risk amongst females at higher ages, with the following result:

Age.	Original Number of Lives at Risk.	Age.	Subdivided Number of Lives at Risk.
85 +	1,154	85-95	1,113
		95-105	41

We have now obtained the total number of lives at risk in age-groups of five or ten years. It still remains to find the number of lives at risk *for each individual year of life* from 0 to 102 or thereabouts. It is at this point that the graphic method has been employed. The method is applied as follows: On paper ruled into equal squares is laid down a base-line or abscissa, and along this are marked off five equal spaces of five squares each, representing the age-periods of 0-5, 5-10, 10-15, 15-20, and 20-25. Six other equal spaces of double length represent the succeeding ten-yearly age-periods, 25-35, etc. On the first portion of the base-line is constructed a parallelogram of such a height that, in accordance with the scale of population given at the left-hand margin, the area of the parallelogram shall represent the total number of lives at risk for the age-period 0-5 years. Thus, for males, the total number of lives at risk for the ages 0-5 has been found to be 211,788; hence the parallelogram for this age-period should have a height of $\frac{211,788}{5} = 42,357.6$, as indicated by the scale of population.

Similarly, other parallelograms are erected on the remaining portions of the base-line, each representing in area the total number of lives at risk for the age-period indicated by the base.

A curved line is now drawn through the upper borders of these parallelograms, without abrupt angles, and in such a fashion that the area included between the base of any parallelogram, the corresponding portion of the two ordinates laterally, and the portion of the curved line above, shall be equal in area to the parallelogram already erected on the same base; in other words, the area cut off from each parallelogram should be equal to the area added to the same. In a few instances a better curve is obtained if two parallelograms are taken together, the amount cut off from one being counterbalanced by the amount added to the other.

The base-line is now divided into equal spaces representing single years of age (readily done if we use paper ruled in squares), and vertical lines are drawn from the centre of each of these spaces upwards to join the curved line. The height of the points of junction, as read off on the scale, will give the number of lives at risk, or mean population, for each year of age.

For further explanation of this graphic method reference may be made to the chapter on life-tables in Newsholme's "Vital Statistics."

At the end of this paper (p. 25) are given the curves for the male populations (Diagram I.).

The results are here tabulated:

Total Number of Lives at Risk, 1891-1896.]

Age.	Males.		Age.	Females.	
	In Original Groups.	Distributed.		In Original Groups.	Distributed.
0	211,788	43,466	0	205,405	42,027
1		42,025	1		40,817
2		41,739	2		40,508
3		42,104	3		40,860
4		42,454	4		41,193
5	217,673	43,264	5	212,641	42,400
6		43,615	6		42,580
7		43,865	7		42,681
8		43,615	8		42,580
9		43,314	9		42,400
10	208,930	42,796	10	206,388	42,120
11		42,146	11		41,900
12		41,367	12		41,518
13		40,431	13		40,850
14		39,480	14		40,000
15	179,740	38,445	15	179,954	38,750
16		37,497	16		37,250
17		36,506	17		35,900
18		35,508	18		34,554
19		34,494	19		33,500
20	154,563	33,380	20	159,206	32,250
21		32,100	21		31,100
22		30,783	22		30,000
23		29,600	23		29,000
24		28,700	24		27,850
25	247,407	27,655	25	223,305	26,800
26		26,804	26		25,900
27		26,104	27		25,100
28		25,455	28		24,270
29		24,854	29		23,450
30	200,725	24,305	30	152,318	22,650
31		23,785	31		21,941
32		23,285	32		21,350
33		22,805	33		20,750
34		22,355	34		20,100
35	200,725	21,900	35	152,318	19,500
36		21,450	36		18,780
37		21,100	37		18,100
38		20,700	38		17,450
39		20,300	39		16,750
40	200,725	19,960	40	152,318	16,100
41		19,650	41		15,450
42		19,350	42		14,800
43		19,100	43		14,250
44		18,750	44		13,750

Age.	Males.		Age.	Females.	
	In Original Groups.	Distributed.		In Original Groups.	Distributed.
45	167,235	18,400	45	114,290	13,100
46		18,050	46		12,500
47		17,650	47		11,900
48		17,300	48		11,426
49		16,800	49		10,850
50	106,211	16,400	50	62,078	10,350
51		16,000	51		9,750
52		15,500	52		9,200
53		15,100	53		8,600
54		14,500	54		8,150
55	38,901	13,750	55	25,501	7,700
56		13,000	56		7,250
57		12,400	57		6,850
58		11,750	58		6,350
59		11,100	59		6,000
60	10,131	10,401	60	8,140	5,600
61		9,610	61		5,100
62		8,800	62		4,700
63		8,050	63		4,380
64		7,350	64		4,000
65	1,273	6,587	65	1,113	3,700
66		5,822	66		3,400
67		5,080	67		3,100
68		4,380	68		2,800
69		3,820	69		2,600
70	1,273	3,370	70	1,113	2,371
71		2,970	71		2,180
72		2,612	72		2,000
73		2,280	73		1,800
74		1,980	74		1,550
75	1,273	1,751	75	1,113	1,300
76		1,525	76		1,200
77		1,355	77		1,080
78		1,185	78		980
79		1,020	79		860
80	1,273	875	80	1,113	760
81		760	81		640
82		650	82		540
83		565	83		425
84		457	84		355
85	1,273	361	85	1,113	280
86		266	86		230
87		192	87		180
88		138	88		129
89		105	89		98
90	1,273	84	90	1,113	73
91		61	91		50
92		42	92		36
93		28	93		26.5
94		18	94		19

Age.	Males.		Age.	Females.	
	In Original Groups.	Distributed.		In Original Groups.	Distributed.
95		9	95		13
96		4	96		8.5
97		3	97		4
98		2	98		2
99		2	99		2
100	56	1	100	41	2
101		1	101		1
102			102		
103			103		
104			104		

NOTE.—The number of lives at risk for each of the years 0-5 has been calculated, not from the curve, but as described later. The results have, however, been inserted in order to complete the above table.

DEATHS.

In a somewhat similar fashion we have to deduce from the annual death returns for the years 1891-1895 the number of deaths for each year of age during this period.

The following table, obtained by addition of results of the Registrar-General for New Zealand, gives the deaths at the age periods used in dealing with the population :

Total Deaths, 1891-1895.

Age.	Males.	Females.
0-5	6,001	4,839
5-10	619	589
10-15	455	395
15-20	618	623
20-25	756	742
25-35	1,269	1,207
35-45	1,486	1,094
45-55	2,103	1,158
55-65	2,619	1,182
65-75	2,000	1,110
75 +	1,499	1,060

By the method of finite differences the residual numbers at age 75 and upwards can be approximately subdivided as follows :

Males.

Age.	Original Number of Deaths.	Age.	Distributed Deaths.
75 +	1499	75-85	1,251
		85-95	242
		95-105	6
		105 +	0

Females.

Age.	Original Number of Deaths.	Age.	Distributed Deaths.
75 +	1,060	75-85	817
		85-95	227
		95-105	16
		105 +	0

These results are now, by an application of the graphic method, utilized to give the deaths for each year of life. Parallelograms are erected, and a curve drawn, as for the "lives at risk." At the end of this paper is shown the curve for male deaths (Diagram II.).

The results deduced from these diagrams are now tabulated :

Total Number of Deaths, 1891-1895.

Age.	Males.		Age.	Females.	
	In Original Groups.	Distributed.		In Original Groups.	Distributed.
0		4,512	0		3,493
1		765	1		651
2	6,001	311	2	4,839	288
3		215	3		239
4		198	4		168
5		154	5		146
6		136	6		132
7	619	121	7	589	118
8		108	8		103
9		100	9		90
10		92	10		81
11		90	11		78
12	455	90	12	395	78
13		90	13		78
14		93	14		80

Age.	Males.		Age.	Females.	
	In Original Groups.	Distributed.		In Original Groups.	Distributed.
15	618	98	15	623	86
16		108	16		112
17		128	17		137
18		139	18		142
19		145	19		146
20	756	150	20	742	148
21		152	21		149
22		153	22		149
23		152	23		149
24		149	24		147
25	1,269	140	25	1,207	143
26		134	26		138
27		129	27		132
28		126	28		124
29		124	29		119
30	1,486	123	30	1,094	115
31		123	31		112
32		123	32		109
33		123	33		108
34		124	34		107
35	2,103	127	35	1,158	107
36		130	36		107
37		134	37		108
38		138	38		108
39		144	39		109
40	2,619	149	40	1,182	110
41		156	41		110
42		163	42		111
43		169	43		111.5
44		176	44		112.5
45	2,619	180	45	1,182	113
46		188	46		114
47		195	47		115
48		200	48		115
49		207	49		116
50	2,619	213	50	1,182	116
51		219	51		117
52		227	52		117
53		233	53		117
54		241	54		118
55	2,619	249	55	1,182	118
56		258	56		118.5
57		264	57		118.6
58		267	58		118.6
59		267	59		118.6
60	2,619	267	60	1,182	118.6
61		267	61		118.6
62		265	62		118
63		260	63		117.5
64		255	64		117

Age.	Males.		Age.	Females.	
	In Original Groups.	Distributed.		In Original Groups.	Distributed.
65	2,000	243	65	1,110	117
66		233	66		116
67		223	67		115
68		213	68		114
69		204	69		113
70	1,251	194	70	817	111
71		186	71		109
72		177	72		107
73		168	73		105
74		159	74		103
75	242	152	75	227	100
76		141	76		96
77		133	77		92
78		124	78		88
79		116	79		83
80	6	108	80	16	78
81		100	81		73
82		91	82		66
83		82	83		60
84		74	84		53
85	6	66	85	16	48
86		58	86		42
87		52	87		36
88		45	88		31
89		38	89		26
90	6	32	90	16	21.5
91		25	91		17.5
92		19	92		14
93		13	93		11
94		10	94		8
95	6	7	95	16	6
96		4	96		4
97		3	97		2
98		2	98		1
99		2	99		1
100	6	1	100	16	1
101		1	101		1
102		—	102		—
103		—	103		—
104		—	104		—

NOTE.—The deaths for each of the first five years of life have been derived from the Registrar's returns, not from the curves.

Having thus obtained for each year of life the number of lives at risk and the number of deaths, we can proceed to build up the life-table step by step.

p_x COLUMN.

If we divide the number of deaths at any particular age which occurred during the five years under consideration by the central population (or total number of lives at risk) for the same age during the same period of time, we obtain the rate of mortality per unit of population, also known as the central death-rate, because it represents the rate at which people are dying in the centre of a given year. This rate is usually indicated by the symbol m_x , where x represents 0, 1, 2, 3, etc., according to the year of age considered.

From these m_x values we can calculate the probability that a person at each age will survive one whole year, this probability being indicated by the symbol p_x ; for the probability of living through one year is equal to the number of survivors at the end of the year divided by the number living at the beginning of the year, and this in turn can be proved equal to the fraction $\frac{2-m_x}{2+m_x}$ (see Newsholme's "Vital Statistics").

$$\text{Hence } p_x = \frac{2-m_x}{2+m_x},$$

and from this equation we calculate the value of p_x for each year of age. Thus for males at age 5-6:

$$\begin{aligned} p_5 &= \frac{2-m_5}{2+m_5}, \text{ where } m_5 = \frac{\text{deaths at age 5-6}}{\text{lives at risk at age 5-6}} = \frac{154}{43,264}; \\ \therefore p_5 &= \frac{2 - \frac{154}{43,264}}{2 + \frac{154}{43,264}} = \frac{86528 - 154}{86528 + 154} = \frac{86374}{86682}; \\ \therefore \log p_5 &= \log 86374 - \log 86682 \\ &= 4.9363830 - 4.9379289 \\ &= -1.9984541; \\ \therefore p_5 &= .99644. \end{aligned}$$

In a similar manner have been calculated the p_x values for all ages above five for both sexes.

AGES UNDER FIVE.

But for the first five years of life the p_x values determined as above are not reliable, because the census returns of population at these ages are not sufficiently correct. Hence some other method must be adopted to calculate the p_x values at these earlier years. The method here adopted is that described by Dr. Hayward (*Journal of Hygiene*, vol. ii., No. 1).

$$\begin{aligned} \text{Let } a &= \text{the number at birth.} \\ &= \frac{1}{2} \text{ births 1890} + \text{all births 1891-1894} + \frac{1}{2} \text{ births 1895.} \\ \text{Let } b &= \text{number at 1 year of age.} \\ &= \frac{1}{2} \text{ births 1889} + \text{all births 1890-1893} + \frac{1}{2} \text{ births 1894,} \\ &\quad \text{less deaths at age 0-1 in the five years 1890-1894.} \end{aligned}$$

$$\begin{aligned} \text{Let } c &= \text{number at 2 years of age.} \\ &= \frac{1}{2} \text{ births 1888} + \text{all births 1889-1892} + \frac{1}{2} \text{ births 1893,} \\ &\quad \text{less } \left\{ \begin{array}{l} \text{deaths at age 0-1 in the five years 1889-1893,} \\ \text{,, ,, 1-2 ,, ,, 1890-1894.} \end{array} \right. \end{aligned}$$

$$\begin{aligned} \text{Let } d &= \text{number at 3 years of age.} \\ &= \frac{1}{2} \text{ births 1887} + \text{all births 1888-1891} + \frac{1}{2} \text{ births 1892,} \\ &\quad \text{less } \left\{ \begin{array}{l} \text{deaths at age 0-1 in the five years 1888-1892,} \\ \text{,, ,, 1-2 ,, ,, 1889-1893,} \\ \text{,, ,, 2-3 ,, ,, 1890-1894.} \end{array} \right. \end{aligned}$$

$$\begin{aligned} \text{Let } e &= \text{number at 4 years of age.} \\ &= \frac{1}{2} \text{ births 1886} + \text{all births 1887-1890} + \frac{1}{2} \text{ births 1891,} \\ &\quad \text{less } \left\{ \begin{array}{l} \text{deaths at age 0-1 in the five years 1887-1891,} \\ \text{,, ,, 1-2 ,, ,, 1888-1892,} \\ \text{,, ,, 2-3 ,, ,, 1889-1893,} \\ \text{,, ,, 3-4 ,, ,, 1890-1894.} \end{array} \right. \end{aligned}$$

In order to obtain from these numbers the sum of the five mid-year or mean population numbers

From a subtract all deaths at age 0-6 months during 1891-1895.

$$\begin{array}{llllll} \text{,, } b & \text{,, } \frac{1}{2} & \text{,, } \text{,, } & \text{1-2 years} & \text{,,} & \text{,,} \\ \text{,, } c & \text{,, } \frac{1}{2} & \text{,, } \text{,, } & \text{2-3} & \text{,,} & \text{,,} \\ \text{,, } d & \text{,, } \frac{1}{2} & \text{,, } \text{,, } & \text{3-4} & \text{,,} & \text{,,} \\ \text{,, } e & \text{,, } \frac{1}{2} & \text{,, } \text{,, } & \text{4-5} & \text{,,} & \text{,,} \end{array}$$

Let the five numbers thus obtained be denoted respectively by n_0, n_1, n_2, n_3 , and n_4 , and let their sum = N . Then N represents the sum of the five mid-year population numbers of those at all ages from birth to age 5. But we have previously obtained from the census data the "years of life," or the total number of those living at ages 0-5, during the five years under consideration. Let this latter number be indicated by C .

Then, theoretically, N and C should correspond. In actual practice they rarely do; but C is taken as a fixed quantity, and divided up into parts, P_0, P_1, P_2, P_3 , and P_4 , which have to C the same proportions that n_0, n_1, n_2, n_3 , and n_4 have to N .

From these values of P_0, P_1 , etc., we can calculate the p_x values. Thus:

$$\begin{aligned} p_0 &= \frac{P_0 - \text{deaths at 6-12 months during 1891-1895}}{P_0 + \text{deaths at 0-6 months during 1891-1895}}; \\ p_1 &= \frac{P_1 - \frac{1}{2} \text{ deaths at 1-2 years during 1891-1895}}{P_1 + \frac{1}{2} \text{ deaths at 1-2 years during 1891-1895}}; \end{aligned}$$

and so on for p_2, p_3, p_4 .

According to this method of calculation the following values were obtained for New Zealand, 1891-1896:

	Males.		Females.
$n_0 =$	43,231	...	42,005
$n_1 =$	41,798	...	40,795
$n_2 =$	41,513	...	40,486
$n_3 =$	41,876	...	40,838
$n_4 =$	42,224	...	41,171
$\therefore N =$	210,642	...	205,295
But $C =$	211,788	...	205,405
Hence $P_0 =$	43,466	...	42,027
$P_1 =$	42,025	...	40,817
$P_2 =$	41,739	...	40,508
$P_3 =$	42,104	...	40,860
$P_4 =$	42,454	...	41,193

These values of P_0, P_1 , etc., are given in the table on p. 28 as the number of lives at risk for each of the first five years of age.

Finally, from these were calculated the following values of p_x :

	Males.		Females.
$p_0 =$	903770	...	921760
$p_1 =$	981960	...	984177
$p_2 =$	992600	...	990479
$p_3 =$	994906	...	994167
$p_4 =$	995347	...	995930

We can now obtain the value of p_x for each year of age, and from this the other columns of the life-table are calculated.

l_x COLUMN.

Taking some arbitrary number of individuals born as the value of l_0 , and multiplying this by the probability of surviving for one year at age 0 (p_0), we obtain the number of survivors at age 1, or l_1 . In turn, this value of l_1 , when multiplied by p_1 , gives l_2 , and so on.

It does not matter what number we begin with, but usually 1,000,000 births are taken and divided into males and females in proportion to the actual number of births of either sex that have occurred during the period under consideration. Thus, in the present life-table 1,000,000 births have been divided into 511,465 male births and 488,535 female births. It is interesting to note that these numbers for either sex correspond closely with those

obtained in other countries. Thus, according to the returns for London, 1891-1900, 1,000,000 births are to be divided into 509,112 males and 490,888 females; for Brighton, 1881-1890, the figures are 511,950 males and 488,050 females.

For purposes of comparison it is usual to construct another series of l_x values, beginning with 100,000 for either sex. This shows the number of survivors at each age in a manner directly suitable for comparison. Both series of l_x values will be found in the table at the end of this section.

d_x COLUMN.

This shows the number of those dying at each year of age out of the arbitrary number of births selected to begin the l_x column. Each d_x value is obtained by simple subtraction: $d_x = l_x - l_{x+1}$.

P_x COLUMN.

This represents the mean number living from age x to age $x+1$ for every year of life except the first. Each P_x value is taken as the *arithmetical mean* of l_x and l_{x+1}

$$\text{or } P_x = \frac{1}{2}(l_x + l_{x+1}).$$

Each P_x value has another significance, for it also represents the years of life lived during the year x to $x+1$ by the number of survivors, l_x , entering upon that year of age. The years of life lived

$$\begin{aligned} &= l_{x+1} + \frac{1}{2}d_x \\ &= l_{x+1} + \frac{1}{2}(l_x - l_{x+1}) \\ &= \frac{1}{2}(l_x + l_{x+1}) \\ &= P_x. \end{aligned}$$

The value of P_0 (= mean population for, or years of life lived in, the first year of age) has been calculated from the formula deduced by Mr. A. C. Waters:

$$P_0 = l_1 + \left(\frac{d_{0 \text{ to } 1} + 5d_{1 \text{ to } 2}}{6} \right)$$

where $d_{0 \text{ to } 1}$ represents the deaths at ages 0-6 months, and
 $d_{1 \text{ to } 2}$ " " " " " " 6-12 months.

For further explanations, see the paper of Dr. Hayward in *Journal of Hygiene*, vol. ii., No. 1.

Q_x COLUMN.

This represents:

1. The complete life-table population at age x and upwards.
2. The years of life lived by l persons of exact age x during the year of age x to $x+1$, and during all the years of age afterwards to the end of the life-table.

Each Q_x value is obtained by simple addition of the P_x values, beginning at the end of the table.

E_x COLUMN.

This represents the expectation of life at each age. It is obtained by dividing the Q_x values by the corresponding l_x values, or

$$E_x = \frac{Q_x}{l_x}.$$

The complete life-table for New Zealand, 1891-1895, is appended to this paper.

DEDUCTIONS FROM LIFE-TABLE.

The figures in each column of the life-table have their own values, but all are not of equal worth, nor is their significance easily appreciated at first sight. Comparison with the corresponding columns of other life-tables is needed before their true importance is recognised.

For this purpose the p_x , l_x , and E_x values are most convenient.

"The p_x Values afford the means of testing the vitality of a community at each age or age-period. They depend neither on antecedent nor on consequent conditions, but simply upon the 'force of mortality' which has prevailed at each special age or age-period.

"The l_x Values.—These depend upon the rates of mortality at preceding age-periods. Thus, high death-rates during the earlier years of life diminish the number of survivors at later ages.

"The E_x Values.—These are affected by the death-rates at all following age-periods.

"Therefore p_x , l_x , and E_x are measures respectively of *present*, *past*, and *future*." *

For purposes of comparison various other life-tables have been consulted. Especially valuable are the table for New Zealand, 1881-1890, by Mr. Leslie ⁽¹⁾, a recent table for New South Wales and Victoria by Messrs. Moors and Day ⁽²⁾, and the still more recent table for London, 1891-1900, by Dr. Shirley Murphy.

COMPARISON OF p_x VALUES.

The following table shows the probability of surviving one year (p_x) at certain ages, according to different life-tables:

* Hayward, *loc. cit.*

Males.

Age.	New Zealand, 1891-1895.	New Zealand, 1881-1890.	Healthy Districts (England), 1881-1890.	N.S.W. and Victoria, 1891.	London, 1891-1900.
0	0.90377	0.90508	0.88085	0.87380	0.81588
5	0.99644	0.99600	0.99444	0.99465	0.99141
10	0.99785	0.99777	0.99793	0.99742	0.99775
15	0.99745	0.99710	0.99724	0.99703	0.99689
20	0.99551	0.99492	0.99582	0.99534	0.99588
25	0.99495	0.99467	0.99459	0.99382	0.99477
35	0.99421	0.99309	0.99262	0.99127	0.98880
45	0.99026	0.98928	0.98953	0.98654	0.98177
55	0.98205	0.98177	0.98239	0.97665	0.96892
65	0.96375	0.96126	0.96293	0.95350	0.94348
75	0.91680	0.91759	0.91122	0.90398	0.88619
85	0.83248	0.81977	0.78421	0.81405	0.78343

Females.

Age.	New Zealand, 1891-1895.	New Zealand, 1881-1890.	Healthy Districts (England), 1881-1890.	N.S.W. and Victoria, 1891.	London, 1891-1900.
0	0.92176	0.91973	0.90650	0.88875	0.84569
5	0.99656	0.99669	0.99484	0.99539	0.99127
10	0.99807	0.99788	0.99763	0.99771	0.99757
15	0.99778	0.99713	0.99670	0.99722	0.99721
20	0.99542	0.99561	0.99536	0.99559	0.99682
25	0.99467	0.99444	0.99438	0.99434	0.99597
35	0.99452	0.99250	0.99270	0.99153	0.99142
45	0.99141	0.99136	0.99110	0.98865	0.98657
55	0.98479	0.98596	0.98499	0.98284	0.97673
65	0.96887	0.96942	0.96725	0.96604	0.95562
75	0.92592	0.92828	0.91980	0.91364	0.90371
85	0.84210	0.82964	0.81185	0.81613	0.80340

This table shows that the probability of surviving one year is markedly greater in New Zealand than in Australia, and greater even than in the specially selected healthy districts of England and Wales. It is interesting to note that the p_x values for New Zealand, 1891-1895, are found slightly greater than those determined for the same country during the years 1881-1890 (Leslie). This is one of the most important uses of a life-table: when compared with a table for the same country in previous years it shows at once the gain or loss.

COMPARISON OF l_x VALUES.

The following table shows the number surviving at certain ages out of 100,000 born in New Zealand, according to the experience of 1891-1895, as contrasted with the results of some other life-tables :

Males.

Age.	New Zealand, 1891-1895.	New Zealand, 1881-1890.	N.S.W. and Victoria, 1891.	England and Wales, 1881-1890.	Brighton, 1881-1890.	London, 1891-1900.
0 ...	100,000	100,000	100,000	100,000	100,000	100,000
5 ...	87,233	87,381	82,419	75,149	75,125	71,898
10 ...	86,001	85,932	80,834	73,348	73,344	70,152
15 ...	85,057	84,975	79,824	72,619	72,501	69,295
20 ...	83,618	83,363	78,383	71,255	71,015	68,072
25 ...	81,592	81,175	76,327	69,381	69,273	66,555
35 ...	77,505	76,548	71,104	63,964	64,090	61,742
45 ...	71,974	70,404	63,835	56,444	56,175	53,471
55 ...	63,295	61,416	53,491	46,298	45,303	42,224
65 ...	48,970	47,060	38,686	32,218	32,455	27,764
75 ...	27,839	27,027	19,548	15,389	16,666	12,199

Females.

Age.	New Zealand, 1891-1895.	New Zealand, 1881-1890.	N.S.W. and Victoria, 1890.	England and Wales, 1881-1890.	Brighton, 1881-1890.	London, 1891-1900.
0 ...	100,000	100,000	100,000	100,000	100,000	100,000
5 ...	88,966	89,094	84,047	78,324	78,546	74,937
10 ...	87,742	87,849	82,578	76,615	76,811	73,050
15 ...	86,906	86,866	81,647	75,906	75,839	72,151
20 ...	85,398	85,359	80,237	74,432	74,733	71,089
25 ...	83,309	83,300	78,291	72,479	73,470	69,876
35 ...	79,094	78,102	73,066	67,099	69,508	65,944
45 ...	73,945	72,070	66,172	60,401	63,475	59,196
55 ...	66,099	64,847	58,027	51,637	54,779	49,722
65 ...	53,415	53,054	45,815	38,550	42,731	36,173
75 ...	33,646	33,745	25,777	20,421	25,080	18,592

This table shows that out of 100,000 born there are more survivors at higher ages in New Zealand than in Australia, and many more than in England and Wales. In correspondence with what was noted for the p_x values, the l_x rates have slightly improved in New Zealand in 1891-1895, as compared with 1881-1890.

COMPARISON OF E_x VALUES.

This is, perhaps, the most popular comparison that can be made of one life-table with others. For, though people may not be much interested in learning their probability of surviving for a year, or the rate at which they have been dying off, they are usually interested in learning how much longer they may expect to live.

The following table gives a comparison of the expectation of life at certain ages, according to the results tabulated in the life-tables mentioned :

Expectation of Life—Males.

Age.	New Zealand, 1891-1895.	New Zealand, 1881-1890.	Healthy Districts (England), 1881-1890.	England and Wales, 1881-1890.	Brighton, 1881-1890.	London, 1891-1900.	Manchester, 1881-1890.
0	55.23	54.44	51.48	43.66	43.59	40.98	34.71
5	58.23	57.16	57.05	52.75	52.87	51.60	45.59
10	54.03	53.09	53.07	49.00	49.12	47.84	42.75
15	49.60	48.66	48.62	44.47	44.67	43.40	38.78
20	45.41	44.55	44.41	40.27	40.55	39.13	34.62
25	41.47	40.68	40.39	36.28	36.51	34.96	30.69
35	33.39	32.82	32.70	28.91	29.02	27.25	23.76
45	25.54	25.23	25.19	22.06	22.36	20.65	17.80
55	18.31	18.15	18.00	15.74	16.48	14.76	12.49
65	12.10	12.04	11.60	10.31	10.96	9.76	8.15
75	7.30	7.16	6.56	6.10	6.64	5.91	5.11

Expectation of Life—Females.

Age.	New Zealand, 1891-1895.	New Zealand, 1881-1890.	Healthy Districts (England), 1881-1890.	England and Wales, 1881-1890.	Brighton, 1881-1890.	London, 1891-1900.	Manchester, 1881-1890.
0	57.79	57.26	54.04	47.18	49.25	45.33	38.44
5	59.87	59.14	58.01	54.92	57.36	55.12	48.06
10	55.67	54.95	54.01	51.10	53.60	51.49	45.43
15	51.19	50.54	49.68	46.55	49.26	47.10	41.50
20	47.04	46.39	45.62	42.42	44.95	42.77	37.33
25	43.16	42.47	41.71	38.50	40.68	38.46	33.38
35	35.19	34.95	34.16	31.16	32.69	30.42	26.30
45	27.27	27.45	26.56	24.05	25.30	23.29	19.79
55	19.87	19.92	19.06	17.23	18.48	16.72	13.91
65	13.31	13.13	12.36	11.26	12.19	11.01	9.11
75	8.03	7.61	7.14	6.68	6.97	6.57	5.76

The above table shows that at all ages the expectation of life is greater in New Zealand than in England, even in its selected healthy parts. Thus, a man aged 25 in New Zealand may expect to live five years longer than a man of the same age in England and Wales, one year longer than a man in the selected healthy districts of England, and no less than ten years longer than a man in Manchester.

It is interesting to determine how much of the total expectation of life at birth is lived at various age-periods of life. For this purpose it is usual to take ages 0-5 as representing infancy, ages 5-15 for school age, ages 15-65 as working period, and ages 65 and upwards as representing the period of decline. Then, by dividing $Q_0 - Q_5$, $Q_5 - Q_{15}$, $Q_{15} - Q_{65}$, and Q_{65} respectively by l_0 , the required values will be obtained.

The following table shows the results for New Zealand as compared with certain other places:

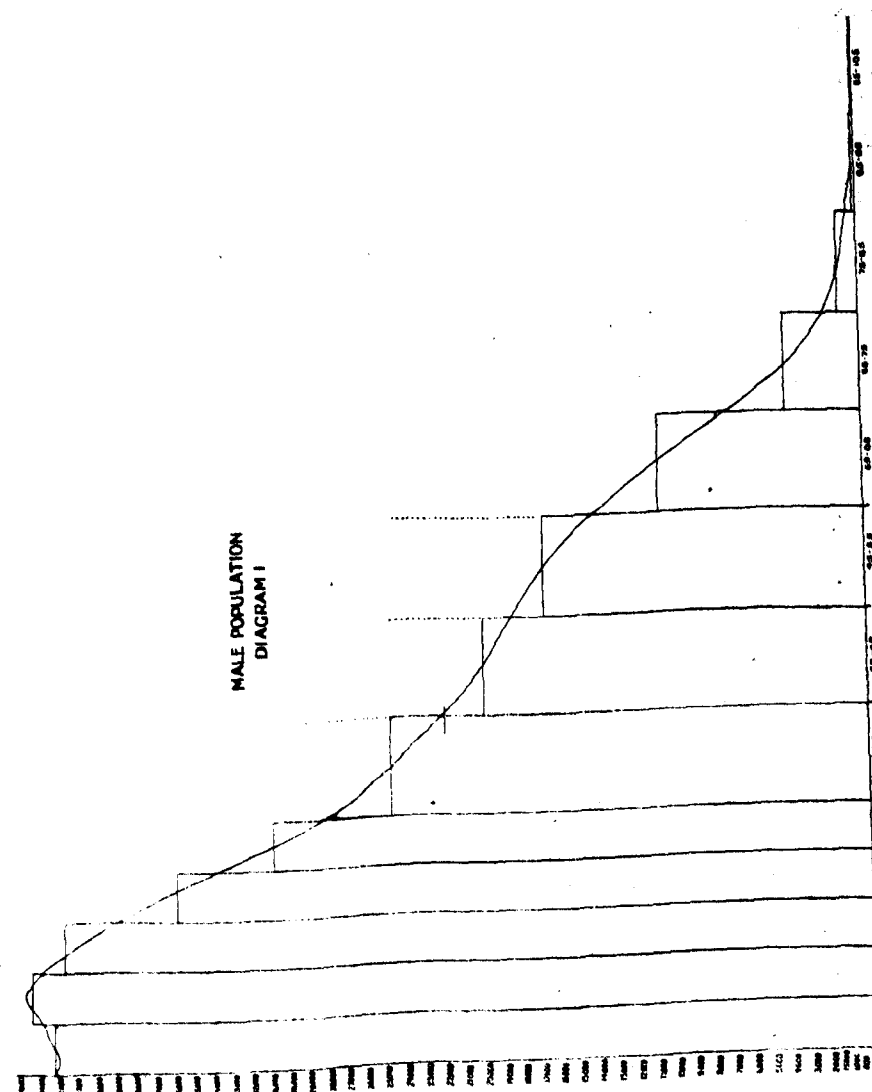
Mean Life-time in Years at Certain Age-periods—Males.

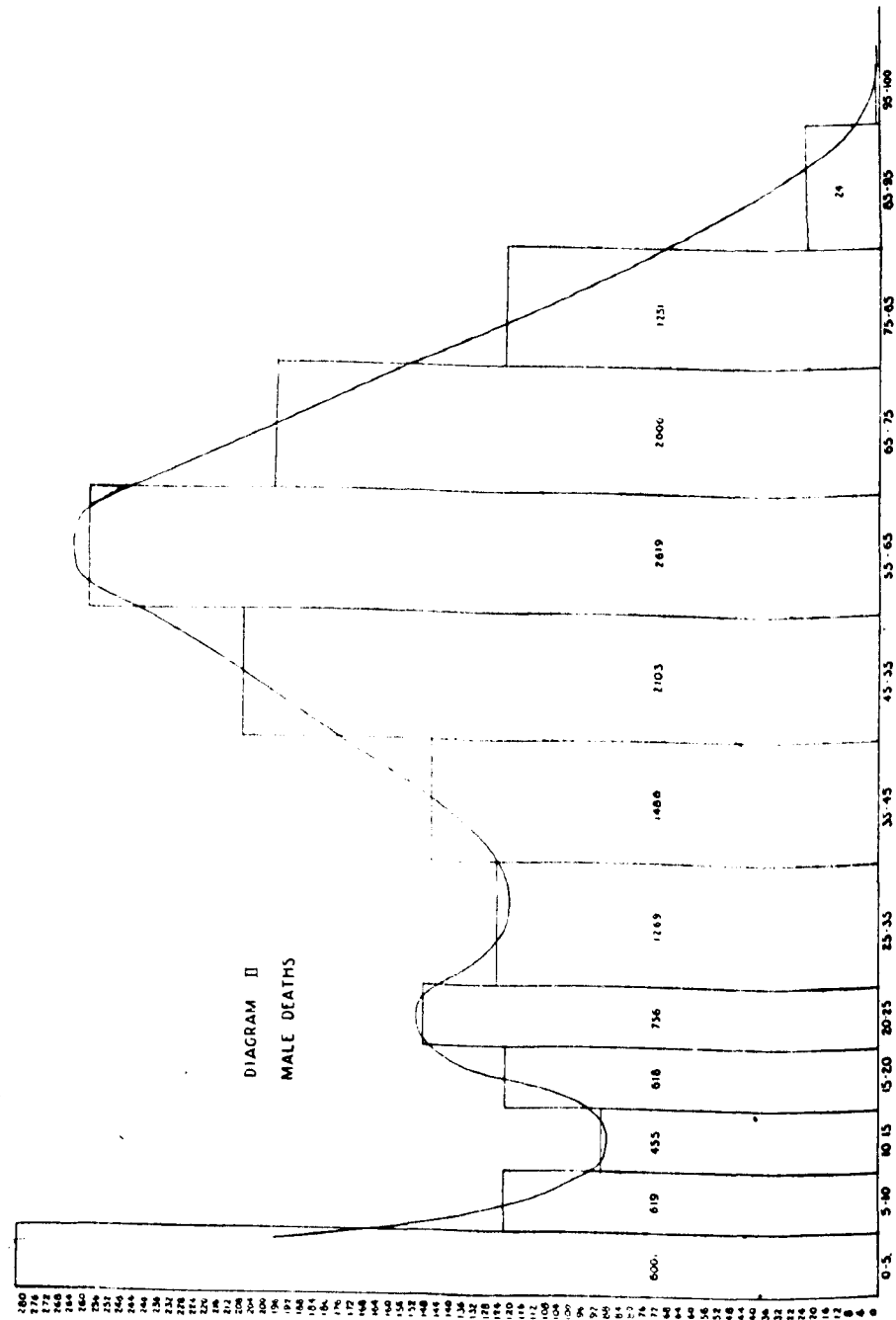
Age-period.	New Zealand, 1891-1895.	England and Wales, 1881-1890.	London, 1891-1900.	Glasgow, 1881-1890.	Manchester, 1881-1890.
Infancy (0-5) ...	4.43	4.02	3.88	3.77	3.76
School age (5-15) ...	8.60	7.35	7.03	6.38	6.50
Working ages (15-65)	36.26	28.97	27.36	23.04	22.98
Decline (65+) ...	5.92	3.32	2.71	1.99	1.47
Total ...	55.21	43.66	40.98	35.18	34.71

Mean Life-time in Years at Certain Age-periods—Females.					
Infancy (0-5) ...	4.52	4.16	4.03	3.92	3.94
School age (5-15) ...	8.78	7.68	7.32	6.72	6.86
Working ages (15-65)	37.37	31.00	30.00	24.35	25.45
Decline (65+) ...	7.11	4.34	3.98	2.71	2.19
Total ...	57.78	47.18	45.33	37.70	38.44

It is evident from this table that the average man in New Zealand works seven years longer than the average man in England, eight years longer than one in London, and thirteen years longer than one in Glasgow or Manchester. The gain to the colony needs no further demonstration.

In the Supplement to the Fifty-Fifth Annual Report of the Registrar-General for England and Wales, Dr. Tatham, in discussing the new life-table for healthy districts, 1881-1890, points out that "the better the health conditions represented by the life-table the less is the increase of the expectation (of life), the sooner is the age of maximum expectation attained, and the sooner, also, is an age reached at which the expectation falls below that at birth."





He illustrates this statement with a table which is here reproduced, supplemented by the results for London, 1891-1900, and New Zealand, 1891-1895. It will be noticed that the New Zealand results conform with the above statement by Dr. Tatham.

Males.

	England and Wales.			Man- chester, 1881- 1890.	Healthy Districts.		London, 1891- 1900.	New Zealand, 1891- 1895.
	1838- 1854.	1871- 1880.	1881- 1890.		1849- 1863.	1881- 1890.		
Expectation of life at birth	39.91	41.35	43.66	28.78	48.56	51.48	40.98	55.23
Age of maximum expectation	4	4	3	4	3	2	3	2
Increase of expectation from birth to age of maximum—in years	9.90	9.66	9.66	12.02	6.28	6.87	11.04	4.97
Ditto—per cent.	24.8	23.4	22.1	41.8	12.9	13.3	26.9	8.99
Year of life during which expectation first falls below that of birth	20th	18th	16th	22nd	14th	12th	18th	9th

Females.

Expectation of life at birth	41.85	44.62	47.18	32.67	49.45	54.04	45.33	57.79
Age of maximum expectation	4	4	3	4	3	2	3 & 4	1
Increase of expectation from birth to age of maximum—per cent.	8.58	8.58	8.28	11.14	4.96	5.32	10.09	3.91
Ditto—per cent.	20.5	19.2	17.6	34.1	10.0	9.8	22.3	6.76
Year of life during which expectation first falls below that of birth	18th	17th	15th	21st	12th	10th	18th	8th

Diagram III. shows in a graphic manner the expectation of life in New Zealand as compared with that in London, 1891-1900, and that in Manchester, 1881-1890.

Numerous other deductions might be made from the life-table, but enough have been given to show the superiority of the New Zealand results.

REFERENCES.

¹ LESLIE: "Rates of Mortality in New Zealand," by George Leslie, Assistant Actuary, New Zealand Government Life Insurance Department. Published in the *New Zealand Journal of Insurance, Mining, and Finance*, September and November, 1895. (This includes a life-table for New Zealand, 1881-1890.)

² MOORS AND DAY: "On the Rates of Mortality in New South Wales and Victoria, and the Construction of a Mortality Table from a Single Census, and the Deaths in the Years adjacent thereto," by E. M. Moors, M.A., and W. R. Day, F.I.A., *Journal of Institute of Actuaries*, July, 1901.

Life-Table for New Zealand, 1891-1895—Males.

Age.	Dying in each Year of Age.	Born and Surviving at each Age.	Population or Years of Life lived in each Year of Age.	Population or Years of Life lived in and above each Year of Age.	Expecta- tion of Life at each Age.
<i>x.</i>	<i>d_x.</i>	<i>l_x.</i>	<i>P_x.</i>	<i>Q_x.</i>	<i>E_x.</i>
0	49,219	511,465	463,724	28,251,672	55·236
1	8,338	462,246	458,077	27,787,948	60·11
2	3,359	453,908	452,228	27,329,871	60·20
3	2,295	450,549	449,401	26,877,643	59·65
4	2,086	448,254	447,211	26,428,242	58·95
5	1,586	446,168	445,375	25,981,031	58·23
6	1,384	444,582	443,890	25,535,656	57·43
7	1,221	443,198	442,587	25,091,766	56·61
8	1,093	441,977	441,430	24,649,179	55·76
9	1,016	440,884	440,376	24,207,749	54·90
10	945	439,868	439,395	23,767,373	54·03
11	936	438,923	438,455	23,327,978	53·14
12	952	437,987	437,511	22,889,523	52·25
13	972	437,035	436,549	22,452,012	51·37
14	1,026	436,063	435,550	22,015,463	50·48
15	1,107	435,037	434,483	21,579,913	49·60
16	1,249	433,930	433,305	21,145,430	48·72
17	1,514	432,681	431,924	20,712,125	47·86
18	1,685	431,167	430,324	20,280,201	47·03
19	1,801	429,482	428,581	19,849,877	46·21
20	1,918	427,681	426,722	19,421,296	45·41
21	2,011	425,763	424,757	18,994,574	44·61
22	2,101	423,752	422,701	18,569,817	43·82
23	2,160	421,651	420,571	18,147,116	43·03
24	2,172	419,491	418,405	17,726,545	42·25
25	2,107	417,319	416,265	17,308,140	41·47
26	2,071	415,212	414,176	16,891,875	40·68
27	2,036	413,141	412,123	16,477,699	39·88
28	2,030	411,105	410,090	16,065,576	39·07
29	2,036	409,075	408,057	15,655,486	38·26
30	2,055	407,039	406,011	15,247,429	37·45
31	2,089	404,984	403,939	14,841,418	36·64
32	2,122	402,895	401,834	14,437,479	35·83
33	2,156	400,773	399,695	14,035,645	35·01
34	2,205	398,617	397,514	13,635,950	34·20
35	2,292	396,412	395,266	13,238,436	33·39
36	2,381	394,120	392,929	12,843,170	32·58
37	2,480	391,739	390,499	12,450,241	31·78
38	2,587	389,259	387,965	12,059,742	30·97
39	2,743	386,672	385,305	11,671,777	30·18
40	2,856	383,939	382,511	11,286,472	29·39
41	3,013	381,083	379,576	10,903,961	28·61
42	3,171	378,070	376,484	10,524,385	27·83
43	3,303	374,899	373,247	10,147,901	27·06
44	3,472	371,596	369,860	9,774,654	26·30
45	3,584	368,124	366,332	9,404,794	25·54
46	3,777	364,540	362,651	9,038,462	24·79
47	3,964	360,763	358,781	8,675,811	24·04
48	4,101	356,799	354,748	8,317,030	23·30
49	4,319	352,698	350,538	7,962,282	22·57
50	4,495	348,379	346,131	7,611,744	21·84
51	4,675	343,884	341,546	7,265,613	21·12

Life-Table for New Zealand, 1891-1895—Males (continued).

Age.	Dying in each Year of Age.	Born and Surviving at each Age.	Population or Years of Life lived in each Year of Age.	Population or Years of Life lived in and above each Year of Age.	Expecta- tion of Life at each Age.
<i>x.</i>	<i>d_x.</i>	<i>l_x.</i>	<i>P_x.</i>	<i>Q_x.</i>	<i>E_x.</i>
52	4,932	339,209	336,743	6,924,067	20·41
53	5,119	334,277	331,717	6,587,324	19·70
54	5,425	329,158	326,445	6,255,607	19·00
55	5,810	323,733	320,828	5,929,162	18·31
56	6,248	317,923	314,799	5,608,334	17·64
57	6,565	311,675	308,392	5,293,535	16·98
58	6,856	305,110	301,682	4,985,143	16·33
59	7,089	298,254	294,709	4,683,461	15·70
60	7,379	291,165	287,475	4,388,752	15·07
61	7,777	283,786	279,897	4,101,277	14·45
62	8,188	276,009	271,915	3,821,380	13·84
63	8,513	267,821	263,564	3,549,465	13·25
64	8,843	259,308	254,886	3,285,901	12·67
65	9,078	250,465	245,926	3,031,015	12·10
66	9,471	241,387	236,651	2,785,089	11·53
67	9,962	231,916	226,935	2,548,438	10·98
68	10,489	221,954	216,709	2,321,503	10·45
69	10,999	211,465	205,965	2,104,794	9·95
70	11,217	200,466	194,857	1,898,829	9·47
71	11,492	189,249	183,502	1,703,972	9·00
72	11,650	177,756	171,931	1,520,470	8·55
73	11,805	166,106	160,203	1,348,539	8·11
74	11,912	154,301	148,345	1,188,336	7·70
75	11,847	142,389	136,465	1,039,991	7·30
76	11,536	130,542	124,774	903,526	6·92
77	11,135	119,006	113,438	778,752	6·54
78	10,726	107,871	102,508	665,314	6·16
79	10,454	97,145	91,918	562,806	5·79
80	10,078	86,691	81,652	470,888	5·43
81	9,458	76,613	71,884	389,236	5·08
82	8,787	67,155	62,761	317,352	4·72
83	7,898	58,368	54,419	254,591	4·36
84	7,560	50,470	46,690	200,172	3·96
85	7,188	42,910	39,316	153,482	3·57
86	7,024	35,722	32,210	114,166	3·19
87	6,845	28,698	25,275	81,956	2·85
88	6,127	21,853	18,789	56,681	2·59
89	4,819	15,726	13,316	37,892	2·40
90	3,491	10,907	9,161	24,576	2·25
91	2,522	7,416	6,155	15,415	2·07
92	1,806	4,894	3,991	9,260	1·89
93	1,164	3,088	2,506	5,269	1·70
94	837	1,924	1,505	2,763	1·43
95	609	1,087	782	1,258	1·15
96	319	478	318	476	0·994
97	106	159	106	158	0·990
98	35	53·184	35·45	52·496	0·987
99	11	17·728	11·81	17·046	0·961
100	3	5·9093	3·93	5·236	0·886
101	1	1·9697	1·306	—	—
102	—	0·65659	—	—	—

Life-Table for New Zealand, 1891-1895—Females.

Age.	Dying in each Year of Age.	Born and Surviving at each Age.	Population or Years of Life lived in each Year of Age.	Population or Years of Life lived in and above each Year of Age.	Expectation of Life at each Age.
<i>x.</i>	<i>d_x</i>	<i>l_x</i>	<i>P_x</i>	<i>Q_x</i>	<i>E_x</i>
0	38,223	488,535	451,477	28,236,495	57.798
1	7,126	450,312	446,749	27,785,018	61.701
2	4,219	443,186	441,076	27,338,269	61.685
3	2,560	438,967	437,687	26,897,193	61.273
5	1,776	436,407	435,519	26,459,506	60.629
4	1,494	434,631	433,884	26,023,987	59.873
6	1,341	433,137	432,466	25,590,103	59.080
7	1,192	431,796	431,200	25,157,637	58.261
8	1,040	430,604	430,084	24,726,437	57.421
9	911	429,564	429,108	24,296,353	56.559
10	824	428,653	428,241	23,867,245	55.679
11	795	427,829	427,431	23,439,004	54.785
12	802	427,034	426,633	23,011,573	53.885
13	813	426,232	425,825	22,584,940	52.985
14	850	425,419	424,994	22,159,115	52.087
15	941	424,569	424,098	21,734,121	51.190
16	1,272	423,628	422,992	21,310,023	50.303
17	1,609	422,356	421,551	20,887,031	49.453
18	1,725	420,747	419,884	20,465,480	48.639
19	1,823	419,022	418,110	20,045,596	47.837
20	1,910	417,199	416,244	19,627,486	47.044
21	1,985	415,289	414,296	19,211,242	46.259
22	2,047	413,304	412,280	18,796,946	45.477
23	2,108	411,257	410,203	18,384,666	44.701
24	2,154	409,149	408,072	17,974,463	43.930
25	2,166	406,995	405,912	17,566,391	43.160
26	2,151	404,829	403,753	17,160,479	42.388
27	2,112	402,678	401,622	16,756,726	41.611
28	2,042	400,566	399,545	16,355,104	40.829
29	2,017	398,524	397,515	15,955,559	40.035
30	2,008	396,507	395,503	15,558,044	39.237
31	2,009	394,499	393,494	15,162,541	38.433
32	1,998	392,490	391,491	14,769,047	37.628
33	2,027	390,492	389,478	14,377,556	36.817
34	2,063	388,465	387,433	13,988,078	36.008
35	2,114	386,402	385,345	13,600,645	35.196
36	2,184	384,288	383,196	13,215,300	34.388
37	2,273	382,104	380,967	12,832,104	33.582
38	2,343	379,831	378,659	12,451,137	32.780
39	2,449	377,488	376,263	12,072,478	31.979
40	2,554	375,039	373,762	11,696,215	31.186
41	2,642	372,485	371,164	11,322,453	30.395
42	2,764	369,843	368,461	10,951,289	29.609
43	2,861	367,079	365,648	10,582,828	28.827
44	2,968	364,218	362,734	10,217,180	28.051
45	3,102	361,250	359,699	9,854,446	27.278
46	3,252	358,148	356,522	9,494,747	26.510
47	3,413	354,896	353,189	9,138,225	25.748
48	3,520	351,483	349,723	8,785,036	24.994
49	3,700	347,963	346,113	8,435,313	24.241
50	3,837	344,263	342,344	8,089,200	23.497
51	4,061	340,426	338,395	7,746,856	22.756

Life-Table for New Zealand, 1891-1895—Females (continued).

Age.	Dying in each Year of Age.	Born and Surviving at each Age.	Population or Years of Life lived in each Year of Age.	Population or Years of Life lived in and above each Year of Age.	Expectation of Life at each Age.
<i>x.</i>	<i>d_x</i>	<i>l_x</i>	<i>P_x</i>	<i>Q_x</i>	<i>E_x</i>
52	4,251	336,365	334,239	7,408,461	22.024
53	4,487	332,114	329,870	7,074,222	21.300
54	4,710	327,627	325,272	6,744,352	20.585
55	4,911	322,917	320,461	6,419,080	19.878
56	5,156	318,006	315,428	6,098,619	19.177
57	5,370	312,850	310,165	5,783,191	18.485
58	5,689	307,480	304,635	5,473,026	17.799
59	5,907	301,791	298,837	5,168,391	17.125
60	6,201	295,884	292,783	4,869,554	16.457
61	6,659	289,683	286,353	4,576,771	15.798
62	7,018	283,024	279,515	4,290,418	15.159
63	7,306	276,006	272,353	4,010,903	14.531
64	7,746	268,700	264,827	3,738,550	13.913
65	8,124	260,954	256,892	3,473,723	13.311
66	8,481	252,830	248,589	3,216,831	12.723
67	8,900	244,349	239,899	2,968,242	12.147
68	9,395	235,449	230,751	2,728,343	11.587
69	9,615	226,054	221,246	2,497,592	11.048
70	9,901	216,439	211,488	2,276,346	10.517
71	10,075	206,538	201,500	2,064,858	9.997
72	10,237	196,463	191,344	1,863,358	9.484
73	10,556	186,226	180,948	1,672,014	8.978
74	11,298	175,670	170,021	1,491,066	8.487
75	12,176	164,372	158,284	1,321,045	8.036
76	11,707	152,196	146,342	1,162,761	7.639
77	11,479	140,489	134,749	1,016,419	7.234
78	11,087	129,010	123,466	881,670	6.834
79	10,857	117,923	112,494	758,204	6.429
80	10,452	107,066	101,840	645,710	6.030
81	10,425	96,614	91,401	543,870	5.629
82	9,928	86,189	81,225	452,469	5.249
83	10,056	76,261	71,233	371,244	4.867
84	9,198	66,205	61,606	300,011	4.531
85	9,001	57,007	52,506	238,405	4.181
86	8,033	48,006	43,989	185,899	3.872
87	7,268	39,973	36,339	141,910	3.550
88	7,016	32,705	29,197	105,571	3.227
89	6,018	25,689	22,680	76,374	2.973
90	5,050	19,671	17,146	53,694	2.729
91	4,355	14,621	12,443	36,548	2.499
92	3,343	10,266	8,594	24,105	2.347
93	2,380	6,923	5,733	15,511	2.240
94	1,580	4,543	3,753	9,778	2.151
95	1,111	2,963	2,407	6,025	2.033
96	705.55	1,852.07	1,499.295	3,618.979	1.953
97	458.60	1,146.52	917.216	2,119.684	1.848
98	275.266	687.913	550.330	1,202.468	1.747
99	165.099	412.747	330.197	652.138	1.579
100	99.059	247.648	198.118	321.941	1.299
101	99.060	148.589	99.059	123.823	0.8333
102	49.529	49.5292	24.764	—	—

Values of p_x and l_x for 100,000 born—Males and Females.

Age.	Probability of Living one Year from each Age.		Of 100,000 born, the Number Surviving at each Age.	
	p_x		l_x	
x	Males.	Females.	Males.	Females.
0	0.903770	0.921760	100,000	100,000
1	0.981960	0.984177	90,377	92,176
2	0.992600	0.990479	88,746	90,717
3	0.994906	0.994167	88,089	89,853
4	0.995347	0.995930	87,641	89,329
5	0.99644	0.99656	87,233	88,966
6	0.99688	0.99690	86,923	88,660
7	0.99724	0.99723	86,652	88,385
8	0.99752	0.99758	86,414	88,141
9	0.99769	0.99787	86,200	87,929
10	0.99785	0.99807	86,001	87,742
11	0.99786	0.99814	85,816	87,574
12	0.99782	0.99812	85,633	87,411
13	0.99777	0.99809	85,447	87,247
14	0.99764	0.99800	85,257	87,080
15	0.99745	0.99778	85,057	86,906
16	0.99712	0.99699	84,840	86,713
17	0.99649	0.99619	84,596	86,453
18	0.99609	0.99589	84,300	86,124
19	0.99580	0.99565	83,971	85,771
20	0.99551	0.99542	83,618	85,398
21	0.99527	0.99522	83,243	85,007
22	0.99504	0.99504	82,850	84,600
23	0.99487	0.99487	82,439	84,181
24	0.99482	0.99473	82,017	83,750
25	0.99495	0.99467	81,592	83,309
26	0.99501	0.99468	81,180	82,866
27	0.99507	0.99475	80,776	82,425
28	0.99506	0.99490	80,377	81,993
29	0.99502	0.99493	79,981	81,575
30	0.99495	0.99493	79,583	81,162
31	0.99484	0.99490	79,181	80,751
32	0.99473	0.99490	78,772	80,340
33	0.99462	0.99480	78,357	79,931
34	0.99446	0.99469	77,936	79,516
35	0.99421	0.99452	77,505	79,094
36	0.99395	0.99431	77,057	78,661
37	0.99366	0.99405	76,591	78,214
38	0.99335	0.99383	76,106	77,749
39	0.99293	0.99351	75,600	77,269
40	0.99256	0.99319	75,066	76,768
41	0.99209	0.99290	74,508	76,245
42	0.99161	0.99252	73,919	75,704
43	0.99119	0.99220	73,299	75,138
44	0.99065	0.99185	72,653	74,553
45	0.99026	0.99141	71,974	73,945
46	0.98963	0.99092	71,273	73,310
47	0.98901	0.99038	70,535	72,645
48	0.98850	0.98998	69,760	71,946
49	0.98775	0.98936	68,958	71,225
50	0.98709	0.98885	68,114	70,468
51	0.98640	0.98807	67,235	69,683

Values of p_x and l_x for 100,000 born—Males and Females (continued).

Age.	Probability of Living one Year from each Age.		Of 100,000 born, the Number Surviving at each Age.	
	p_x		l_x	
x	Males.	Females.	Males.	Females.
52	0.98546	0.98736	66,321	68,851
53	0.98468	0.98648	65,356	67,981
54	0.98351	0.98562	64,356	67,063
55	0.98205	0.98479	63,295	66,099
56	0.98034	0.98378	62,159	65,093
57	0.97893	0.98283	60,937	64,038
58	0.97753	0.98149	59,654	62,939
59	0.97623	0.98042	58,313	61,774
60	0.97465	0.97904	56,927	60,565
61	0.97259	0.97701	55,484	59,296
62	0.97033	0.97520	53,964	57,933
63	0.96821	0.97352	52,363	56,496
64	0.96589	0.97117	50,699	55,001
65	0.96375	0.96887	48,970	53,415
66	0.96076	0.96645	47,195	51,752
67	0.95704	0.96357	45,343	50,016
68	0.95274	0.96009	43,395	48,195
69	0.94798	0.95746	41,345	46,271
70	0.94404	0.95425	39,194	44,303
71	0.93927	0.95121	37,001	42,277
72	0.93445	0.94789	34,754	40,214
73	0.92893	0.94332	32,476	38,119
74	0.92279	0.93568	30,168	35,958
75	0.91680	0.92592	27,839	33,646
76	0.91162	0.92307	25,523	31,153
77	0.90643	0.91829	23,267	28,757
78	0.90056	0.91406	21,090	26,407
79	0.89239	0.90793	18,993	24,138
80	0.88374	0.90237	16,949	21,915
81	0.87654	0.89209	14,979	19,776
82	0.86915	0.88481	13,129	17,642
83	0.86468	0.86813	11,411	15,610
84	0.85020	0.86107	9,867	13,551
85	0.83248	0.84210	8,389	11,669
86	0.80338	0.83266	6,984	9,826
87	0.76146	0.81818	5,611	8,182
88	0.71962	0.78546	4,272	6,694
89	0.69354	0.76576	3,074	5,258
90	0.68000	0.74328	2,132	4,026
91	0.65986	0.70212	1,450	2,992
92	0.63106	0.67441	956.8	2,101
93	0.62318	0.65625	603.8	1,417
94	0.56521	0.65217	376.3	930
95	0.44000	0.62500	212.6	606.5
96	0.33333	0.61904	93.58	379.1
97	0.33333	0.60000	31.19	234.6
98	0.33333	0.60000	10.39	140.8
99	0.33333	0.60000	3.466	84.48
100	0.33333	0.60000	1.155	40.26
101	0.33333	0.33333	0.385	30.41
102	—	—	—	10.13

THE ESTIMATION OF INTERCENSAL POPULATIONS.*

By J. SPOTTISWOODE CAMERON, M.D., B.Sc.,

Medical Officer of Health for the City of Leeds.

We have been fortunate in Leeds in having been able to obtain for each intercept† three populations—namely, those for the census periods of 1881, 1891, and 1901, and to calculate by the method of interpolation approximate populations for the middles of the intermediate years.

This method has advantages over either dividing the differences equally, or estimating the populations in the later period as though they had increased at geometrical progression to the population enumerated at the last census. Both methods are open to fallacies, and during the autumn, since the earlier portion of this report was printed, I suggested to my friend Mr. Smith, of Pudsey, who was working at the subject of public health with me at the time, that he should average the results obtained by the methods of interpolation and geometrical progression, and use these figures, after certain corrections, for the accepted intercept populations for the middles of the intermediate years. This, with a large amount of labour, he has been kind enough to do, and I have already referred to and used some of his results.

A few words of explanation may, perhaps, be advisable for the sake of any who are not familiar with the processes used. By the method of geometrical progression it is, of course, understood that the population is supposed to increase from one census to the other at compound interest, the earlier population being looked upon as the principal, the latter as the amount. It is quite easy by the use of logarithms to obtain the rate at which the increase per annum would have taken place, and to assign to any particular period the amount which the population of a district should have reached at that date. This method supposes that the rate of progress has been uniform during the ten years.

In a district, however, in which the population has been increas-

* From Supplement to Annual Report.

† *Intercepts of City Wards in Leeds Union Divisions.*—In these several divisions the subdistricts are cut into by the wards, so that portions of one ward are sometimes in several subdistricts, and even townships are not confined entirely to wards. The township of Leeds, for instance, is divided into three subdistricts, of which the North contains portions of the North Ward, North-East Ward, and Central Ward. Such portions I have for convenience called "intercepts."

ing less rapidly during the 1891-1901 intercensal period than during the 1881-1891 period, it is probable that the increase during the earlier years has been at a greater rate than during the later ones. This is probably what really occurred in the population for the whole city. The rate of increase in Leeds during the 1871-1881 decade, supposing it to be uniform, would be at the rate of about 1.78 per cent. per annum. The rate of increase of the whole population of Leeds between the 1881-1891 censuses was similarly approximately at the rate of 1.75 per cent. per annum, while the population enumerated in 1901, regarded as having increased at uniform geometrical progression from that of 1891, would have necessitated that the annual increase should have been at the rate of a little under 1.56 per cent. Regarding these three periods as three periods with separate rates of increase—1.78, 1.75, 1.56 per cent.—it will be seen that these rates were diminishing, and that the curve describing the populations of each year estimated for the several decades at these three rates of increase would have cusps or points at the censal periods.

THE INTERPOLATION OF POPULATIONS BY THE METHOD OF DIFFERENCES.

If it be supposed that the change from 1.78 to 1.75, and from 1.75 to 1.56, in the rate of annual increase were coming about in a somewhat regular manner, it is possible to restate the population for the intermediate years in such a way that the curve of estimated populations should have a more uniform course. The method usually adopted—I believe at the suggestion of Mr. Noel Humphries, of the Registrar-General's office—is to establish three columns of differences.

The logarithms of the populations for the middles of 1881, 1891, and 1901 are written in the right-hand column, space being left between them for those of the intermediate years. Two other logarithms are found by a simple formula; one is placed in the first, one in the second column.* The logarithm just placed in

* The formulæ for obtaining the logarithms which are to head respectively the first and the second column, and which for convenience may be called (a) and (b), are as follows:

$$100 (a) = (\log. \text{pop. } 1901 - 2 \log. \text{pop. } 1891 + \log. \text{pop. } 1881).$$

$$10 (b) = (\log. \text{pop. } 1891 - \log. \text{pop. } 1881) - 45 (a).$$

These formulæ will hold good for any three periods ten years apart, whether 1881, 1891, and 1901 as above, or 1871, 1881, and 1891, and the interpolated populations for the intervening years will, of course, be for those years at the same time of the year as the known populations refer to. Understanding by (a) and (b), therefore, the numbers found by these formulæ, and where the known populations are ten years apart, the population for any intermediate year may

the second or middle column is then added to the first logarithm in the right-hand column, and gives the logarithm of the population for the middle of 1882. This logarithm is then written under that for 1881, and is that of the first of the interpolated populations. The logarithm in the first or left-hand column is then added (algebraically) to the logarithm in the second column, and their sum written immediately below. This new logarithm is now added to the logarithm in the third column, which we said was the logarithm of the population for 1882. The result is the logarithm of the population for 1883, which is now written in the third line of the third column.

In the same way the logarithm in the first column is always added to the last line in the second column, and that line then added to the line corresponding to it in the third, and so on until the amount in the tenth line of the second column when added to the tenth line of the third will give the logarithm that we have already written in the eleventh line of the right-hand column; and similarly for the second decade, the logarithm of the twentieth line in the middle column added to the logarithm in the twentieth line of the right-hand column should produce the logarithm already written in the twenty-first line of the right-hand column. It will be noticed that any particular logarithm in the right-hand column—say the eleventh—will consist of the original number at the top of that column plus (say) 10 times the number written in the second column, plus (say) $10 \times 9 \div 2$ times the number in the first column, the co-efficients of the quantities heading the first and second columns being for any particular line in the series, the second and third of the co-efficients of the expansion of the binomial for the power

be found from the binomial co-efficient as described in the text. For instance, the population for the year 1892, using the formulæ above, would be:

$$\begin{aligned}\text{Log. pop. 1892} &= \text{log. pop. 1881} + 11 (b) + 55 (a). \\ \text{But log. pop. 1891} &= \text{log. pop. 1881} + 10 (b) + 45 (a). \\ \therefore \text{log. pop. 1892} &= \text{log. pop. 1891} + (b) + 10 (a).\end{aligned}$$

If it be desired to get the populations for each quarter of each year of the decade, they can be obtained from the census population with a slightly altered formula—namely:

$$\begin{aligned}1,800 (a) &= \text{log. pop. 1901} - 2 \text{log. pop. 1891} + \text{log. 1881}. \\ 40 (b) &= \text{log. pop. 1891} - \text{log. pop. 1881} - 3,160 (a).\end{aligned}$$

From these formulæ the populations, say, for the end of the second quarter—i.e., the middle—of 1891 can be found thus:

$$\begin{aligned}\text{Log. pop. 1891 (mid.)} &= \text{log. pop. 1881 (cens.)} + 41 (b) + 820 (a). \\ \text{But log. pop. 1891 (cens.)} &= \text{log. pop. 1881 (cens.)} + 40 (b) + 780 (a). \\ \therefore \text{log. pop. 1891 (mid.)} &= \text{log. pop. 1891 (cens.)} + (b) + 40 (a).\end{aligned}$$

This method of getting the mid-year populations involves some very long logarithms, and the shorter method I have employed is described in the text and the foot-note on p. 89.

corresponding to the number of the line above. Thus, to take another example, the co-efficients of (b) and (a) respectively for the twenty-first line will be 20 and $20 \times 19 \div 2$.

DISADVANTAGES OF THE METHOD.

It is by no means certain that the changes in the rates of increase or decrease of population have been made at all uniformly, and strange results are occasionally obtained by this method when relied upon alone. For instance, the intercept of the North-East Ward in the Potternewton township had a population of 102 at the 1881 census, of 179 at the 1891 census, and of 6,210 at that of 1901. If the curve of population be obtained by interpolation, the population for 1882 would be actually less than that for 1881, and would continue to decrease to 1884, after which it would increase, until in 1889 it had exceeded that of 1881, whence it would rise with a rapidly ascending curve through the census figure of 1891, and reach 6,210 in 1901. This is obviously incorrect, as there is no reason to suppose that the population in this part of the town actually decreased between 1881 and 1891. It was probably nearly stationary, though slightly increasing during that period. So far as the interpolation populations between 1891 and 1901 are concerned, they are not much affected by this comet-like orbit, but on the whole I thought it safer in dealing with intercepts to equalize this irregularity by combining the geometrical estimates with those by interpolation. In dealing with the whole city this difficulty is not likely to occur. Intercepts alter in population, as in the one instanced, by the sudden opening out of land for building purposes and the migration to the area of families from other parts of the town.

COMPARISONS OF ESTIMATED POPULATIONS FOR THE CITY FROM 1890-1901.

On the annexed table will be found populations for the city as a whole arrived at in three different ways. In the second column populations have been estimated as if they had increased at compound interest at a rate calculated from the actual populations at the census of 1881 and that of 1891. The census is taken at the end of the first quarter of the year. The populations were estimated to the middles of the years named in the first column. The supposition on which these estimates were made was, of course, that the population went on increasing during these years at a uniform rate of compound interest obtained by the comparison of these two populations. The estimate of the population for the date of the

1901 census upon this calculation would have been 486,919, but the actual population enumerated was only 428,968.

Table showing Mid-Year Population of Leeds from 1890-1901, estimated in Three Ways, and giving Factors for Correcting Rates as given in the Annual Reports from 1891-1900, to Rates upon the Population estimated by the Two Other Methods.

Year.	Population calculated by Geometrical Progression at Rate of Increase between 1881-1891 (see Table D, Part II.)	Population calculated by Geometrical Progression at Rate of Increase between 1891-1901.	Populations interpolated according to Changing Rates between 1881-1891 and 1891-1901.	Factors to Correct Rates, calculated on the Populations given in Column 2 to Rates on the Corresponding Populations—	
				In Column 3.	In Column 4.
1	2	3	4	5	6
1890 ...	862,768	868,264	868,079	—	0.999102
1891 ..	869,099	868,929	869,084	1.000458	1.000175
1892 ...	875,540	874,678	875,061	1.002298	1.001220
1893 ...	882,094	880,517	881,157	1.004140	1.002456
1894 ...	888,761	886,448	887,259	1.005987	1.003879
1895 ...	895,546	892,470	893,887	1.007888	1.0054907
1896 ...	402,449	398,587	399,535	1.009688	1.0072982
1897 ...	409,472	404,799	405,716	1.011544	1.0092884
1898 ...	416,618	411,108	411,895	1.013404	1.011467
1899 ...	423,889	417,514	418,101	1.015267	1.013842
1900 ...	431,287	424,021	424,322	1.017188	1.0164125
1901 ...	486,918*	480,680	480,555	1.019080	1.019178

In the third column the same method of computation is employed, but the rate of increase is obtained from a comparison of the populations at the censuses in 1891 and 1901, the increase each year, if regarded as uniform, having been, as already stated, at a rate a little less than 1.56 per cent. This method of assuming the population as having grown at a rate obtained from the known results of the censuses near the beginning and the end of a period is probably not very far from correct; but as the rate calculated in the same way for the preceding decade was higher, it is probable that the populations in the earlier years will be a little under- and those in the later years a little overestimated. The error, however, is probably in no case very great. Assuming for the moment that these populations were approximately correct, then the birth and death rates, which were published in the annual reports during the decade, would require to be multiplied in each case by the figure which I have given in the corresponding line of column 5, and

* Used only in earlier reports for 1901.

which have been obtained by dividing the numbers in column 2 by those in column 3.

In the fourth column are given the populations for the several years estimated by the method of interpolation already described, and the last column gives the factors for correcting rates obtained from the populations in the second column, so as to make them correspond to the rates which would have been published had we known and used the populations now printed in the fourth column. Some of the fallacies about the calculation of populations by the method of interpolation have been already mentioned.

It will be noticed that the difference between the factors given in the fifth and sixth columns is in no case very great, and if the corresponding factors in any particular year be divided one by the other, the resulting factor will generally be so small as not to affect the death-rate from all causes in the first place of decimals.

HOW THE MID-YEAR POPULATIONS HAVE BEEN ARRIVED AT.

The method given above presupposed that the populations for the middle of the years 1881, 1891, and 1901 are known. It may be worth while putting on record the method by which these mid-year populations were found. As already said, the census population is taken at the end of the first quarter. The census populations for 1871, 1881, and 1891 were treated by the method of differences already explained, and the corresponding figures for the same time-periods for 1880 and 1882 were obtained from them. With these three data—the populations for the end of the first quarter of 1880, 1881, and 1882—populations were next found by the method of differences for the intermediate quarter periods, including, therefore, that for the middle of 1881.*

In the same way, from the census populations of 1881, 1891, and

* Using again (a) and (b) to represent the head-lines of the first and second columns in the tabulations by the method of difference, the formulæ become:

$$16(a) = (\log. \text{pop. } 1882 - 2 \log. \text{pop. } 1881 + \log. \text{pop. } 1880).$$

$$4(b) = (\log. \text{pop. } 1881 - \log. \text{pop. } 1880) - 6(a).$$

The several population logarithms are those found for the ends of the first quarter of the years named. To find the intermediate populations it must be remembered that we write the logarithms of the census period populations for 1880, 1881, and 1882 in the third column, leaving three blank lines between each for the logarithms to be found of the populations for the ends of the second, third, and fourth quarters of 1880 and 1881. The logarithm of the population for 1881 (middle) will therefore fall on the sixth line of the third column. The co-efficients of the second and third terms of the expansion of a binomial to the fifth power are 5 and 10, and to the fourth power 4 and 6.

$$\text{Hence } \log. \text{pop. } 1881 (\text{mid.}) = \log. \text{pop. } 1880 (\text{cens.}) + 5(b) + 10(a).$$

$$\text{But } \log. \text{pop. } 1881 (\text{cens.}) = \log. \text{pop. } 1880 (\text{cens.}) + 4(b) + 6(a).$$

$$\text{Hence } \log. \text{pop. } 1881 (\text{mid.}) = \log. \text{pop. } 1881 (\text{cens.}) + (b) + 4(a).$$

1901, populations for the end of the first quarter of 1890 and 1892 were obtained, and from these the intermediate population for the middle of 1891. This method was not available for the population for the middle of 1901, but the formulæ just used were employed to obtain approximate census period populations for 1900 and 1902, and by the same method the population for the middle of 1901.

Having now obtained by this double method the three populations for the middle periods of 1881, 1891, and 1901, the intermediate middle-year periods were interpolated, from these data, by the method already described.

* * * * *

MORTALITY IN 1895-99.*

The mortality for the quinquennium 1895-1899, taken as an average of the rates printed at the time, was 19·5. As, however, the population had not been increasing in quite as large a ratio during the latter half of the decade as it was estimated to have done in the earlier, the rate should probably have been more nearly 19·7.

Leeds Death-Rates, 1895-1899, estimated on Populations.

Years.	Regarded as Terms of a Geometrical Series, whose Ratio was obtained from the Results of the Censuses.		Found by the Method of Differences from the Data of the Censuses 1881, 1891, and 1901.
	1881-1891.	1891-1901.	
1895	20·5	20·7	20·6
1896	18·8	18·9	18·9
1897	19·9	20·1	20·1
1898	19·2	19·5	19·4
1899	19·1	19·4	19·4
Lustrum	19·5	19·7	19·7

This rate is much lower than the rate of any of the six preceding quinquennia for which we have official returns. For the triennium 1900-02 the rate, as the revised population, has been 19·1, the lowest for any three consecutive years in our Leeds record.

* From Annual Report for the year 1902.

THE POPULATION IN INTERCENSUS YEARS.

By JOHN C. McVAIL, M.D., D.P.H., F.R.S.Ed.,
Medical Officer of Health for the County of Stirling.

IN calculating the population for the intercensus years it is very fallacious to assume the same growth or diminution year by year in one decennial period as had been experienced in that immediately preceding. This being so, the safest way to ascertain approximately the population in any year appeared to be to find from the valuation roll the number of occupied houses, and to multiply by the average number of persons per house as given in the census report. This method, however, as noted by me in a former report, is subject to a curious fallacy. An "inhabited house" in the census returns is not the same as an occupied house in the valuation roll. According to the census, "a separate house was reckoned—every dwelling (1) with a distinct outside entrance from a street, court, lane, road, etc.; or (2) with a door opening directly into a common stair or passage; but if any such dwelling is subdivided and occupied by different families, it must be reckoned as only one house. . . ." It is obvious that under this definition half a dozen occupied houses opening into a common passage are counted as only one house, while in the valuation roll they appear as six houses. The factor, therefore, of the average number of persons per house yielded by the census returns will be incorrect if applied to the valuation roll. To get over this difficulty I have ascertained from the valuation roll the number of occupied houses in the census year, and have, for each parish in the county, divided the census population by the number of houses in the valuation roll. The factors thus obtained will be applicable up till 1911, the year of the next census. It is no doubt the case that, owing to change in the nature of the population in any parish, the average number of persons per house may alter. If the population of a parish has largely consisted of villas or houses of a better class, with servants, and if, owing to the uprising of a new industry, many working-class houses come to be erected—say, colliery villages—the factor ascertained as above may become unreliable. Until, however, a quinquennial census comes to be taken in this country, the method of ascertaining the population here used is certainly better than that which the Registrar-General has to use, his method, as already noted, being to assume that the same rate of increase or diminution continues during one decade as had been found in the previous decade.

As was to be expected from the census definition of inhabited house, the factor in every case is larger than where the valuation roll is used, so that the result of using the census factor would be to give an exaggerated estimate of the population in every year, with a consequent underestimate of the birth and death rates.

* Annual Report.

INFANTILE MORTALITY.*

By JOHN TATHAM, M.A., M.D., F.R.C.P., D.P.H.,

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THE expression "infantile mortality" is understood in this country to mean the proportion of deaths under one year in a thousand births. To illustrate this subject, three tables have been prepared, and are hereto appended, Table I. showing for each of the years of the decennium 1891-1900 the deaths of infants of each sex at three groups of ages under one year: (a) in England and Wales as a whole, (b) in London, and (c) in the provinces; Table II. showing, for the same years, the mortality under one year of age per thousand births, from several diseases or groups of disease, as given in the new list of causes of death now adopted in the General Register Offices of England, Scotland and Ireland; Table III. showing for the year 1901 the local distribution of infantile mortality in each sex from all causes and from specified diseases in the several counties of England and Wales.

Most of the headings in these tables are self-explanatory, but with respect to three of them some explanation is necessary.

Under the head of "Diarrhoeal Diseases" are included the following: Diarrhoea and epidemic diarrhoea, infective enteritis, English cholera, gastric catarrh, other diseases of the stomach (mainly gastritis), enteritis, and gastro-enteritis.

Under the head of "Tuberculous Diseases" are classed phthisis, pulmonary tuberculosis, tuberculous meningitis, tuberculous peritonitis, tabes mesenterica, general tuberculosis, and tuberculous disease of other parts of the body.

Under the head of "Wasting Diseases" are included premature birth, injury at birth, congenital defects, atrophy, debility, and marasmus. In England and Wales as a whole during the decennial period 1891-1900 infantile mortality from all causes averaged 168 per thousand among male infants, and 138 per thousand among female, the proportion being lowest in both sexes in the year 1894, and highest also in both sexes in the year 1899. With the exception of measles and whooping-cough, all the diseases and groups of disease in the table showed considerably heavier fatality among male infants than among female.

By the help of Table III. and of the census returns it appears that, speaking generally, infantile mortality is highest in those counties which contain a large preponderance of urban population, and is lowest in those counties where the population is mainly rural in character.

Thus, Lancashire, Northumberland, and Durham, being essentially urban counties, their average infantile mortality in 1901 was 197 per thousand among males, and 163 per thousand among females. On the other hand, Rutland, Wiltshire, and Dorsetshire, being for the most part rural counties, their average infantile mortality did not exceed 102 for males, and 88 for females.

* A paper read at the International Congress of Hygiene and Demography.

TABLE I.
Deaths of Infants at Groups of Ages under One Year. (a) In England and Wales, (b) In London, (c) In the Provinces.

MALES.										
	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
(a) England and Wales:										
0-3 months	37,912	36,961	40,253	34,966	39,746	37,589	38,482	39,602	40,488	39,158
3-6 "	15,266	14,824	17,147	13,182	17,831	15,418	17,000	17,607	18,171	16,745
6-12 "	28,079	22,239	23,320	19,688	25,078	21,959	24,415	24,988	24,908	23,555
Under one year	76,257	74,024	80,720	67,836	82,655	74,966	79,897	82,147	83,565	79,458
(b) London:										
0-3 months	5,379	5,485	5,823	5,089	5,666	5,520	5,435	5,575	5,788	5,575
3-6 "	2,897	2,860	2,561	2,010	2,632	2,598	2,581	2,690	2,645	2,456
6-12 "	3,632	3,501	3,645	3,211	4,016	3,819	3,669	3,911	3,989	3,518
Under one year	11,408	11,846	12,029	10,310	12,314	11,935	11,685	12,176	12,867	11,555
(c) Provinces:										
0-3 months	32,538	31,476	34,430	29,877	34,080	32,069	33,047	34,027	34,705	33,583
3-6 "	12,869	12,464	14,586	11,122	15,199	12,822	14,419	14,917	15,526	14,286
6-12 "	19,447	18,738	19,675	16,477	21,082	18,140	20,746	21,027	20,967	20,087
Under one year	64,854	62,678	68,891	57,476	70,341	63,031	68,212	69,971	71,198	67,956
FEMALES.										
(a) England and Wales:										
0-3 months	28,609	27,968	30,540	26,601	30,240	28,758	29,166	29,720	30,863	29,755
3-6 "	11,874	11,966	14,169	10,662	14,247	12,695	13,776	14,858	15,030	13,581
6-12 "	19,061	18,510	19,692	16,750	20,951	18,594	20,750	21,288	21,517	20,254
Under one year	59,544	58,439	64,341	54,013	65,438	60,047	63,692	65,866	67,410	63,455
(b) London:										
0-3 months	4,288	4,129	4,459	3,994	4,425	4,297	4,333	4,286	4,389	4,261
3-6 "	1,889	1,802	2,191	1,670	2,123	2,099	2,079	2,306	2,151	2,081
6-12 "	3,196	3,164	3,185	2,838	3,390	3,284	3,189	3,424	3,880	3,138
Under one year	9,368	9,095	9,785	8,502	9,938	9,680	9,601	10,016	9,920	9,481
(c) Provinces:										
0-3 months	24,326	23,834	26,081	22,607	25,815	24,461	24,833	25,434	26,474	25,399
3-6 "	9,935	10,164	11,978	8,992	12,124	10,596	11,697	12,552	12,879	11,455
6-12 "	15,865	15,346	16,497	13,912	17,561	15,310	17,561	17,864	18,137	17,111
Under one year	50,176	49,344	54,556	45,511	55,500	50,367	54,091	55,850	57,490	53,965

N.B.—Still-births are not registered in England and Wales.

TABLE II.
Infantile Mortality, England and Wales, 1891-1900.
DEATHS UNDER ONE YEAR PER THOUSAND BIRTHS.

MALES.										
YEAR.	All Causes.	Measles.	Whooping-Cough.	Diarrheal Diseases.	Tuberculous Diseases.	Meningitis and Convulsions.	Pneumonia.	Bronchitis.	Wasting Diseases.	Other Causes.
1891 ...	164	8	6	15	10	26	10	24	47	28
1892 ...	162	8	6	17	9	25	10	21	48	28
1893 ...	173	8	5	32	10	25	9	18	50	21
1894 ...	150	8	6	14	8	22	11	20	45	21
1895 ...	176	8	5	32	10	24	11	19	50	22
1896 ...	161	5	6	24	8	22	11	18	48	19
1897 ...	170	4	6	35	8	22	11	17	48	19
1898 ...	175	8	5	41	8	22	11	16	49	20
1899 ...	177	8	5	44	8	22	12	16	49	18
1900 ...	169	4	6	33	8	22	12	16	50	18
Mean 1891-1900	168	8	6	29	9	28	11	19	48	20
FEMALES.										
1891 ...	188	8	7	13	8	20	8	19	38	17
1892 ...	182	8	7	15	7	19	7	17	39	18
1893 ...	143	8	5	28	8	20	7	14	41	17
1894 ...	124	8	7	12	7	18	8	16	36	17
1895 ...	144	8	5	28	8	19	8	15	41	17
1896 ...	133	4	7	21	6	18	8	14	39	16
1897 ...	141	8	6	31	7	17	8	14	39	16
1898 ...	145	8	5	36	7	17	9	18	40	15
1899 ...	148	2	5	39	6	17	9	18	40	17
1900 ...	139	8	6	28	6	17	9	18	40	17
Mean 1891-1900	138	8	6	25	7	18	8	15	39	17

TABLE III.
Infantile Mortality from Several Causes, 1901.
MALES.

REGISTRATION COUNTIES.	DEATHS UNDER ONE YEAR PER 1,000 BIRTHS FROM:									
	All Causes.	Measles.	Whooping-Cough.	Diarrheal Diseases.	Tuberculous Diseases.	Meningitis and Convulsions.	Pneumonia.	Bronchitis.	Wasting Diseases.	Other Causes.
England and Wales	166	2	5	37	7	21	11	14	51	18
London ...	162	8	5	36	8	15	13	14	46	22
Surrey ...	129	1	4	29	5	12	9	10	42	17
Kent ...	149	2	5	38	6	15	9	14	48	17
Sussex ...	121	1	4	23	6	15	9	10	40	18
Hampshire ...	136	1	2	34	6	14	6	13	48	17
Berkshire ...	119	1	2	19	5	15	7	11	44	15
Middlesex ...	138	2	5	36	6	12	10	10	41	16
Hertford ...	111	2	6	19	8	10	7	11	39	14
Buckingham ...	118	0	6	20	8	7	8	13	45	16
Oxford ...	122	0	6	14	4	16	8	16	47	11
Northampton ...	125	1	4	22	3	16	7	10	50	12
Huntingdon ...	115	—	17	13	5	10	3	12	40	15
Bedford ...	128	1	4	20	4	14	8	9	53	20
Cambridge ...	128	1	4	20	7	11	8	10	54	18
Essex ...	159	4	6	45	7	13	9	13	45	17
Suffolk ...	142	1	8	17	5	12	8	13	61	17
Norfolk ...	157	4	2	24	5	16	9	13	64	20
Wiltshire ...	101	1	8	11	4	9	6	10	43	14
Dorset ...	107	2	5	11	8	12	6	14	43	11
Devon ...	186	8	6	19	5	19	10	18	40	16
Cornwall ...	189	8	2	18	8	15	16	8	50	19
Somerset ...	117	0	6	17	3	13	10	11	43	14
Gloucester ...	125	1	6	19	5	16	12	15	40	11
Hereford ...	118	1	8	16	4	14	5	13	42	15
Shropshire ...	119	2	8	15	8	18	7	7	42	12
Stafford ...	181	1	7	35	8	27	10	14	60	19
Worcester ...	149	2	6	25	8	16	9	12	56	15
Warwick ...	184	3	4	46	8	19	10	14	59	21
Leicester ...	167	2	5	37	7	23	9	16	57	11
Rutland ...	99	—	8	8	4	4	17	4	50	4
Lincoln ...	153	1	5	29	4	22	7	17	56	12
Nottingham ...	186	4	4	42	10	19	13	15	61	18
Derby ...	164	2	6	29	8	24	9	15	55	16
Cheshire ...	171	2	5	43	7	22	10	13	52	17
Lancashire ...	196	3	4	52	8	25	14	16	53	21
West Riding ...	184	2	5	44	9	28	12	14	53	17
East Riding ...	177	3	4	49	6	22	11	15	52	15
North Riding ...	158	1	3	29	7	28	11	13	52	14
Durham ...	194	4	4	45	10	30	9	15	62	15
Northumberland ...	201	8	5	59	9	27	10	13	60	15
Cumberland ...	141	2	6	24	5	15	10	19	45	15
Westmoreland ...	109	4	—	16	5	8	8	15	33	20
Monmouth ...	167	1	8	31	4	27	17	16	49	14
South Wales ...	187	1	7	36	5	42	16	15	49	16
North Wales ...	148	2	8	23	4	41	9	10	37	14

TABLE III. (continued).
Infantile Mortality from Several Causes, 1901.
FEMALES.

REGISTRATION COUNTRIES.	DEATHS UNDER ONE YEAR PER 1,000 BIRTHS FROM:									
	All Causes.	Measles.	Whooping Cough.	Diarrhoeal Diseases.	Tuberculous Diseases.	Measles and Convulsions.	Pneumonia.	Bronchitis.	Warting Diseases.	Other Causes.
England and Wales	186	2	5	82	6	17	9	11	41	13
London ...	186	8	5	81	7	12	11	12	88	17
Surrey ...	100	1	5	21	4	10	5	9	82	18
Kent ...	111	2	5	24	4	12	5	11	84	14
Sussex ...	108	1	6	20	5	8	7	9	88	14
Hampshire ...	118	2	8	28	4	12	6	9	85	14
Berkshire ...	95	—	5	14	8	12	7	8	86	10
Middlesex ...	122	2	6	84	5	10	8	9	85	18
Hertford ...	82	1	4	15	8	9	4	8	28	10
Buckingham ...	101	0	7	17	8	8	7	8	41	10
Oxford ...	89	—	2	12	1	9	6	8	41	15
Northampton ...	105	0	6	18	2	12	4	8	48	12
Huntingdon ...	78	—	14	9	8	5	—	7	28	10
Bedford ...	97	0	4	18	4	14	5	10	84	8
Cambridge ...	99	0	8	20	6	9	6	4	88	18
Essex ...	188	2	5	87	6	11	8	9	89	16
Suffolk ...	106	0	7	18	8	10	6	9	47	11
Norfolk ...	118	8	1	21	8	12	5	9	45	14
Wiltshire ...	80	1	5	9	4	8	4	7	84	8
Dorset ...	98	1	6	9	2	11	7	9	85	18
Devon ...	107	8	6	16	5	14	9	18	81	10
Cornwall ...	105	8	4	12	4	14	11	4	40	18
Somerset ...	89	0	6	12	2	9	6	9	85	10
Gloucester ...	105	0	7	16	4	12	9	12	84	11
Hereford ...	92	2	10	8	5	12	7	4	87	7
Shropshire ...	100	2	11	18	4	11	8	9	86	10
Stafford ...	146	1	7	80	6	21	8	12	48	18
Worcester ...	120	1	6	28	6	11	7	8	44	14
Warwick ...	151	8	5	89	6	15	8	11	48	16
Leicester ...	188	1	5	29	6	21	10	12	44	10
Rutland ...	90	—	—	18	4	21	8	8	86	—
Lincoln ...	125	1	6	21	4	16	4	16	48	14
Nottingham ...	157	2	5	41	6	17	12	11	48	15
Derby ...	181	1	6	24	7	21	9	12	40	11
Cheshire ...	188	2	6	86	6	17	7	11	89	14
Lancashire ...	162	8	4	47	7	19	10	18	48	16
West Riding ...	152	2	5	89	6	21	10	18	41	15
East Riding ...	148	2	5	87	6	22	9	10	89	18
North Riding ...	140	1	4	29	6	22	5	11	50	12
Durham ...	164	8	6	41	8	24	8	12	51	11
Northumberland ...	168	8	5	51	4	28	6	10	47	14
Cumberland ...	117	1	6	20	7	18	6	11	42	11
Westmoreland ...	79	1	—	10	6	18	8	8	27	11
Monmouth ...	144	1	10	27	4	28	12	12	89	16
South Wales ...	158	1	9	29	5	33	11	11	40	14
North Wales ...	125	1	9	17	8	31	6	11	85	12

THE INTERNATIONAL CONGRESS OF PUBLIC HEALTH AND DEMOGRAPHY.

It is a little difficult to give an account of the Brussels Congress without giving a summary of the papers which were read and the discussions which ensued. Many of these were extremely important, and led to animated scenes, such as the attempt of his German colleagues to defend Professor Koch's theory on bovine tuberculosis. They had come with the object of "climbing down" from the position taken up, but their method of doing so provoked an attack from the French delegates, and the discussion thereupon became a heated one between the representatives of the two nations, while Britain smiled benignly over them in the person of Professor Sims Woodhead, who presided. Ehrlich also was subjected to some severe criticism on his "side-chain" theory, and forcibly replied. Disinfection was the subject of an interesting discussion, German and French views again coming into conflict. Infant feeding and methods of providing supplies of pure and prepared milk for infants received much attention. These two subjects—disinfection and milk supplies—were well represented in the museum, which also included the excellent pathological preparations prepared by Dr. Gratia, showing monkeys infected with tubercle from bovine and human sources. The one subject which was neglected both in practice and theory was "ventilation." The rooms in which the meetings were held were so badly ventilated that even the Brussels press made reference to it in sarcastic terms.

Copies of the papers were sent to each delegate in advance, and thus they had time to study them, and time was saved at the meetings, as the papers were not required to be read. This proved a great advantage, and should be adopted at future congresses.

THE LATE PROFESSOR CORFIELD.

It is with much regret that we record the death of William Henry Corfield, at the age of sixty years. To few students of hygiene is his name unknown, as for many years Dr. Corfield devoted himself to what has been termed practical sanitation. Coming after such men as Simon, Parkes, Chadwick, Neil Arnot, it was perhaps inevitable that his attention should have been largely directed to insanitary conditions as primary causes of disease, and, being of a practical turn of mind, he devoted himself successfully to the removal of such conditions. On the subject of the sanitary construction and arrangements of dwelling-houses Dr. Corfield contributed numerous addresses, lectures, and papers. In 1869 Dr. Corfield was appointed Professor of Hygiene and Public Health at University College, and soon after established the first hygienic laboratory in London. In 1871 he was elected Medical Officer of Health of Islington, and in the next year was transferred to St. George's, Hanover Square, and held office there for twenty-eight and a half years, until that parish was merged in the City of Westminster. He was then appointed consulting sanitary adviser to H.M. Office of Works. Professor Corfield was a member of almost every society at home and abroad connected with hygiene, either holding office or having had honorary membership conferred upon him. Some years ago he was President of this Society, and at the time of his death held a similar position in the Epidemiological Society.

THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

REPORT OF COUNCIL, SESSION 1902-1903.

1. In presenting their report for the past session, your Council are able to record a continuance of the progress made by the Society in former years. There are now on the roll 865 members, including 25 honorary fellows, 702 fellows, 72 members, and 66 associates. The total net increase in membership for the year is 57. During the past year 7 fellows and 1 associate have died, and 18 fellows, 3 members, and 4 associates have resigned. There were elected during the year 62 fellows, 18 members, and 10 associates, the yearly averages for the previous ten years being 54, 16, and 8 respectively.

2. Your Council regret to have to record the death of Professor W. H. Corfield, M.A., M.D., F.R.C.P., who was for many years a fellow (and a vice-president) of the Society, the membership of which he had to resign last year on account of ill-health.

3. Dr. J. Spottiswoode Cameron, at the annual meeting in October, delivered a most valuable and instructive presidential address, entitled "Sanitary Progress during the last Twenty-five Years—and in the Next." At the ordinary meetings of the Society papers introducing discussions were read upon the following subjects: "The Sanitary Control of Schools," by Dr. H. Meredith Richards; "The Prospect of Extinguishing Tuberculosis," by Dr. Alfred Hillier; "The Renewal of the Vaccination Act," by Dr. E. W. Hope; "Regulations under the Dairies, Cowsheds, and Milkshops Orders," by Dr. J. Mitchell Wilson; "Public Health Administration," by Dr. Joseph Groves; "Annual Reports," by Mr. Herbert Jones.

A special meeting was held on November 21st, 1902, when the requirements for underground bakehouses in connection with the Factory and Workshop Act, 1901, were discussed, and a series of suggested requirements for the guidance of medical officers of health in advising their authorities were issued by the Society, so as to secure, as far as possible, uniformity of action throughout the country. These "suggested requirements for underground bakehouses" gave rise to much discussion in the trade, and a conference was held on March 13th, 1903, at the Home Office between representatives of the Society of Medical Officers of Health on the one hand, and of the Master and Journeyman Bakers Associations on the other hand. At this conference much good was effected in clearing up many doubtful and misunderstood points in connection with the subject of the requirements needed to be carried out in all underground bakehouses previous to such being certified as suitable under Section 101 of the Factory and Workshop Act, 1901.

All the meetings were well attended.

The Provincial Meeting was held at Wakefield on July 11th, and was attended by over 100 members of the Society, with their friends. Those present at the meeting were the guests of the Mayor of Wakefield (E. A. Brotherton, Esq., M.P.) to luncheon.

4. Resolutions were passed by the Society relating to—

"The sanitary control of schools," on November 14th, 1902 (PUBLIC HEALTH, December, 1902, p. 136).

"Underground bakehouses," on November 21st, 1902 (PUBLIC HEALTH, December, 1902, p. 172).

"The renewal of the Vaccination Act," on February 13th and March 13th, 1903 (PUBLIC HEALTH, April, 1903, p. 425).

"The desirability of a quinquennial census," on April 3rd, 1903 (PUBLIC HEALTH, May, 1903, p. 487).

Resolutions were referred from the Society to your Council for consideration relating to—

"The administrative control of tuberculosis" (PUBLIC HEALTH, March, 1903, pp. 315 and 323).

"The grooming, etc., of cows" (PUBLIC HEALTH, April, 1903, p. 425).

5. Communications from the Society have been addressed during the past year to:

The Board of Education—

(a) On the sanitary control of schools (PUBLIC HEALTH, December, 1902, p. 172, and March, 1903, p. 367).

(b) As to the withdrawal from the provisional code of Article 101* (PUBLIC HEALTH, May, 1903, p. 487).

The Local Government Board.—On the sanitary control of schools (PUBLIC HEALTH, December, 1902, p. 172, and March, 1903, p. 366).

The Home Office—

(a) On the need for a *minimum* air-space of 500 cubic feet per worker being settled by order under Section 3 of the Factory and Workshop Act, 1901, in respect of bakehouses of all classes (PUBLIC HEALTH, December, 1902, p. 175; February, 1903, p. 285; August, 1903, p. 676; September, 1903, p. 733).

(b) On bye-laws (or regulations) to be framed for the conduct of the businesses of bakehouses, restaurants, and all other places where cooked food is prepared (PUBLIC HEALTH, December, 1902, p. 175; February, 1903, p. 285; and May, 1903, p. 486).

(c) On standards for ventilation of factories and workshops—a memorial being drawn up and presented to the Home Secretary, praying for a minimum standard being prescribed under Section 7 of the Factory and Workshop Act, 1901, which shall not be lower than that now in force in artificially humidified factories—viz., 9 volumes of carbonic acid in 10,000 of air; or, preferably, 5 volumes of carbonic acid in excess of that found in the outside air at one and the same time, such standard not to be lowered for gas (or oil) lighted factories and workshops in the way suggested in the first recommendation of the Departmental Committee on p. 5 of the First Report on the Ventilation of Factories and Workshops (PUBLIC HEALTH, August, 1903, p. 676; September, 1903, p. 731).

The Registrar-General.—Referring to the question of giving the addresses of newly-born children to sanitary authorities (PUBLIC HEALTH, May, 1903, p. 485).

6. Your Council, having considered various suggestions from the Branches in connection with alterations in the Articles of Association, decided to submit certain suggested alterations to special extraordinary meetings of the Society to be held in September and October.

7. Your Council have had under consideration at several meetings the question of the renewal of the contract for publishing PUBLIC HEALTH, and have made arrangements, which will come into force from February 1st, 1904, and which (it is anticipated) will be of considerable advantage to the Society.

8. Delegates from the Society attended the Fourteenth International Congress of Medicine at Madrid, April 2nd, 1903; the Sanitary Institute Congress at Bradford in June, 1903; the Congress of the Royal Institute of Public Health at Liverpool in July, 1903; and the International Congress of Hygiene and Demography at Brussels in September, 1903.

9. Sir Francis Sharp Powell, Bart., again introduced into Parliament the Public Health Bill to provide Fixity of Tenure and Superannuation for Health Officers, but he was not able to secure discussion of the measure. The Parliamentary Committee of your Council is now conferring with a Committee of the British Medical Association as to the means which should be adopted for the furtherance of the Bill. The thanks of the Society are due to Sir Francis Powell, Bart., Sir Walter Foster, Mr. Talbot, Dr. Farquharson, Mr. Henry Hobhouse, Mr. Cripps, Mr. Heywood Johnstone, Sir Michael Foster, and Sir John Batty Tuke, all of whom backed the Bill. The Council hope that Members of the Society will make themselves familiar with the Bill, a copy of which can be obtained from the Hon. Secretaries, and should take every opportunity of pressing its clauses upon Members of Parliament.

10. No change has taken place in the *personnel* of the regular officers of the Society, all of whom were unanimously re-elected by your Council.

HERBERT JONES, } *Hon. Secretaries.*
JOSEPH PRIESTLEY, }

September, 1903.

REPORT OF THE EDITOR.

To the Council of the Incorporated Society of Medical Officers of Health.

GENTLEMEN,

The increasing demands made upon the pages of PUBLIC HEALTH lead one to the conclusion that your Journal is recognised as the medium by which the views of authors may be best brought before those who are most interested and most influential in public health work. The power entrusted to me to add a few pages when required has had to be exercised almost every month, so that PUBLIC HEALTH has become a 64-page Journal. Under these circumstances, and in view of the figures placed before you by the Journal Committee, I think the subscription price of PUBLIC HEALTH, which has been 10s. 6d. per annum post free, should be raised to 12s. 6d. post free per annum, and 1s. 6d. for single copies.

A list of "Current Public Health Literature" has been introduced each month, and appears to have met with the approval of many

members. It would, doubtless, be more useful if the references were grouped under subjects, as in the *Index Medicus*; but already the preparation of the list entails a considerable amount of work, the assistance in which I am indebted to several contributors, who have kindly undertaken certain foreign periodicals.

I am, Gentlemen,

Yours faithfully,

FRANCIS J. ALLAN,

Editor.

August 28th, 1903.

REPORT OF THE HONORARY TREASURER.

To the Council of the Incorporated Society of Medical Officers of Health.

GENTLEMEN,

I have much pleasure in being able to report that the finances of the Society are in a good state. The year now under consideration which ended in June last, shows an excess of income over expenditure of £70 11s. In 1902 the excess was £4 4s. 5d.

The balance standing in favour of the Society for the year 1903 is £841 7s. 10d., as against £770 16s. 10d. for 1902.

The sum for this year is made up of £500 in Metropolitan Stool £50 loan to Sanitary Inspectors' Examination Board, £100 on deposit £146 19s. 9d. at bank, and the remainder due from publisher and a petty cash in the hands of the secretaries.

The subscriptions for 1903 brought in £742 0s. 8d., and for 1902 £690 4s. The favourable balance this year is due to a larger amount received on the publishing account—that is, for cash sales of the Journal—and to an increased membership.

In comparing the last two years, the expenditure under the chief heads was: For rent (net), 1903, £49 8s. 6d.; 1902, £31 10s. 6d. Printing, 1903, £54 1s. 5d.; 1902, £75 10s. 5d. Stationery, 1903, £9 0s. 2d.; 1902, £6 14s. Salaries, 1903, £46 10s.; 1902, £48 5s. Office furniture, 1903, £10 2s.; 1902, £28 2s. 8d. Dinner expenses, 1903 (loss), £25 17s.; 1902 (loss), £4 11s. 2d. Journal account (editorial), 1903, £88 2s. 1d.; 1902, £88 18s. 1d. Printing of Journal, 1903, £264 17s.; 1902, £284 5s. 6d. The proportion paid to Branches needs no comment.

The outstanding subscriptions are not in excess of last year. There are a few matters on the expenditure side of the accounts that might receive the consideration of the Council.

I am, Gentlemen,

Your obedient servant,

GEORGE MILLSON,

Treasurer.

September 7th, 1903.

THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

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Revenue Account: July 1st, 1902, to June 30th, 1903.

EXPENDITURE		INCOME	
To Rent, No. 9, Adelphi Terrace ...	£54 13 6	By Subscriptions ...	£742 0 3
Printing, General Account ...	54 1 5	Dividend on £4,099 17s. 5d. India	115 6 0
Stationery and Books ...	9 0 2	3 Per Cent. Consolidated Stock	12 2 5
Salaries:		Dividend on £514 16s. Metropolitan 2½ Per Cent. Consolidated Stock ...	1 11 11
Clerk ...	£40 0 0	Interest on £100 Standing on Deposit at the Union of London and Smith's Bank, Limited ...	5 5 0
Caretaker ...	6 10 0	Metropolitan Branch — Use of Rooms at 9, Adelphi Terrace ...	6 10 6
Office Furniture ...		Contribution (per Editor) towards cost of diagrams in Journal ...	42 13 9
Dinner Account:		Publishing Account:	
Expenses of Dinner ...	66 2 6	Due at Date ...	72 17 6
Less received for Tickets ...	40 5 6	Less contra ...	30 3 9
Journal Account:	25 17 0	Sale of Forms "A" and "B" (L.G.B. Tables):	
Printing ...	264 17 0	Per Rebman, Limited, Publishers ...	4 0 11
Editorial ...	83 2 1	Less Commission ...	0 12 2
Hon. Solicitor's Disbursements ...		Carried forward ...	3 8 9
Hon. Secretaries' Petty Cash:			£928 18 7
Printing ...	0 18 0		
Postages ...	7 13 10		
Travelling Expenses ...	23 2 0		
Auditors' Fee ...			
Carried forward ...	£587 15 6		

Accounts 1902-1903

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Accounts 1902-1903

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EXPENDITURE.		INCOME.	
Brought forward ...	£587 15 6	Brought forward ...	£928 18 7
Royal Institute of Public Health:		Balance down to June 30th, 1902	770 16 10
Delegates' Fee ...	2 2 0		
Petty Cash (clerk):			
Travelling Expenses ...	£0 9 2		
Messengers ...	0 2 6		
Expenses at Meetings ...	0 7 6		
Typewriting and Envelope Addressing ...	4 19 0		
Postages ...	19 18 0		
Cheque-book and Bank Charges	25 16 2		
Proportion of Subscriptions Paid to Branches:	1 1 5		
Metropolitan ...	31 5 0		
Midland ...	28 2 6		
North-Western ...	34 10 0		
Northern ...	23 7 6		
Yorkshire ...	39 0 0		
West of England and South Wales ...	29 7 6		
Home Counties ...	21 17 6		
Southern ...	11 5 0		
Scottish ...	22 17 6		
Carried forward ...	£858 7 7	Carried forward ...	£1,699 15 5

Accounts 1902-1903

EXPENDITURE.		INCOME.	
Brought forward ...	£858 7 7	Brought forward ...	£1,699 15 5
Balance carried forward, viz.:			
Balance, June 30th, 1902 ..	£770 16 10		
Plus Excess of Income over Ex-			
penditure, 1902-1903 ...	70 11 0		
	<u>841 7 10</u>		
	£1,699 15 5		£1,699 15 5

We have examined the foregoing accounts, and certify them to be correct.

(Signed) A. G. WARREN, F.C.A. } Auditors.
OLIVER FIELD, M.D. }

[Public Health

October, 1903]

Accounts 1902-1903

Balance-sheet: June 30th, 1903.

LIABILITIES.		ASSETS.	
To Capital Account:		By value of £4,099 17s. 5d. India	£4,000 0 0
Mr. Berridge's Bequest ...	£4,000 0 0	3 Per Cent. Consolidated Stock	
Sundry Creditors:		at cost ...	
Messrs. Rebman, Limited, Pub-		Value of £514 16s. Metropolitan	
lishing Account, Journal ...	30 3 9	2½ Per Cent. Consolidated Stock	
Ditto, Table Forms ...	0 12 2	at cost ...	500 0 0
Clerk—Petty Cash Account ...	1 18 2	Loan to Sanitary Inspectors	
		Board ...	50 0 0
Balance on Income and Expen-		Deposit at Union of London and	
diture Account ...	841 7 10	Smith's Bank, Limited	100 0 0
		Cash at Bank as per Cash-book...	146 19 9
		Petty Cash in hands of Hon.	
		Secretary ...	0 3 9
		Amount due on Publishing Ac-	
		count:	
		Journal ...	72 17 6
		Tables ...	4 0 11
			<u>76 18 5</u>
	<u>£4,874 1 11</u>		£4,874 1 11

We have examined the foregoing accounts, and certify them to be correct.

(Signed) A. G. WARREN, F.C.A. } Auditors.
OLIVER FIELD, M.D. }

10th September, 1903.

EXTRAORDINARY GENERAL MEETING.

An extraordinary general meeting of the Society was held at No. 9, Adelphi Terrace, London, W.C., on Friday, September 18th, 1903. Present: The President, Dr. J. Spottiswoode Cameron (in the chair), Drs. H. R. Kenwood, R. K. Brown, R. Dudfield, G. B. Millson, W. A. Bond, J. Wheatley, L. T. F. Bryett, S. Davies, W. H. Coates, R. Prichard, J. H. Jones, A. Bostock Hill, J. R. Kaye, C. Killick Millard, J. Groves, A. W. Harris, Herbert Jones, and J. Priestley.

The HON. SECRETARY read the requisition to convene the meeting. It was moved by Dr. HERBERT JONES, and seconded by Dr. J. PRIESTLEY—

"A. That Article 15 of the Articles of Association be rescinded, and the following stand in lieu thereof:

"15. The Officers of the Association shall be—

(a) A President, who shall be elected at the Ordinary Meeting of the Association, in the month of April in every year, by the Fellows and Ordinary Members, from among the Fellows. The name and address of any Fellow proposed for election as President, shall be sent to the Honorary Secretary of the Association, who is a member of the Metropolitan Branch, in the month of March preceding the election, and, together with the name of the proposer and seconder, shall be inserted in the notice convening the Meeting. The election shall be by ballot. The President shall come into office on the first day of the Session following his election.

(b) Vice-Presidents, who shall be the past Presidents of the Association, and the Presidents for the time being of the several Branches.

(c) A Treasurer, who shall be a member of the Metropolitan Branch.

(d) Two Honorary Secretaries, of whom one shall be a member of the Metropolitan Branch.

(e) An Editor of PUBLIC HEALTH.

(f) An Honorary Librarian.

(g) An Honorary Solicitor.

(h) Two or more Trustees of any funds of the Association which it may be necessary or convenient to invest in the names of Trustees, if and whenever the Council shall think fit to appoint such Trustees."

To which an amendment was moved that the word "honorary" be inserted before the word "officers" in the first line of the resolution, and that the word "honorary" be deleted from the remainder of the resolution.

Debate ensued, in the course of which the PRESIDENT held that there was nothing in the present article to prevent the Council appointing an Assistant Secretary in addition to the honorary officers.

The amendment was then withdrawn, and the original motion, on being put to the meeting, was declared by the PRESIDENT to be carried unanimously.

It was moved by Dr. HERBERT JONES, and seconded by Dr. J. PRIESTLEY—

"B. That Article 16 of the Articles of Association be rescinded, and the following stand in lieu thereof:

"16. The Treasurer, the Honorary Secretaries, the Editor, the Honorary Librarian, and the Honorary Solicitor shall be elected annually by the Council at their meeting in April, and shall come into office on the first day of the Session following their election. All elections shall be by ballot, and the retiring officers shall be eligible for re-election.

"C. That Article 17A of the Articles of Association be rescinded, and the following stand in lieu thereof:

"17A. The Council shall be elected as follows: Before the last day of July in every year each Branch shall hold a meeting for the election of their President and their other representatives on the Council, all of whom shall come into office on the first day of the Session following their election. No Fellow shall be eligible to be elected on the Council and no Fellow or Ordinary Member shall be eligible to vote whose subscription for the current year shall be unpaid. The Honorary Secretary of each Branch shall, within seven days after the meeting for the election of Members of the Council, send to the Honorary Secretary of the Association, who is a Member of the Metropolitan Branch, the names and addresses of the President and of the elected representatives. In the event of any Branch failing to elect qualified representatives, the Council shall, at their meeting in September, elect from among the Fellows attached to the Branch the requisite number of Fellows to represent the Branch on the Council. Any casual vacancy shall be filled up by the Council from Fellows attached to the Branch, whose representative shall have ceased to be a Member of the Council. All elections shall be by ballot. The Council shall come into office on the first day of the Session following their election.

"D. That Article 10 of the Articles of Association be rescinded, and the following stand in lieu thereof:

"10. Candidates for election as Fellows, Ordinary Members, or Associates shall be proposed in writing by two Fellows or Ordinary Members at a meeting of the Association, and shall be balloted for at the next Ordinary, Provincial, or Annual Meeting. The names, addresses, and titles of the candidates, with the names of their proposers and seconders, shall be inserted in the notice convening the meeting of the Association at which the election is to take place. An Ordinary Member upon appointment to the office of Medical Officer of Health shall *ipso facto* become a Fellow of the Association, and shall forthwith notify such fact to the Honorary Secretary of the Association, who is a Member of the Metropolitan Branch.

"All elections shall be by ballot, and no candidate shall be declared to be elected unless he obtains the votes of four-fifths of the Fellows and Ordinary Members present and voting."

The motion was put to the meeting, and declared by the PRESIDENT to be carried unanimously.

NOTE.—The words underlined indicate the alterations proposed.

In Article 17A "before the last day" takes the place of "in the month."

The above resolutions will be submitted for confirmation at a meeting to be held at the Holborn Restaurant on Friday, October 9th, 1903.

West of England and South Wales Branch.—The summer meeting was held at Brunswick House, St. Helen's Road, Swansea, July 30th. Present: Drs. Eben Davies (in the chair), Herbert Jones, Howard Jones, Lloyd Jones, D. T. Jenkins, W. H. Symons, and D. J. Thomas; visitor, Dr. McVail.

Dr. Tubb Thomas (M.O.H. Wiltshire C.C.) was unanimously elected President elect.

The retiring President, Dr. Prichard (M.O.H. Cardiff Rural Districts), and the Hon. Secretary, Dr. J. Howard Jones (Newport), were elected Branch representatives.

Dr. Symons brought forward the question of the formation of a separate Branch for the South-West of England.

It was carried as an instruction to the Hon. Secretary that all medical officers of health within the Branch area be circularized to attend the next meeting of the Branch to discuss the matter.

SPECIAL LOCAL LAWS.

REPORT OF THE SELECT COMMITTEE.

THE Police and Sanitary Committee—the Select Committee to whom were referred all private Bills promoted by municipal and other local authorities, by which it is proposed to create powers relating to police or sanitary regulations in conflict with, deviation from, or excess of, the provisions of the general law—have issued a special report. They suggest that the special local laws that had been authorized might, for convenience of reference, and to insure uniformity of future legislation, be embodied in a Local Authorities Clauses Act.

In the Sheffield Corporation Bill the Committee have granted a clause providing for the compulsory notification of phthisis, which has not been hitherto allowed. They had evidence before them that a voluntary system of notification had been in operation in the city for some time, and that the Corporation had the means and intention of dealing with all cases which might be brought to their notice.

The attention of the Committee has been drawn more than once to absurd and irrational proposals contained in the Bills before them—e.g., a clause providing that spitting in a tramcar should be deemed to be a nuisance within the meaning of the Public Health Act, 1875, which would have the effect of applying the elaborate procedure in Sections 91-99 of that Act, including service on the person offending of a notice to abate the nuisance, the matter being one which can be, and in many cases has been, dealt with by bye-law under the Municipal Corporations Act, 1882.

CURRENT PUBLIC HEALTH LITERATURE.

The Lancet.

(No. 4,172.) Milroy Lectures. (Continued.)

Infantile Scurvy. W. S. Colman.

Results obtained by the Sanatorium.

Treatment of Pulmonary Tuberculosis. F. W. Burton-Fanning and W. J. Fanning.

Treatment of Summer Diarrhoea and Vomiting of Infants. H. T. Hicks.

Lancashire County Council and Vaccination.

(No. 4,178.) The Sandgate "Sanatoria" for the Open-air Treatment of Consumption.

(No. 4,174.) A Note on the Etiology of Yellow Fever. J. B. Tomblason.

British Medical Journal.

(No. 2,224.) An Inquiry into the Relation of Vaccination to Infant Mortality and Acute Concurrent Infantile Diseases. (With Charts.) J. M. Mackenzie.

Security of Tenure of Office of Sanitary Officers. Joseph Groves.

The Appointment of a Minister of Public Health. Frank G. Bushnell.

Physical Degeneration in Children of the Working Class: an Inquiry into its Causes and Suggestions for its Remedy. Herbert H. Tidswell.

Cancer Research. (Editorial.)

Glanders in London and Glasgow.

Miner's Phthisis: Report of Experiments with Sprays to remove Dust.

The Bacteriological Examination of Public Water-supplies.

Infant Mortality in France. Resumé of Paper by P. Budin.

(No. 2,225.) The Water-supply for Landing Parties and Naval Brigades. J. F. Hall.

The Medical Acts Amendment Bill. (Text.)

Vaccination Acts: Resolutions relating to Future Legislation.

Midwives Act: Text of Privy Council's Order. (Also in *Lancet*, No. 4,178.)

(No. 2,226.) The Utilization of Infant's Milk Depots. T. D. Lister.

A Discussion on Tuberculosis in Children: its Relation to Bovine Tuberculosis.

Nathan Raw, W. Arbuthnot Lane, Douglas A. Reid, John Mackenzie,

Theodore Fisher, W. Langford Symes, Edmund Cautley, George Carpenter,

and W. McAdam Eccles.

The Wet Summer and the Public Health. (Leading Articles.)

The Journal of State Medicine, Vol. XI, No. 8, August.

Address to the Liverpool Congress of the Royal Institute of Public Health. Earl of Derby.

Opening Address to the Section of Bacteriology and Comparative Pathology. Professor Rubert Boyce.

Presidential Address to the Section of Preventive Medicine and Vital Statistics. J. Spottiswoode Cameron.

Introductory Address to the Section on Port Sanitary Administration. Thomas Clarke.

Tubercular Expectoration in Public Thoroughfares. H. E. Annett.

Journal of the Sanitary Institute, Vol. XXIV., PART II., JULY, 1908.**Congress at Bradford:**

Addresses by President, Presidents of Sections, and of Conferences.

Architecture in its Relation to Hygiene. J. Slater.

Insect-borne Parasites. Major Ronald Ross.

Journal of Tropical Medicine, Vol. VI.

(No. 16.) Mosquitoes and Steamers. They breed in bilge water, water in cisterns, etc. Andrew Balfour.

Eosinophilia associated with Dracontiasis. L. S. Dudgeon and F. J. Child.

The Journal of the American Medical Association, Vol. XLI.

(No. 5.) Soluble Toxic Substances in Autolytic Disintegration Products of Typhoid and Dysentery Bacilli: The isolation of toxins—Recent work by Conradi, also by Shiga and Neisser, indicating advances in this direction—The character of the toxins produced—Bacterial life in the body possibly not parallel with that in culture media—Field for further research in this direction.

Is Hydrophobia a Protozoic Disease? Recent claims by Negri of the discovery of a protozoan organism of the disease.

The Influence of the Dwelling in the Development of Tuberculosis: Tuberculosis largely a disease of the poor—Studies and observations of Flick in Philadelphia, Biggs in New York, and Romberg and Gaedicke in Marburg demonstrating this fact—The defects of dwellings as affecting the moderately well-to-do—The modern flat often a temptation to disease.

(No. 6.) The Essential Principles of Infant Feeding, and the Modern Methods of applying Them. Thomas Morgan Rotch. (Continued in No. 7.)

The Recent Advances in our Knowledge of Agglutination: The defects of the agglutination tests—New light on agglutinins by the researches of Bail, Joos, Eisenberg, and Volk—Two constituents in the agglutinable substance in bacteria—Wasserman's researches on the partial agglutinins—Milk laboratories—Types of prescription blank—Home modification of milk—Dr. Ladd's card for home modification—Edsall's comparative analyses—General principles of percentage feeding—Rules for feeding—Need of individual study of cases—Practical conclusion, namely, the need of extraordinary precautions in the technic of the test.

The Point of Attack in Pulmonary Tuberculosis: The question whether it starts in the bronchioles or in the vessels—Hirschfeld's results, and the contradictory ones of Aufrecht—Recent work by Abrikossoff rather confirming Hirschfeld's findings—Another possible source of invasion shown by Grober.

New Investigations Concerning the Fixation of Tetanus Toxin by Cerebral Tissue: The alleged neutralization of tetanotoxin by brain tissue—Recent work by Besredka, showing that more tetanotoxin is fixed than is neutralized—Dmitrievsky's recent work on the subject.

(No. 7.) Recent Investigations Bearing on Infectious Diseases of Unknown Etiology. Ludvig Hektoen. (To be continued.) Human diseases belonging to this group—The infectious nature of the diseases discussed—Possibility of enzymes as the cause—Reasons why the organisms of these diseases have not been discovered—Incultivability—Mixed or symbiotic infections—Unstainability—Ultramicroscopic size—Filtration experiments

—Smallpox—Hydrophobia—Bovine peripneumonia—Foot and mouth disease—Yellow fever—Chicken pest.

Co operative Methods for Improving the Usefulness of Statistical Classifications of Causes of Death. Cressy L. Wilbur, Medical Referee U.S. Census in Vital Statistics. Importance of proper statistical classification of causes of death—Significance of the word "classification" as here used—The Bertillon classification; its advantages and defects—The vital statistician and the mortality classification—Difficulties of compilation—Estimation of causes in cases of multiple diseases reported—Discussion by Drs. Fulton and Swarts.

New York Medical Journal, July 18th.

Artificial Immunity in Experimental Tuberculosis. E. L. Trudeau. His experiments, like those of De Schweinitz, antedated those of Behring. He has used only small animals—guinea-pigs—and in these he has not obtained an absolute immunity that will protect overwhelming infections, but still they show that the latter condition is not comparable with ordinary exposure in every-day life. He thinks the principle has been established, and that with a more thorough knowledge of it we may yet get considerable immunity.

La Presse Médicale, Vol. XI.

(No. 62.) Chemical and Bacteriological Examination of Unsound Food, and of Meat Preparations containing Flesh other than the Kind they profess to be. H. Martel.

(No. 63.) The Milk Question. P. Desfossez. (Treatment by cooling—Reduction of organisms thereby—Considers that milk should be kept in a refrigerator during distribution.)

A Practical and Rapid Means of rendering Water Potable. Professor Vaillard and Georges. (Iodine is liberated in the water.)

(No. 64.) Formalin in Histological Stains, with Formula. Ch. Morel and Dalous.

The Statue of the Leprous King in Cambodge. M. E. Jeanselme has examined this statue—a relic of a former civilization in Indo-China—and concludes that what was believed to represent leprosy is only the effects of age.

(No. 66.) Centrifugation as a Rapid Means of Estimating the Nutritive Value of Milk. M. Fabre.

La Semaine Médicale, Vol. XXIII.

(No. 25.) Latent Scarlatina and its Epidemiological Importance. P. Caziot. Sponge Fishers' Disease. S. Zervos.

(No. 27.) Kidney Troubles in Scarlatina and Diphtheria.

(No. 28.) Trunczek's Serum in the Treatment of Gonorrhœal Rheumatism. L. Lévi.

Centralblatt für Bakteriologie.

(No. 6.) Experiments in connection with the Influenza Bacillus. E. Friedberger; also A. Wolff.

Investigation of the Watercourses of China. G. Mayer.

Bacteriologic Study of the Sweepings of Warships. C. M. Belli.

A Fish Epidemic in Bucharest. V. Babes and P. Riegler.

The Parasite of Texas Fever. (*Ibid.*)

The Inter-relation of Typhoid Agglutination in Mother and Fetus. C. Stäubli.

- Water and the Typhoid Bacillus. H. Bonhoff.
 Deyke's Pepsin-Trypsin-Agar as a Medium for the Diphtheria Bacillus.
 B. Bösse.
 Metal Stopper for Reagent Glasses. F. Gloge.

Berliner Klin. Wochenschrift, Vol. XL.

- (No. 25.) Four Cases of Lysol Poisoning. K. Liepelt. Successful treatment by freely washing out stomach.
 Cancer in Cold-blooded Animals. L. Pick and H. Poll.
 (No. 26.) Mutual Relations in Pathology. Laache.
 Protein Chromogen Reaction and Cancer. K. Glaessner.
 (No. 27.) The Case of Laboratory Plague in Berlin. W. Dönitz.

Deutsches Archiv. für Klin. Medizin (Leipzig), Vol. LXXVI.

- (Nos. 4 and 5.) Influence of the House on Susceptibility to Tuberculosis.
 Romberg and G. Haedecke.

Deutsche Med. Wochenschrift, Vol. XXIX.

- (No. 26.) Experimental Tests of Dissemination of Typhoid by Butter. Carl Bruck demonstrates the possibility of this taking place.
 Symbiosis of Influenza Bacillus. M. Neisser.
 Tuberculosis and Cancer in the Same Family. E. Aronsohn.
 Plague in Berlin (and in No. 27). M. Kirchner.

Wiener Klin. Wochenschrift, Vol. XVI.

- (No. 20.) Inter-transmissibility of Tuberculosis for Various Animals. E. Wiener.
 The *Bacillus proteus vulgaris* (Hansen) as a pathogenic organism. E. Hahn.
 (No. 28.) Results of the Serum Treatment of Scarlet Fever in 112 Cases.
 T. Escherich. None of the children died that were injected on the first and second day of the disease, although there were 8 very severe cases in the 24 injected the second day. Only 17.4 per cent. died of the 28 injected the fourth day and 80 per cent. of those injected the fifth day, after which the mortality rose to 60 per cent. of the 4 not injected until the ninth day, the latter all very severe cases. A single large injection the first or second day affords the best results.
 (No. 24.) The Effect of Specific Absorption on Agglutinins. A. Posselt and R. R. v. Sagasser.
 (No. 26.) A Theory as to the Length of Time of the Incubation Period.
 C. v. Pirquet and B. Schick.
 (No. 27.) The Gruber-Widal Serum Reaction in Icterus. L. Langstein.
 The Fruits of Ehrlich Toxin Theory. M. Gruber.

Riforma Medica (Palermo), Vol. XIX.

- (Nos. 12 and 18.) Contribution to the Study of Septicæmia from the Micrococcus Tetragonus in Man. L. Fornace.
 (Nos. 17 and 18.) Experimental Lead Poisoning. G. Fasoli.

Giornale della Reale Società Italiana d'Igiene (Milan), Vol. XXV., No. 7, JULY 31st.

- On a Uniform Method of Testing *B. diphtheria*, *B. anthrax*, and *streptococci*.
 F. Santori.

- Study of Trachoma. Umberto Cano.
 School Hygiene. G. B. Sigurtà.
 A New Van for the Transport of Articles to and from Disinfecting Stations.

Hospitaltidende (Copenhagen), Vol. XLVI.

- (No. 4.) Bactericidal Properties of Milk. B. Meyer. (Fresh milk has for some hours bactericidal power for the ordinary bacteria in milk and for the diphtheria bacillus.)
 Sanatoria and Hospitals. M. Hindhede.
 (Nos. 7 and 8.) Reform needed in Building Laws. S. Hansen.
 (Nos. 9 and 10.) Transmission of Human Tuberculosis to Cattle. J. Fibiger.
 A review of the various reports which have appeared within the last few years on the subject. He finds that various authors have reported 61 attempts at inoculation of cattle with human tuberculosis, with positive results in 41—that is, tuberculosis was induced in 51 out of 81 animals in these 41 experiments. In 74 experiments on 108 cattle, swine, and goats the results were positive in 52—that is, on 78 of the animals. Consequently, two-thirds of all the experiments were successful, and two-thirds of all the animals were infected. Koch's assertions on this subject are therefore untenable. The tuberculosis is generally restricted to the par or organ inoculated; but occasionally the infection spreads, and the disease becomes universal. As a rule, human tuberculosis is not so virulent for cattle, but there are numerous exceptions in which the disease develops as rapidly and with as much intensity as from virulent bovine tuberculosis. Fibiger states that besides the animals mentioned above, dogs, cats, sheep, horses, asses, and monkeys have been inoculated with human tuberculosis, and always with a certain proportion of positive results.

Zeitschrift für Klin. Medizin (Berlin), Vol. XLIX.

- (Nos. 1 to 4.) Transmission of Scarlet Fever by Milk. K. Ekholm. (A milkmaid had been treated for phlegmonous angina, and shortly afterwards cases of scarlet fever developed in six families who were supplied with milk from this farm, and only two families with children on this milk route were spared. Two of the adults also suffered from a febrile tonsillitis at the same time.)
 Cerebral Affections after Carbonic Oxide Poisoning. C. Sibelius.
 Pathogenic Action of *Balantidium Coli*. E. Ehnrooth.

Centrablatt für Allgemeine Gesundheitspflege (Bonn), 1908. Zweilundzwanzigster Jahrgang, Siebentes und Achtes Heft.

- The Dwellings Department at Stuttgart. J. Stübgen and O. Stübgen.
 The Sedimentation of Organic Substances held in Suspension in Sewage, and its Influence on the Mechanical Purification which takes place in Settling Tanks. Steuernagel.
 The Seasonal Prevalence of Infectious Diseases in Vienna in the Years 1891-1900, II. (end). Siegfried Rosenfeld.

Deutsche Vierteljahrschrift für öffentliche Gesundheitspflege (Braunschweig), 1908. Fünfunddreissigster Band, Drittes Heft.

- On the Hygienic Importance of the Preservation of Meat. Hüttner. Conclusions:

1. The fresh meat of healthy animals should alone be preserved.
2. The best and readiest method of preserving fresh meat is preservation in cold stores fitted up and administered in a hygienic manner.
3. The most appropriate method for the preservation of meat for a longer time and for military purposes is that of Appert.
4. The addition of antiseptics (boric acid, salicylic acid, sodium sulphide) should be forbidden by law. Common salt may be added, or smoking of meat may be permitted.
5. The surest means of sterilizing meat is a boiling heat. For military purposes the interior of the meat should be heated to 100° C.
6. Flesh powder for soldiers in war and pickled meat for sailors are suitable.
7. No preserved meat should be used for a lengthened period. Care must be taken to change the diet under all conditions.
8. The date and method of preservation should be stated on all preserved meats.
9. All meat, whether preserved or fresh, should always, when possible, be eaten only after being cooked.

Beer and its Adulteration. Theodor Struppler.

Our House Refuse Disposal from a Hygienic Point of View. Stakemann.

Conclusions:

1. House refuse contains much infectious material, and is constantly accumulating, so that the unhygienic disposal of it is a danger to public health.
2. The collection and disposal of it should be undertaken by the authorities of all great towns, and should not be left to the occupiers.
3. The collection is best made in light tin-plate bins, which are emptied into the collecting waggons at night-time only. The collection should be as frequent as possible—at least twice weekly.
4. In rural districts house refuse must be carefully disposed of in the soil.
5. In large towns the refuse should be burnt to cinders.
6. This method is the only unobjectionable method from a hygienic point of view.

On the Question of Communal Water-supplies. Julius Schmidt.

The Bacterial Contents of the Waterworks of the Public Water-supplies in the District of Arnsberg. Springfield.

The "General Exposition for Hygienic Milk-supply" held in Hamburg, May 2nd to 12th, 1908. E. Pfeiffer.

The Nutrition of Soldiers from a Physiological and from the National Economical Standpoint. Felix Hirschfeld.

Hygienische Rundschau, 1908.

(No. 5.) The Housing of the Working Classes Question in Berlin. H. Albrecht.

A PERMANENT Census Bureau has just been established by the House of Representatives of the United States.

CLASSIFICATION OF PNEUMONIA.—Dr. Clive Riviere (*Lancet*, July 18th, 1903) states that broncho-pneumonia may be said not to occur after the age of three years except as a complication of the specific fevers. Exceptions are so rare that pneumonia in the later years of childhood may be regarded as "croupous" with great confidence.

PUBLIC HEALTH:

The Journal of the Incorporated Society of
Medical Officers of Health.

VOL. XVI. No. 2.

NOVEMBER, 1908.

EDITORIAL.

THE PRESIDENTIAL ADDRESS.

THE great experience of the newly-elected President in all matters pertaining to rural sanitation enabled him to speak with authority upon a subject of the highest interest and importance to medical officers of health, especially to those holding office in rural districts. It is doubtful whether any, save those engaged in rural sanitation, realize the difficulties encountered in attempting to provide suitable water-supplies for villages, hamlets, and small groups of houses. Towns with large populations and corresponding ratable values can always, in this country, provide ample supplies of good water at a reasonable cost, and the only difficulties are those of an engineering character. Funds being available, the services of competent engineers can be secured and the difficulties overcome. In thinly populated districts the expense of providing a public supply is usually much greater per head of population, and the works to be undertaken are too small to be deemed worthy of consideration by any eminent engineer; consequently, if the medical officer of health or the local surveyor cannot devise a scheme and prove its practicability, a public supply is not likely to be provided. In urban districts the medical officer of health has usually little to do with the water department, and frequently the head of this department objects to any interference by the medical officer. In rural districts, on the other hand, everything connected with the water-supplies—the quantity, quality, distribution, etc.—is more or less under the supervision of the medical officer, and if localities are badly supplied, the local authorities look to him for advice as to how a suitable supply can be obtained. When new houses are erected he has to examine the proposed supply, and certify whether it is

is a reasonable supply of wholesome water available within a reasonable distance. All this presupposes that the medical officer of health has no mean knowledge of chemistry, geology, and engineering, and it is quite certain that no such officer in a rural district can properly discharge his duties unless he has made a special study of these subjects. As Dr. Groves says, he should at least be acquainted with the leading facts of physical geology, and know how to utilize the information furnished by the various maps issued by the Geological Survey.

Dr. Groves is somewhat optimistic in his views as to the expense at which rural water-supplies can be provided. He appears to have forgotten that nearly every such scheme must be carried out with borrowed money, and must therefore receive the sanction of the Local Government Board. By the time this sanction is acquired the scheme will no longer be a simple one, but as complicated with duplication of pumps, engines, mains, etc., as though it were a scheme for a large town, and of vital importance that the district should never for a single moment be deprived of water. Moreover, the expense will have so increased that probably the authority will abandon the scheme. The requirements of the Board are certainly preventing the carrying out of many small schemes which would provide supplies infinitely better than those which at present exist. Rural authorities should be encouraged rather than discouraged, and the Local Government Board could help greatly in this by showing that it is anxious to assist in reducing the cost of such schemes to the minimum, compatible with reasonable efficiency. Comprehensive schemes for supplying groups of parishes have been carried out within recent years in several counties, and it has been found possible in this way to provide water for an exceedingly scattered population at a fairly reasonable cost. Dr. Groves justly remarks that by obtaining such supplies "we do far more than give the people wholesome water to drink—we increase enormously the use of water for domestic, dairy, and other purposes which affect the interests of the public health, and we effect an incalculable economy of labour and time, and save the money they represent." He might also have added that the market value of the land in the district is considerably increased, and a great inducement offered to the town dweller to move into the country.

Apart from the provision of public supplies, Dr. Groves shows that very much could be done to improve present conditions were the springs and wells now utilized, more adequately protected, and his remarks on the methods of effecting improvements are well worth

consideration. There is no doubt that in the country one has to make the best of existing conditions. It is folly to close a well and cut off a source of supply if by so doing the people are driven to obtain water from even more dangerous sources. Even rain-water supplies may be rendered available for many domestic purposes if builders and others accepted the common-sense suggestions of the president, and constructed proper receptacles, and took sufficient care to prevent fouled water entering the tanks. Only in exceptional cases can sufficient water be collected from a roof to supply all the requirements of the inmates of the house. It is a mistake, therefore, for Rural Sanitary Authorities to grant water certificates for new houses when no other provision has been made. However large the storage tanks, the supply fails during the summer months, the tenants, naturally, complain to the Authority, and the troubles of the medical officer of health begin. Incidentally, Dr. Groves also refers to a subject which is as interesting to the urban medical officer as the rural, and that is the danger of relying too much on the results of chemical and bacteriological analyses. Notwithstanding the frequency with which both have been found misleading, there is still a tendency to trust them rather than to make careful inspections of the source from which the water is obtained. Analyses are fluttered in the eyes of the public, and dazzle them; meanwhile sewage pours intermittently into the well, and sooner or later produces an outbreak of disease. Dr. Groves does not wish to minimize in the slightest degree the value of water analysis. It has its own important place, especially in determining whether the mineral constituents are objectionable, either on account of their quantity or quality, but no analysis, chemical or bacteriological, can tell whether any given source is "safe."

The danger of trusting to small filter-beds without proper supervision is another point worthy of emphasis. With skilled management they may be trusted to insure the bacterial purity of a water, but improperly managed, the filtered water may be actually worse than the unfiltered. Neither can domestic filtration be trusted, and a suspicious water should always be boiled before being used for drinking purposes.

The importance of a good and pure supply for dairy purposes is also insisted upon. The filthy condition of cows and cowsheds and dairies in many rural districts is chiefly due to the limited supply of water, and the danger arising from washing dairy-vessels in polluted rain-water cannot be too strongly urged. This danger is one which affects the town dwellers who consume milk from such country dairies, and it is to their interest, as well as to the interest

of the rural population, that better supplies of water should be rendered available in agricultural districts.

No doubt Dr. Groves' able address will direct attention to this subject, a subject which, as he justly observes, is "of momentous concern to each one of us, for it affects very closely the interests of the public health, the guardians of which we are."

DR. B. A. WHITELEGGE, C.B., His Majesty's Chief Inspector of Factories, has been appointed President of the Epidemiological Society in the place of the late Dr. W. H. Corfield.

THE RAINFALL DURING THE SUMMER MONTHS.—The exceptionally severe rainfall in the lower Thames Valley during the past summer gave rise to the impression that the condition was widespread. In *Symons' Meteorological Magazine* (September) it is shown that in North Wales, Lancashire, and the West of Ireland, the summer was actually drier than the average, and by far the greater part of the British Isles had a total rainfall for June, July and August less than 25 per cent. in excess of the average. The heavy falls were confined to the south-east part of England. Eastward from the borders of Cornwall and Wales to the North Sea the excess much exceeded 50 per cent., and within a roughly circular area, with a radius of about forty miles from London, the excess was greater than 100 per cent.—in other words, more than twice the normal amount. June was the wettest, and August the least wet, of the three months as a rule. At Camden Square the average fall for the three summer months is 6.25 inches; this year it was 15.87, two and a half times the average.

FACTORS IN SPREADING TYPHOID FEVER.—During twenty-five years, reports to the State Board of Health showed that typhoid fever existed in Michigan inversely as the depth of water in wells. Recently there has apparently been a marked change in this relation. From March 1st to June 30th, 1903, the average depth of water in the observation well at Lansing has been over twice as much, and the typhoid fever over 80 per cent. more prevalent than the average for the ten years preceding. The unusual spread of typhoid fever in Michigan, notwithstanding the existence of conditions which hitherto favoured its decline, may be due to several facts, such as that one circuit judge has decided that typhoid fever is not a communicable disease, dangerous to the public health, and some boards of supervisors have refused to allow bills for expenses incurred by local health officials for the care of indigent typhoid fever patients, thus practically putting a stop to local work by health officials for the restriction of typhoid fever in those parts of the State. In cities, especially in Menominee, typhoid fever is and has been a great factor in the mortality rate. Even the Detroit Board of Health takes no action to require reports from householders and physicians, or other measures for the restriction of this dangerous communicable disease, such as placarding of premises and disinfection of discharges and of premises after death or recovery of patients.—*Journ. A. M. A.*, July 26th, 1903.

RURAL WATER-SUPPLIES.

By JOSEPH GROVES, B.A., M.B., F.G.S.,
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President of the Society.

WHILE the conditions of life in cities and great towns, and the sanitary problems they present, necessarily absorb much of our attention, the significance of the rural districts in relation to the health of the community as a whole is not, perhaps, sufficiently emphasized. We do not always seem to recognise fully the immense importance to the urban populations of the sanitary condition of the rural districts, and the arduous and responsible nature of the labours involved in their charge.

The cities and towns overflow their boundaries, and suburbs of workmen's dwellings and of better-class houses spring up under the sanitary supervision of the rural authorities. As locomotion is quickened and cheapened, the urban populations will go farther afield at night, for in the future distance will be measured by time rather than by miles. Many of the rural areas contain considerable, some of them very ancient, towns, and half-grown and embryo towns, and rising watering-places and health-resorts, and large and small agricultural villages, all of which present their own, often very difficult, problems. The whole population, urban and rural, is largely dependent upon the country districts for their food-supplies, of which, milk, vegetables, fruit, and what are known generally as dairy produce, form such a large proportion; and shell-fish are collected along the coasts and estuaries and creeks of rural districts, and sent into the towns for consumption. The sanitary administration of the rural authorities should therefore be of the highest interest, for upon its efficiency depends to a large extent—to what extent we cannot know—the protection of the health of the whole of the people in the present, and the proper development of the towns in which will dwell so many thousands of the population in the future.

If there be one factor of the many factors of sanitation more dominant than another in a rural sanitary district, it is that of water-supply, and it is upon the subject of rural water-supplies I propose to address you.

The sources of supply vary in different districts and in different parts of the same district, sometimes within very narrow limits.

* Presidential address delivered on October 9th, 1903.

Surface Supplies.—Many dwellings in the country, even farm-houses, are dependent entirely upon rain water collected from the roofs. Rivers, streams, rivulets, land-drainage, ponds, ditches, shallow dip-holes in the Drift, or alluvial sand and gravel, are examples of sources of surface supplies.

Wells.—Surface soak-wells, wells sunk to a water-bearing stratum, and deep wells are those usually found.

Springs may be divided into springs from the surface-drift and alluvium, and springs from the older rocks.

Speaking generally, surface-supplies liable to contamination furnish the large majority of the rural population with water, while a comparatively small minority are supplied by springs from the older rocks and deep wells not liable to pollution, either directly or by means of public supplies in the rural parishes, or by extension of the urban water-mains into the rural districts.

The origin of the supplies is in the rainfall. Reaching the earth as rain, which it for the most part does, it sinks into the soil in proportion to its porosity. If it falls faster than it can be absorbed, it runs off to the watercourses, or accumulates on the ground. The extremes of permeability are sand and gravel on the one hand, and clay and igneous rock on the other, and there is every degree between. If there are crevices and fissures in the subsoil-rocks which lie near the surface, or if the rock itself is exposed, the water rapidly passes away.

Much of the land in some parts is covered by Drift or Alluvium, recent formations which are usually very porous and sometimes of great thickness. They consist of sand and gravel and larger débris of older rocks. The water is held up in them by beds of clay at quite shallow or varying depths, and is made use of for supply.

Water-bearing Tertiary rocks may be at the surface or at considerable depth beneath it. For example, the Bembridge Limestone, in which the water is held up by the Osborne Clay, where it exists, is often a most useful source of domestic supply. The Headon Beds and Upper Bagshot Sands, in which the water is held up by the Barton Clay, and the Bracklesham Beds and Lower Bagshot Sands, in which it is held up by the London Clay, are deep sources of water-supply. In some Tertiary districts the clays cover miles of the surface, and the bulk of the water-supply is obtained from pockets filled with sand and gravel.

The Chalk at the top of the series is the great source of public water-supply among the Secondary rocks in many districts, and especially in the South of England, where it is at the surface. In some parts of the formation the water circulates in great

fissures, descending to saturate the Upper Greensand, beneath which the Gault Clay stops its progress. The Chalk may be denuded away, leaving the Upper Greensand to receive the rainfall directly; or by denudation the Gault may be exposed over wide districts, in which the absence of wholesome water is a great sanitary difficulty. Similarly, the Gault may be removed, leaving the Lower Greensand exposed, in which the water is held up by the Weald Clay. Or the Lower Greensand may have disappeared and the Wealden be at the surface, forming a large waterless area.

In one rural sanitary district twenty-one miles long and sixteen miles broad at its widest part, all the conditions described are present, and water-supplies are obtained from each of the formations indicated.

Below the Lower Greensand the Oolitic rocks hold abundant water: in the Upper Oolite, held up by the Kimmeridge Clay; in the Cornbrash, held up by the Oxford Clay; and in the Lower Oolite, held up by the Lias Clay. In the Marlstone series between the Upper and Lower Lias is a copious supply, and the same may be said of the New Red Sandstone and Magnesian Limestone. Below the Coal Measures in the Old Red Sandstone there are porous water-bearing beds of considerable thickness. But the lower Primary rocks, the Silurian and Cambrian, afford scanty supplies, and the discovery of underground water in the unstratified rocks is very uncertain, as it makes its way by fissures, the direction of which cannot be traced.

The water falls, and it is immaterial whether it be rain, dew, or has other atmospheric sources; and if the land be absorptive, it passes slowly down from particle to particle, carrying organic impurities with it—which undergo chemical change and ultimately disappear—until it reaches an impermeable stratum, and it is then stored up at greater or less depth beneath the surface in some such reservoir as those just mentioned. These are not like artificial reservoirs, for in obedience to gravity, pressure, and other forces the water circulates, moving along the lines of least resistance, and sometimes under pressure rising again against gravity. Should it reach the surface above the impermeable stratum, as on the side of a valley which has cut the formation across by denudation, it issues as a spring. The spring may simply be the overflow of a natural reservoir, as in the Chalk where the tilted Tertiary Clay lies against it, and the water flows out over its lip or edge.

The water carries down with it, of course, impurities lying beneath the surface, and also if the pervious bed be of no great

thickness, it may not be decomposed and rendered innocuous. I have said that some rocks are much creviced and fissured, and some are channelled and hollowed. In districts where these exist it is within the experience of most that great efforts are made when forming a cesspit to find an opening in the rocks (a fissure in the chalk, a crevice in sandstone or a channel hollowed out in limestone) and there are many instances of sewage containing disease-germs being carried long distances practically unchanged to water-bearing strata, and causing outbreaks of such diseases as enteric fever, the water being in such large volume that chemical or bacteriological analysis failed to detect impurity.

Such examples emphasize the importance of adhering strictly in rural districts to the sanitary test of wholesome water, which is the only reliable test: water free from the possibility of contamination by the poisons which produce disease. I do not wish to minimize in the slightest degree the value of water-analysis. It has its own very important place, and especially as regards the mineral constituents of water. But it is not the test of wholesome water, and it does not usually apply until water at risk is already poisoned, and then, perhaps, mischief is already done. Moreover, water may be potent for evil, and the methods neither of the chemist nor the bacteriologist may be able to appreciate the fact. I remember an epidemic of enteric fever in which there were four or five hundred cases and a mortality of 10 per cent. Spot-maps pointed out the public water-supply as the source of the poison. The chemists declared it an excellent potable water quite free from organic impurity, and the bacteriologists pronounced it so pure that it contained only 150 micro-organisms to the c.c., not one of them pathogenic. Drop samples were taken and examined, with the same result.

Now, the sanitary test had often been applied to this water-supply, and the conditions did not satisfy it. People were advised to boil the water before drinking, and many did so; but the analyses were fluttered in the eyes of the public, and dazzled them. The water was pumped from a new tube-iron well sunk into the Chalk. Into this new well flowed the water from the old stone-stained well. There were ancient leaking cesspits within a couple of hundred yards from this well, and it was discovered a stone of the staining had been displaced, and through the gap came a perennial stream from the neighbouring millpond. No wonder they had an abundant water-supply. A fortnight or so after the communication between the two wells was severed fresh cases ceased. People who drank from the millpond and the stream which fed it did not get enteric, which may be explained, perhaps, by the fact

observed by Dr. Percy Frankland, that river-water containing millions of micro-organisms to the c.c., in which a part of the stool of an enteric fever patient was placed, did not produce the disease after five days, whereas deep-well water containing 150 micro-organisms to the c.c., similarly contaminated, produced enteric fever after thirty-five days.

As I have already said, the rural populations are largely dependent for their water upon surface-sources of supply, the majority of which probably would not satisfy the sanitary test of wholesome water. But to a large extent their use is inevitable, and there only remains to adopt the most stringent methods available to secure the greatest amount of protection possible. In almost every rural district one would expect to find some dwellings dependent upon rain directly for water-supply. Apart from certain dietetic considerations, rain-water, if properly collected and stored, is not an undesirable drinking-water, and it is, of course, the best possible for household purposes. But how rarely is it thus collected and stored! The desiderata are underground water-tight ventilated tanks of such ample capacity that overflow pipes are unnecessary when the house is occupied; some mechanical arrangement for rejecting the first water, which contains the washings of the roofs and gutters, if possible; the discharge into capacious covered gullies in which much of the foreign matter will be deposited, which have overflows into the first chamber of a filter divided by slates, which reach nearly to its floor, and filled with natural filtering material, sand, grit, layers of gravel graduated in size, chalk and larger stones. The water passes down one section of the first chamber and rises up through the second section, from which it overflows into the first section of the second chamber, and finally into the tank or reservoir, the number of chambers necessary being determined by the quality of the water when it reaches the tank. The catch-pit should be cleansed weekly or oftener if necessary, and the filtering material should be renewed at least once in six months. While a certain number of householders even among the peasantry will attend to their water-supply arrangements perfectly, the majority neglect them, and rain-water supplies are usually abominably unwholesome. In the present state of education and intelligence of the people, efficient sanitation in rural districts involves automatic arrangements.

Rivers and perennial streams not only provide water for all purposes to those living on and near their banks in many districts, and in dry summers in clay-districts to man and beast for miles round at great cost, but they are frequently made use of for public

supplies. Rivers and streams are the natural drains of a country, and if that country be highly cultivated or populated, a large amount of sewage and filth containing the poisons which produce disease must find their way to them directly or indirectly. And when one considers what large populations make use of them for drinking, dairying, and every purpose, we can only suppose that greater evils than those we know of, such as widespread outbreaks of disease, do not more frequently occur, because of the absence of cholera from the interior of this country, and because the toxins produced by the myriads of beneficent micro-organisms which their waters contain destroy the pathogenic microbes which find their way to them. For public supplies river-water is filtered, but one cannot be blind to the risks as one observes the weak links which might, and sometimes do, give way. I connected outbreaks of sickness in a rural district some years back with the so-called cleansing of such filtering-beds, and found it was considered necessary because of the accumulation of a jelly-like mass over them. This jelly contained a vast mass of microbic life. Since the beds have been left alone these epidemics have ceased. Any effective private treatment it seems impossible to apply generally, and we have to fall back upon boiling the water for drinking; but in connection with dairy-work this precaution is too universally neglected, and it is no uncommon thing to see dairy-vessels being swilled out in the convenient stream or river, which may be not far below the intake of the farmyard drainage or the mouth of a sewer.

The smaller streams are used and fouled by cattle; they receive the drainage of farmyards, and in the best cared-for districts cesspit-overflowers are surreptitiously carried to them, not infrequently at night. In villages on clay they are the only source of water-supply apart from rain-water, which cannot be collected from thatched roofs. In dry seasons they may cease to flow, and the water is dipped in meagre quantities from muddy holes in their beds. The mud is allowed to subside in the buckets, and the supernatant water is ladled from them, or run off into other buckets, tubs, or pans. Any rain-water stored in the usual small tanks has been long since exhausted, and the dairyman or market-gardener, under the pressure of business, may not be able to wait for the muddy water to clear even. The admonition to boil the water for drinking may not be heeded, but in many villages in the South of England the cottagers drink weak tea at every meal, a large brew being made for the children to take to school and the husband and elder boys to work, as well as for use at home between meals.

Rivulets on the hillside, especially if near the spring, are useful. They are easily managed. Little reservoirs are sometimes made by the cottagers on their course, from which they dip, or from which the water is piped to a lower level, and the farmer may pipe it to troughs for his cattle, and turbines throw it possibly to the tops of country residences, but very seldom to a farmhouse. It is often worth while to look after such supplies, and much may be done at little cost.

An agricultural drain-pipe projecting through a bank and discharging into a ditch water from land-drainage is a boon to many a cottager, and as the pipes are laid at a good depth to avoid the plough, the water, though possibly liable to contamination, is not necessarily unwholesome, and it is often soft.

In some parts of the country ditches, especially in clay districts and in times of stress, are much resorted to. They are very liable to pollution, particularly near dwellings.

Ponds are sources of water-supply in some sections of almost every rural district. They are subject to pollution. Cattle usually drink from and foul them. Having regard to milk-supplies, there is one universal pond which demands attention: that which receives the drainage of the farmyard. The British farmer insists it must be right for the cows, as they like to drink the water more than any other, he supposes because it is drink and meat at the same time, and if the milk is not flavoured by it, he cannot see that it matters.

Dip-holes are shallow wells or depressions in water-bearing ground. The water is held up by clay not far beneath the surface, as where the Upper Greensand is thinning out over the Gault, or sand and gravel fill a pocket in the clay. Although liable to surface contamination from dirty buckets and in various ways, some of these dip-holes, when situated in the corners of permanent pastures and protected from cattle, are far less objectionable than dip-wells in cultivated gardens.

Wells are the chief sources of domestic water-supply in most rural districts. The majority are surface soak-wells, and in the agricultural villages they are usually dip-wells in vegetable gardens highly fertilized with pig and human manure. They are loosely steined with brick or stone, and their heads are not generally raised above the surface of the ground, although they may have covers for the protection of the family in another sense than from contamination of the water. Houses of a better class are often situated on gravel, plateau gravel, or gravel contained in pockets of the alluvial clay. They have similarly constructed wells, but they are sealed by pumps. The houses drain into cesspits also

loosely stained. The sewage is supposed to soak out of the cess-pit and the water into the well, but as a matter of fact the sewage and water stand at the same level in the respective wells, the level of the underground water, or, in other words, the houses drain directly into the reservoir from which the water-supply is drawn. When the underground water-level is at some depth below the surface in country villages, the wells are somewhat less liable to pollution, if only because the water is raised by means of a windlass and the same bucket lifts it. If the underground level is below 28 feet, this is the universal method of drawing it in many parts, for force-pumps are not often met with. If it be at considerable depth, a public well often serves the village-community, the water being laboriously raised by windlass. In such districts the farmsteads depend upon the same method, great economy in the use of the water being observed to save labour. These deep wells are not infrequently found to have become contaminated in the course of ages. In many of the villages, and not a few of the towns in rural districts, there are public pumps to which the people go for their drinking-water, that in their private wells having gradually become too nasty to drink. It is not unusual for the public wells to be closed one after another for the same reason, the subsoil having become more and more polluted as population has become crowded. In many rural districts now the deep tube-wells to reservoirs hundreds of feet below the surface are coming into use for domestic as well as for public supplies.

Often one of the most difficult questions to decide in a rural district is the advisability of closing wells. The well-water in a populous village may either be already contaminated or in imminent risk of contamination. To close the wells would be to cut off the water-supply and to drive the people to even more dangerous sources. The decision taken must depend upon the circumstances, but greater security may be generally obtained by reconstructing the wells. If the well be of moderate depth, the upper 6, 8 or 12 feet, as the case may be, of the brickwork should be rebuilt in cement, and should be surrounded with 9 inches of well-puddled clay or concrete, which is better. The head should be raised above the surface in concrete, or brickwork in cement, covered with concrete, and a pump fixed. For shallow wells concrete should be used throughout. Driven tube-wells, however, are safer and more economical. In reconstructing deep wells, the precautions taken will depend greatly upon the nature and porosity of the surface-beds through which it passes. It may be more economical, and often it is more satisfactory, to drive or bore a new well, the means

for doing which are much improved. Trouble is sometimes experienced in these wells from the wearing of the pumps by sand, as when they are sunk to the Bagshot Sands, the great water-bearing beds of the Tertiary rocks. This may be obviated by the use of the air-lift pump.

But although very much may be done to increase the comparative safety of wells and other sources of rural water-supply, and although as regards new buildings we have it entirely in our own hands to refuse the water-certificate if the sanitary test of wholesome water be not satisfied, even if we are not supported by bye-laws, which we should be, our best efforts will effect far less than we could desire. It has long seemed to me there is but one method by which the health of the dwellers in rural districts, and indirectly of the urban populations, can be satisfactorily secured in connection with rural water-supplies, and that is by having independent public supplies. By obtaining such supplies we do far more than give the people wholesome water to drink: we increase enormously the use of water for domestic, dairy, and other purposes which affect the interests of the public health, and we effect an incalculable economy of labour and time, saving the money they represent, for turning a tap is a very different thing even to pumping from a well. If this saving could be calculated in pounds shillings and pence, it would be found, probably, that an independent water-supply in many rural parishes would cost nothing. A £2,000 gravitation-scheme would cost £100 a year for sinking fund and interest, and another £10 for expenses would probably cover the annual outlay. If the water-rent did not meet this charge the balance would not be appreciated in the rating, and if they exceeded it the credit-balance would help the rates. But such considerations are scarcely appropriate, for the community must expect to pay for their protection.

The simplest method of obtaining a water-supply for a parish is to go to the head of a perennial stream, high up on the side of a hill if possible (for a gravitation-supply is, of course, the most advantageous) to collect the water as it leaves the rock in a sufficiently large reservoir for the needs of the population, and pipe it through the parish. If some of the water-bearing strata are at the surface in such a position, as, for example, the Upper Greensand, in which the water is very evenly distributed, it may be necessary only to drive an adit into the hill a few feet above the impervious stratum to obtain sufficient water. If the Greensand is below the surface and the Chalk above it, the water may be obtained in a similar manner, but the strong Chalk-springs often issue at a considerable elevation,

If a gravitation-supply is not practicable, it is necessary to pump to a height from which every house in the parish may be supplied. If there is no commanding hill, a water tower must be built. Assuming it is necessary to go beneath the surface to no great depth, an iron cylinder well must be constructed from which to pump. If a sufficient quantity of water can only be found at a great depth, it may be hundreds of feet down, a tube well must be driven or bored.

In a non-gravitation supply, if the water issues at the surface in sufficient volume, it may be possible to raise it by ram or turbine. If not, or if it is beneath the surface, a wind-pump is the most economical means of raising it, and if the reservoir has ample storage-capacity it may be sufficient. Or an oil- or gas- or small steam-engine may be used, but this would increase the annual charge, which is a consideration in a purely agricultural parish.

If I were asked how a medical officer of health may be enabled to indicate to his authority the existence of a porous stratum in which enough water is held up, by a bed of clay or other non-permeable rock, to supply the population of a particular parish or combination of parishes—and the cost is less if parishes can be combined for purposes of water-supply. I should say every medical officer of health of a rural district should be a geologist. I do not mean that he should necessarily be learned in geology or be a practised palaeontologist, but he should be familiar with the elements of the science, and be acquainted with the leading facts of physical geology. Then with local knowledge, the aid of the Drift map and the sections of the district of the Geological Survey, and, "when needful, the help of a competent geologist" (such as my friend and our brother member Mr. W. Whitaker, F.R.S.), he would not be likely to lead his authority astray.

Gentlemen, in place of narrating to you the results of any special investigations I may have made, I have preferred, as your President, to bring before you, if inadequately, a practical subject which is of momentous concern to each one of us, for it affects very closely the interests of the public health, the guardians of which we are. But although it is common to all of us, I felt when choosing a subject appertaining to rural administration something of sympathy and encouragement would be conveyed to some among us whose labours are least known, who are struggling in the face of adverse influences to do their duty, and who have no possible recompense but that of an approving conscience. As a class, medical officers of health have many disabilities and great responsibilities; our work receives

little recognition: we are even denied the means of making it more efficient, but we have our compensations. I sometimes think that a man who, in the presence of strong opposition and contumely, perhaps knowing that he risks his chance of reappointment, is the means of securing to the people of only one parish the blessings of an independent water-supply, has not lived in vain.

THE TREATMENT OF SMALL-POX.—R. B. Sandall, from his experience in the Philippines, believes in the practice of opening the pustules freely. He would use antiseptic baths from the very beginning, and keep the skin as nearly aseptic as possible. As soon as the spots became vesicular, open the top and remove all contents, applying antiseptic solution to the whole open surface. The pustules, after they have formed, should be treated in the same way, and the skin kept free from pus. The vesicles, once thoroughly opened and destroyed, do not proceed to pus formation, and absorption of the poison is avoided.—*Journ. A. M. A.*, July 11th, 1903.

FIRE HYDRANTS A SOURCE OF WATER POLLUTION.—Attention is drawn in the *Sanitary Record* (December 18th, 1902) to a practice of water companies and local authorities owning water-supplies of fixing fire-hydrants in public roadways, in chambers which are almost universally built in rough brickwork, and which are generally to be found in a filthy condition from the surface washings of roads. Frequently, too, they are found to be connected to road gullies and sewers so as to drain off the water. These hydrants, especially of the patent class with ebonite ball, readily admit the foul water from the chambers or pits in which they are placed, and, when the mains are temporarily emptied, such foul matter is inevitably drawn into the water mains. It is very desirable that, as regards both hydrants and air-valves on water mains, they should be effectually protected in water-tight chambers, so as to insure that public water-supplies are no longer dangerously polluted through them.

THE IMPORTANCE OF GOOD BREAST MILK.—It has for many years been an accepted fact the world over that the mortality of infants who are fed on good human milk, obtained from their mothers or other healthy women, is lower than that achieved by any other method of feeding. It should, however, at once be insisted on that experience has also shown that it is good human breast milk, and good according to the modern sense of the word, which has produced these results. Poor milk from human beings, poor because it contains inadequate percentages of the various elements of the milk, such as the fat, sugar and proteids, or because of the improper combination of these elements, can, as it has often been proved, produce diseases, especially those which are connected closely with nutrition. The most common of these diseases are rachitis, infantile atrophy, infantile scorbutus, and the various gastro-enteric disturbances, which not only lead to malnutrition, but also render the infant vulnerable to specific diseases caused by specific organisms.—T. M. ROTCH, *American Medical Journal*, xli., No. 6, August 8th, 1903.

FURTHER OBSERVATIONS ON THE INFLUENCE OF THE CONSUMPTION OF SHELL-FISH ON THE SEASONAL INCIDENCE OF TYPHOID FEVER.

By J. T. C. NASH, M.D., D.P.H.,
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In April last I had the honour of reading a paper before the Epidemiological Society of London on "The Seasonal Incidence of Typhoid Fever," in which I advanced my view that the seasonal incidence was very largely a mere coincidence dependent upon the seasonal consumption of shell-fish (particularly cockles, oysters, and mussels). I elaborated this theory on various lines, and exhibited numerous charts and diagrams which I constructed from the typhoid fever returns of various towns for a period of years.

I had previously drawn attention* to the fact that the minimum of typhoid fever occurred during the close season for English oysters and indifferent season for other shell-fish, while the maximum was rapidly attained after August 4th, when the "close" season terminated. I also constructed a typhoid fever curve for Southend† for purposes of comparison with the curve for London, 1869-1890. These curves showed that in Southend typhoid fever incidence rose to great excess in September, and rapidly declined thereafter. In London, on the other hand, typhoid deaths were most numerous throughout November. I pointed out that the difference in these curves was easily explicable on the assumption that shell-fish played a great part in the seasonal incidence of the disease.

In Southend twenty out of twenty-two shell-fish shops shut early in October until the following seaside season. In London, on the contrary, the consumption of oysters is, perhaps, at its height during October and the early part of November.

I have from time to time made further researches into this question, and I have published my results, both in the paper I read before the Epidemiological Society, to which I have already made reference, and which will appear in the forthcoming volume of the *Transactions of the Epidemiological Society*, and also in a contribution at the Congress of the Royal Institute of Public Health at Liverpool, which will shortly appear in the *Journal of State Medicine*.

* *Journal of the Sanitary Institute*, vol. xxiii., part. iv., p. 892.

† *Ibid.*, p. 898.

I propose in the present instance to give a few local details which I think it will be admitted prove my contention as to the seasonal incidence of typhoid fever (in Southend, at any rate) being merely a coincidental circumstance dependent upon the increased consumption of shell-fish during August and September. How, then, does the incidence of typhoid fever in Southend support this proposition? The Southend morbidity curve clearly shows that September is by a long way the month of greatest typhoid incidence in Southend. I shall therefore deal specially with the September notifications.

During September, 1902, thirteen cases of typhoid fever were notified in Southend. Close inquiry showed that eleven of these admitted shell-fish (cockles and oysters) within the incubation period (one day to four weeks).

During September, 1903, fifteen notifications of typhoid fever were received, all of which gave a history of shell-fish. The facts I shall presently adduce will satisfy any unbiassed but critical mind that unquestionably all the probabilities are in favour of these cases being due to the consumption of polluted oysters and cockles.

It has been my practice for the last two years to have inquiries made as to a history of shell-fish in all cases of every notifiable disease. This enables me to furnish some facts and figures which are extremely significant. I give the figures for 1902 and 1903 (January to September) in tabular form:

Inquiries as to Shell-fish in Cases of Notified Infectious Diseases in the Borough of Southend-on-Sea.

	1902.			1903 (to September 30th).		
	Total No.	Shell-fish.	No Shell-fish.	Total No.	Shell-fish.	No Shell-fish.
1. All other infectious diseases (excluding typhoid fever)	501*	2	499	163	3	152
2. Typhoid fever cases ...	103	55	48†	31	28	3
Totals ...	604	57	547	194	31	155

Working out the percentages for 1902, we find that only 0.4 per cent. of 501 cases of notifiable disease other than typhoid fever ate shell-fish, whereas no less than 54 per cent. of the cases of typhoid

* Chicken-pox was a notifiable disease during 1902.

† Among the forty-eight cases which denied shell-fish, nine were actually secondary to shell-fish cases, and four others had daily handled uncooked fish.

fever had recently eaten shell-fish; in addition, a further 10 per cent. were secondary to shell-fish cases.

The figures I have collated for 1903 are, if anything, even more conclusive. Here, again, we note the remarkable fact that only 2 per cent. of all other notified diseases, apart from typhoid fever, had eaten shell-fish (and these were neither oysters nor cockles, but whelks), while no less than 90 per cent. of the cases of typhoid fever had recently eaten or handled oysters, cockles, or mussels.

Taking the two years together, shell-fish was admitted in 88 out of 798 cases of infectious diseases, but of these 88 shell-fish consumers, no fewer than 94 per cent. were cases of typhoid fever.

The figures for 1903 amply confirm the figures for 1902.

Surely it is remarkable that in 98 per cent. of thirty-one cases of typhoid fever notified between January 1st and September 30th, 1903, we should have a shell-fish history within the incubation period. (In all but three of these cases the history was definite as to the eating of shell-fish within the incubation period.)

It is no less remarkable that among no less than 168 cases of other notifiable diseases we should have a history of shell-fish in only three cases, while even in these three cases the form of shell-fish eaten was whelks, and not oysters or cockles. Such evidence is glaringly suggestive, but it does not stand alone.

I have prepared a tabular statement of the thirty-one cases of typhoid fever, giving particulars of inquiries as to each case, and an analytical statement of the whole series, from which other remarkable facts are now evident:

1. The twenty-eight cases attributed to shell-fish have occurred in twenty-six different houses, of which no less than eighteen, or nearly 70 per cent., are quite new houses; while in six houses, or no less than 60 per cent. of the remainder, the drains have been tested within the last five years. These facts are altogether against soil pollution.

2. Twenty of these twenty-eight shell-fish cases occurred among adult (or adolescent) males. This fact in itself is strongly against either milk or house-drain infection, in either of which methods of infection women and children would more probably be in the majority of those affected.

3. The cases are widely scattered. This is suggestive of a common food factor, but against pollution of a particular site or of a particular milk-supply.

4. The only discoverable common factor that can bear critical investigation is shell-fish, in most cases obtained from a common source.

The relative ages of the two groups do not materially modify the conclusions drawn as shown in the following statement of cases notified during 1903 to September 30:

	Age Incidence.			
	0-10.	10-20.	20-40.	40 and upwards.
1. All other infectious diseases ...	85	40	25	18
2. Typhoid fever cases ...	4	9	15	8

THE PURIFICATION OF DRINKING-WATER IN THE FIELD.

In a very comprehensive review of the various suggestions which have been made for water purification, Vaillard and P. Georges (*La Presse Médicale*, August 8th, 1903) advocate an iodine method, which yielded good results when employed in a proportion of 6 centigrammes per litre of water. To obtain the iodine in a nascent state, they decompose iodate of sodium with tartaric acid, and then dissolve it in an excess of iodide of potash. To make the method of practical application, the various reagents are compressed into differently-coloured tabloids, in accordance with the following formulæ:

No. 1. Blue tabloids { Iodide of potassium ... 10 grammes.
Iodate of sodium (dry) ... 1.56 "
Methylene blue, a sufficiency.

Divide into 100 tabloids, each weighing 0.1156 gramme.

No. 2. Red tabloids { Tartaric acid ... 10 grammes.
Sulpho-fuchsin, a sufficiency.

Divide into 100 tabloids, each weighing 0.1 gramme.

The simultaneous solution of a red and blue tabloid in a litre of water sets free 0.06 gramme of iodine, leaving 0.0346 gramme of iodide of potassium and small quantities of tartrates of potash and soda in solution. When the liberated iodine has acted for ten minutes, it is neutralized by adding and dissolving in the water a third tabloid, white in colour, and containing 0.116 gramme of hyposulphite of soda.

This chemical sterilization of the water can be carried out in any metal vessel without detriment. In the case of waters heavily laden with suspended matters, a preliminary clarification is desirable. Not more than 1 litre should be used at a time, for in a large quantity of water the excess of carbonates is liable to neutralize the tartaric acid, and so to prevent its action on the sodium iodate.

The procedure is similar in idea to the bromine method of Schumberg,* and the chlorine method recently described in PUBLIC HEALTH by Lieutenant Nesfield.†

* PUBLIC HEALTH, vol. xiv., p. 709, September, 1902.

† *Ibid.*, vol. xv., p. 601, July, 1903.

CAUSATION OF ENTERIC FEVER, APART FROM WATER-SUPPLY: A RECORD OF PERSONAL EXPERIENCE.*

By MAJOR ROBERT CALDWELL, R.A.M.C., F.R.C.S., D.P.H.

Judging from recent publications, there appears to be a rapidly-growing conviction in the mind of the profession that outbreaks of enteric fever frequently originate in causes altogether apart from supplies of water used for drinking purposes, and the experience in this connection of medical officers of the army and navy and civilian practitioners resident abroad have probably, to some extent, formed the basis for a departure from well-worn lines of thought.

My first intimate acquaintance with enteric fever on any extensive scale was at Korosko, a small Arab settlement situated about midway between the first and second cataracts of the Nile, and approximately 800 miles south of Cairo. The native inhabitants were scattered, and inconsiderable as regards numbers. Their only occupation was agriculture in a primitive form, and no endemic disease was known to exist amongst them. Beyond a narrow fringe of dhurra fields north and south of the camp, and a few scattered palms, vegetation of all kinds was absent; to the east the desert stretched in unbroken continuity to the Red Sea; to the west, and in our immediate proximity, lay the river. High hills of volcanic rock within half a mile of the river-banks closed our eastward horizon, while to the west, and therefore on the farther side of the stream, the desert presented the popularly accepted appearance of a more or less level ocean of sand. The soil in the camp was, of course, sandy and intensely dry.

These details have been somewhat dwelt upon, as emphasizing the fact that we were living on a somewhat restricted area, on absorbent soil devoid of vegetation, exposed to excessive heat, intensified by the neighbouring rocks, and in the immediate proximity of a river the waters of which, as is well known, undergo remarkable alterations in volume at certain seasons of the year.

I first reached the place in question in May, 1885; the force at this time consisted of about 850 officers and men, and, I should state, a high degree of sanitary efficiency prevailed. The camp was mainly occupied by the Queen's Own Cameron Highlanders, men of splendid physique and singularly free from sickness of any kind

* Read before the West of England and South-Western Branch.

except a transitory fever which attacked European new-comers and which appeared to be entirely local. Its clinical manifestations closely resembled those of influenza; the febrile symptoms never lasted more than a few days, and I never heard of sequelæ of any kind. What its causation was I do not know, but it certainly bore no resemblance in any respect to our accepted views of enteric fever, and there is no reason whatever to believe that it was in any way connected with that disease. It was an excellent example of a malady entirely dependent on some local but undiscovered condition. I hope to cite later on a somewhat parallel case of a far more serious state of affairs in which the cause of the trouble was to some extent better appreciated.

About two months after my arrival I was ordered to Cairo on duty, and was there placed in medical charge of a company of mounted infantry proceeding to the front. Our progress up the Nile, owing to the weight of the barges containing the horses, was necessarily slow, and an interval of almost two months elapsed between our departure from Cairo and our arrival at our destination, which was Wady Halfa. During this time there is no doubt whatever that the men did not confine themselves to boiled water for drinking purposes. Scientific filtration was unknown; what was called, in courtesy, by this name consisted in allowing water to trickle through the germ-laden pores of a filthy earthenware jar, and to collect in another receptacle of a more or less similar nature; and yet from the day we left Cairo to the day we arrived at Halfa not one man, to the best of my recollection, exhibited any sign of sickness in a serious form. On arriving at Halfa, I received orders to proceed to Sarras, an isolated post some miles on the south side of the second cataract. The local conditions at the spot named closely resembled those detailed in connection with Korosko.

A point well worthy of most particular attention is that several months had elapsed since the ground upon which we camped had been occupied by any considerable number of troops. Owing to circumstances which need not be stated here, many sanitary precautions—notably the boiling of drinking-water—could not be regularly carried out, and even the crude method of filtration named above was largely neglected; but perhaps on the whole this was just as well. Local conditions were certainly not conducive to comfort; the heat of the day was only equalled in intensity by the cold of the night, and the latter was not mitigated by the circumstance that for some weeks we were sleeping for the most part without camp-beds, tents, or stretchers, and in some

cases without blankets. The total force present averaged about 800 officers and men, and the state of things which I have named lasted for a period of fully six weeks. During this time I do not remember ever to have seen a case which in any way suggested the existence of enteric fever; on the contrary, the health of the men was, on the whole, excellent. I returned to Korosko early in December of the same year, and found that tents had almost been entirely replaced by huts, and that many comforts were now obtainable which were previously unknown. Unfortunately, the health of the troops was more or less in inverse ratio to the degree of comfort which they were enjoying. Enteric fever and dysentery were rife during the winter and succeeding spring, the former disease especially existing in a form of extreme severity. The force at this time, I should state, was about 700 strong. That two bodies of men placed under the same climatic conditions should differ so remarkably regarding health as the troops stationed respectively at Sarras and Korosko is a matter which naturally excites surprise and tends to stimulate inquiry. The occurrence is the more remarkable in view of the fact that the first-named men were subjected to hardships of a sufficiently severe character, sanitary precautions of all kinds being, at the same time, largely in abeyance, while in the case of the troops at Korosko every available comfort for soldiers in the field was in existence, and a rigid system of sanitation, including the careful boiling of all drinking-water, was scrupulously carried out.

Attention may here again be called to the fact that the men of the mounted infantry had drunk unboiled water with impunity during their two months' journey up the river.

The following explanation of these facts may possibly be severely criticised, but I will nevertheless venture to offer it for what it is worth: Since I had left Korosko in June, the summer had passed, the ground had been in continued occupation by troops, and the Nile had almost completed its annual rise and subsequent fall. With every possible care, the soil of even the best-administered camps must sooner or later become impregnated with organic matter of all sorts. When the activities of the nitrifying organisms in the upper layers of the soil are not overtaxed, this organic is reduced to inorganic matter, and where plants are present it is rapidly taken up as food for the vegetable world, and the energies of the organisms of the soil are again set free to recommence their task, should circumstances call for it. Where, however, vegetation is absent, as was the case at Korosko, or where the supply of organic material is excessive, the vital powers of the living agencies

in question being overtaxed, there must remain a residue of partially-reduced organic material, which, coupled with the presence of moisture and a suitable temperature, would form an excellent medium for the growth of a fairly extensive variety of microbic forms. The sandy soil of Egypt is dry and highly permeable, the rise of ground-water, due to the corresponding rise of the Nile, would furnish the necessary moisture, and the conduction of heat from the surface would be productive of everything necessary as regards temperature.

Although I do not feel myself competent to discuss the transformation of bacteria, nevertheless I do not think that I am wrong in stating that such a theory of transformation is quite in accordance with ascertained facts of Nature, and receives particular support from what we know as to the influence of external conditions on the biological and morphological characteristics of microbial forms of life. Any theory which assumes the possibility of the transformation of the colon or other bacillus into the *B. typhosus* is especially convenient, as it not only fits in with facts which are too well known to admit of discussion, but it also does away with the necessity for admitting the existence of an antecedent case of enteric fever as requisite for an outbreak of the same disease. The admission of the necessity for an antecedent case, of course, only brings us face to face with the question, "How did the first case originate?" and this can only be answered by supposing a special act of creation. It seems likely that such transformation as that referred to must have here taken place, and the essential microbe subsequently disseminated through the medium, probably, of dust.

To sum up the above. We had in the month of June a camp occupied by about 850 men, living under certain conditions which have been already named, including in particular extreme dryness of the soil. The general health of these men was excellent. Six months later, with a slight diminution in the number of occupants, exactly the same locality, after a prolonged occupation and after a rise in soil humidity, acquired disease-producing powers of a deadly description. On the other hand, a body of men about 300 strong, placed under most unfavourable conditions as regards protection from either heat or cold, and in the face of an enforced neglect of sanitary precautions, maintained an excellent standard of health. The topographical and climatic conditions may, for practical purposes, be considered as identical in both cases; but in the one case the locality, as just stated, had been under occupation for a prolonged period, while in the other the men were occupying what,

from a sanitary point of view, might be termed a virgin soil. These facts should afford some support to the theory which I have just ventured to propound.

It is scarcely reasonable to assume that the approximate disparity in numbers, as stated above, would account in any important degree for the difference set forth as regards sickness and health consistently with an exclusive theory of water-borne enteric from the Nile. The case of the mounted infantry, previously mentioned, is also worthy of particular attention. These men, as already stated, had exposed themselves freely to the risk of enteric fever as far as water-supply was concerned; but they had, nevertheless, been conveyed in safety past old-standing camps, where the disease in question was working havoc, where water was religiously boiled, but where the soil was hopelessly polluted.

I should not omit to state that my experience as regards Korosko was by no means an isolated one; a similar train of events occurred both at Assouan and Wady Halfa. In particular, I remember finding the former a hot-bed of enteric fever in the spring of 1886, a marked contrast to the state of affairs during the previous summer.* The general conditions were in the main the same as those obtaining at Korosko.

I may also, as regards the local origin of the disease, cite the case of the various regimental camel corps. These corps were mainly employed in patrolling the desert roads with a view to intercepting slave-caravans and checking illicit trading with the Soudan. The men engaged on this duty enjoyed a high degree of health, and, having some personal knowledge of their work, I can speak from experience as to its excellent results on physical well-being generally, although the water used for drinking purposes in these expeditions was drawn direct from the Nile, and, being carried largely in bheestie skins, which were generally the reverse of clean, was not at times inviting to either nose or palate. The effect on health of removal from the influence of a polluted camp is here sufficiently apparent.

My next experience of enteric fever in an epidemic form was during the recent South African campaign. On December 24th, 1899, I arrived at Estcourt, a small town in Natal, situated about twenty miles south of the Tugela. The town in question was the appointed rendezvous of the Fifth Division, to which I was attached.

The weather was tempestuous and very changeable, rain fell in

* In 1885 the death-rate in the Field Frontier Force, which comprised the stations of Assouan, Korosko, and Wady Halfa, was 28·70 per 1,000; in 1886 it was 70·51 per 1,000. The vast majority of these deaths resulted from enteric fever.

torrents; the camps were generally more than ankle-deep in mud; the water used for drinking purposes was turbid; filters, as a rule, were conspicuous by their absence, and if boiling as a means of purification was resorted to, I certainly never heard of it. The general health of the men nevertheless remained fairly good, and during two weeks of our stay I only heard of one case of enteric fever. Diarrhoea of a mild type, however, was prevalent. It should be noted here that the camping-grounds had not been previously occupied for any length of time. On January 8th orders were issued concerning the line of march, and in the small hours of the following morning, in darkness and torrents of rain, the Fifth Division started for the relief of Ladysmith. Great-coats were not worn, and the men were, of course, soaked to the skin in a few minutes. We reached Frere about six in the evening, having had no food beyond some broken biscuit since the previous night. The meat served out at Frere to the unit to which I belonged had only been recently killed, and, having no mincing-machine, we found it uneatable. On the following day we left Frere about mid-day, and after thirty-six hours' march, inclusive of frequent halts, we pitched our tents at Springfield Bridge at midnight on January 11th.

While marching from Frere the men had again been soaked to the skin, a thunderstorm having broken directly over the column. In many cases they had had next to no food, and only occasional snatches of sleep during the many halts that had occurred in the previous night. Such sleep as they had managed to obtain had for the most part been on ground saturated with rain and in bitter cold. The remainder of the march to the Tugela was carried out in fairly easy stages, and calls for no special comment here. The conditions, however, obtaining at the actual seat of hostilities, as stated later on, are well worthy of careful attention.

It is likely that the above details may appear irrelevant, but they have been set forth with the view of emphasizing the fact that men exhausted with hunger, fatigue, exposure to weather, and lack of sleep, and who drank freely from pools and streams, no matter how filthy, might reasonably be expected, being in a state of lowered vitality, to contract any form of water-borne disease to which they were exposed.

Nothing of the sort, however, was noticed except to a trivial extent, and no sickness of a serious nature in anything approaching epidemic form occurred, as far as my experience goes, until the concluding days of the month of January, 1900. A certain area of veldt, known as Spearman's Plain, situated in the immediate neighbourhood of the Tugela, but separated from it on the north

by a range of hills, was in constant occupation by various units of Buller's army for approximately three weeks—that is, during the greater part of the month of January. It was here that sickness first showed itself in a serious form. The ground had been occupied for a sufficient period to become more or less saturated with filth; the heat during the day was intense, and the moisture necessary to start microbial activity was supplied by heavy rain.

Diarrhoea, accompanied by fever of an anomalous type, was the first indication that something was radically wrong. The worst among the cases were sent by sick convoy to the hospitals on the lines of communication. What percentage proved to be enteric fever I have no means of knowing, but, as will appear later on, it must have been considerable. A certain number recovered after a few days' treatment, and returned to duty. Before the end of the month enteric fever in an unmistakable form had made its appearance. That the occurrence of disease was due to some purely local condition is to some extent proved by the following facts:

The hills to the north side of the plain were held by the men of the Naval Brigade, and after the Battle of Spion Kop a 5-inch battery of Royal Artillery was added to the above force.

The distance from that part of the summit held by the sailors to the camp in the plain varied from a quarter of a mile to a mile, while the 5-inch battery must have been distant about a mile and a half. As far as my remembrance goes, not a single officer or man of either the Naval Brigade or the 5-inch battery contracted illness in any serious form throughout the hostilities which occurred on the Tugela during January and the early part of February, 1900, and, from the nature of my duties in the above period, it is not likely that any such occurrence would have escaped my notice. The men in question were subjected to the same general conditions of service as those which affected the rest of the army, except for the fact that in proportion to their numbers they were in the occupation of a far more extensive area of ground than was the case as regards any other of the units.

On February 10th the army had begun its retirement from the Tugela consequent on the action at Vaal Kranz. The close of the first day's march brought us to Springfield Bridge, where a detached force was left to hold the passage of the Little Tugela against the enemy in our rear, while the main body marched to Chieveley. I received orders to remain with the first-named force.

The ground at Springfield had, as already stated, been occupied by the army during its advance, and the soil in the immediate

neighbourhood of our camp was in consequence seriously polluted. The position was held until February 21st, when we marched to rejoin the rest of the army at Chieveley and Colenso. During the days of our stay at Springfield, diarrhoea and fever were rife among officers and men. The more serious cases were sent by ambulance to the hospital at Frere. For the most part they received a provisional diagnosis only, and I have no means of ascertaining their further history as regards individuals. Statistics framed under the conditions in which we were placed at this time would, for reasons which I need not dwell on, have little value for my present purpose, and although I can, therefore, furnish nothing in the way of a record of cases, there is no doubt whatever, in the light of information supplied from the hospitals on the lines of communication, that a very high percentage of men sent away from the front marked "S.C. Fever" or "Diarrhoea" subsequently developed enteric fever in an unmistakable form; indeed, its existence amongst us was fairly established before our departure for Chieveley on February 21st.

The above experience was repeated again and again throughout subsequent periods of the campaign. At Olivier's Hock, a post situated near the summit of the Drakensberg, where the water was of undoubted purity, and where the existence of previous soil pollution was beyond the limits of any reasonable probability, enteric fever occurred in a mild but unmistakable form in the month of January, 1902. The ground had been occupied by troops for some months, and, although no sanitary precaution was omitted, fouling of the soil was absolutely unavoidable.

At a farm in the Bethlehem district of the Orange River Colony, occupied by about twenty-five men, three cases of enteric fever occurred in one week during the month of February of the above year, and two of these cases proved fatal. The type of disease was exceptionally severe, and other cases followed so rapidly that the post in question had to be abandoned. It should be particularly noted in this connection that I recommended that all drinking water should be boiled, but that this measure proved altogether ineffective in checking the disease. The soil near the farm had been horribly polluted by trekking columns that had halted in the immediate vicinity, and, judging by the relics that they had left behind them, the construction of latrine trenches had not invariably been carried out.

Men on the march were generally in the best of health, but prolonged stay in standing camp was almost invariably the precursor of an outbreak of sickness of the nature referred to above, in-

cluding invariably unmistakable enteric. The attacks of diarrhoea and fever lasting only a few days, to which reference has been made, coexisted to such an extent with genuine enteric fever, and arose under such absolutely similar conditions as the last-named, that a doubt arises as to how far the two may not be pathologically related, and as to whether the former may not be an attenuated form of the latter disease. Although this question can receive no final answer at present, it is not without practical significance, as the admission that any such relationship may exist should call for measures of precaution which would not otherwise be adopted.

I could, as already stated, multiply instances of a similar nature to those already detailed, but to do so would prove wearisome. I should, however, add that any idea of the importation of enteric fever from the base or lines of communication is out of the question, and that, according to information from perfectly reliable sources,* the health of the local inhabitants of the districts that I have referred to had always been excellent. Two facts are here noteworthy: first, that in Natal enteric fever has its stronghold in the towns where soil pollution would be excessive; second, that the seasonal curve of this disease corresponds generally in height with that of the rainfall, which latter, be it noted, reaches its maximum during the hottest season of the year. These facts should go some way to substantiate previous statements concerning the soil as a suitable medium for microbial growth.

There is no intention here to deny the existence of water-borne enteric; to prove a negative is always difficult, and in the present case it would be a matter of impossibility to do so, particularly as no analysis of the water, as far as I am aware, was ever made, and also that it was consumed unboiled and unfiltered. But to affirm, as some have done, that our sources of drinking-water during the earlier period of the Natal campaign—viz., the Great and the Little Tugela, with their neighbouring springs, which have for many years been used with impunity by the inhabitants of a singularly healthy district—should on the occurrence of war be productive in one of the contending forces of the conditions of morbidity set forth above, appears to be somewhat of an absurdity, particularly as the assertion in question involves a disregard of the possible influence on health of the fermenting mass of fetid filth on which we were at times forced to have our being.

* Notification has only been introduced throughout Natal within the past eighteen months. According to information kindly furnished to me by Dr. Hill, M.O.H. for the colony, there were no cases of enteric notified during the past year from the area of the relief operations in the neighbourhood of the Tugela.

A supply of "safe water" to troops on service, if within the bounds of practical sanitation, will no doubt be a measure of extreme value in combating the inroads of enteric fever in the field; but disappointment will ensue if other conditions besides water-supply are not taken into consideration, and among such conditions soil pollution should occupy a not insignificant place.

It is right to add that the above statements refer only to matters which came under my own observation; the experience of others, I am prepared to admit, may have been different.

DISCUSSION.

Dr. D. S. DAVIES, of Bristol, said that he could quite believe that the typhoid bacillus might exist in a harmless form in virgin soil, and become virulent under the conditions described by Major Caldwell.

Dr. J. HOWARD-JONES stated that at Newport (Mon.) isolated cases of typhoid fever were more generally due to contamination of soil than to water-supplies.

DIARRHŒA AND POLLUTED WATER.

At a recent meeting of the Chelmsford Rural District Council Dr. J. C. Thresh presented a report on an extensive outbreak of diarrhoea which had recently prevailed in the borough of Chelmsford and a portion of the rural district. The epidemic commenced suddenly on July 25th, and terminated as suddenly about August 25th. During this period it is estimated that 1,400 persons were attacked, and fourteen deaths occurred. The disease affected all classes and all ages, but only proved fatal to young children, with one exception. The epidemic was limited in the rural district to a village deriving water from the Chelmsford mains, while in the borough it was limited to that portion deriving water from the same mains. One part of the borough supplied with water from a different source did not suffer from any excessive prevalence of diarrhoeal disease, nor was there any excessive prevalence in any of the suburbs of Chelmsford deriving water from other than the implicated source. An inspection of the waterworks showed that water was pumped from a deep well into a small uncovered reservoir. This was not bricked up above ground level, hence during a very heavy rain (as on July 23rd) water from the ground adjoining would run into it. This is a patch of garden manured from time to time with road scrapings. An examination of the tank showed a deposit on the bottom consisting of soil, worms, etc. The Water Committee on August 23rd had the implicated reservoir cut off, and the epidemic at once ceased. Limited outbreaks of diarrhoea attributed to polluted water are not uncommon, but epidemics are fortunately not of frequent occurrence. Dr. Thresh has referred to a number in his work on "Water and Water-Supplies," and of these some were referred to the action of suspended mineral matter, and others to the action of bacteria derived from sewage, manure, or decomposing animal or vegetable substances; but none of these outbreaks appear to have been so extensive as the one now recorded.

SCHOOL NOTIFICATION OF INFECTIOUS DISEASE.

By JOHN J. BOYD, M.B., C.M., D.P.H.

Medical Officer of Health for South Shields.

In bringing this subject forward for discussion to-day, my motive is to seek for information rather than to impart it. The subject of the relations between medical officers of health and elementary schools has been lately rather prominently brought before the Society, especially by Dr. Richards in his interesting paper and in the discussion which followed it.

Limitations.—In that paper and discussion the whole question of the control of schools from a public-health point of view was under consideration, the discussion closing with the adoption of a series of resolutions to be submitted to the Board of Education and the Local Government Board. I shall, however, in the few remarks I am about to make, confine myself within much narrower limits—to the consideration, namely, of the prevention or control of infectious or zymotic disease by utilizing the school as a

Notification Agency and an Inspection Ground.—I therefore limit myself to two out of the eight resolutions passed at the meeting I have just referred to—viz., Nos. 2 and 8.

As regards No. 2, the power of entry to all public elementary schools can, I take it, be without difficulty given to the medical officer of health by resolution of the Town and County Council; the examination of scholars might also, I suppose, be authorized by the same authority, as it is at present by school managers, and could not be objected to by parents as long as it consisted of a mere inspection of exposed parts—hands, face, tongue, throat. The taking of swabs from the throat or any more detailed examination would, I think, require to be done at the child's house, when the consent of the parent could be obtained.

For practical purposes, then, I consider that it is not necessary to go beyond the Town Council for the powers asked for in this resolution.

The same remark would seem to apply to resolution 8. For many years both resolutions have been practically acted on in South Shields. The right of entry, and the examination of children by the medical officer of health, have never been objected to either by School Board or by voluntary schools, with, I think, one exception. I quite understand that the arrangement has been a voluntary one, which might have been put a stop to at any time by the Board or the school managers; but owing to the advantage accruing from it

being so evidently mutual, this termination was highly unlikely. Now, however, the new Education Act, having placed the Town Council as the supreme authority over all the elementary schools, I presume that they can grant the necessary powers to their medical officer of health. Whether it is advisable that the medical officer of health should be appointed medical officer to the School Board or Education Committee is a different question.

Notification of Infectious Disease.—I pass on now to the first of my two points—viz., how far, and in what manner, the schools may best be used as a notification agency. Our present methods in South Shields, which, no doubt, are very similar to those in use in other boroughs, are that, in addition to the notification by medical practitioners of the diseases mentioned in the Notification Act, we receive notification from the headmasters and mistresses of the various schools of cases of measles, chicken-pox, and whooping-cough. On receipt of the school notification, a visit is made by the sanitary inspector, who leaves printed instructions regarding the disease from which the child is suffering, and inquires whether any doctor is in attendance. Should there be no medical man in attendance, a visit is then made by the medical officer of health to confirm the diagnosis of the parent or otherwise. On the other hand, information is sent by the Health Office to the schools with regard to all cases of disease notified under the Notification Act where children are attending from the infected house.

Slowness of Notification.—The present system of notification, whether by schools or by medical men, cannot be regarded as altogether satisfactory. The information is not received by the medical officer of health sufficiently early in the course of the illness for him to make the best use of it in limiting the spread of disease.

As far as cases notified by medical men are concerned, this arises from the fact that they are not called in until two or three days after the commencement of the illness. In the case of the schools, it largely arises from the roundabout route by which the information has to travel on its road to the medical officer of health. As an illustration of this slowness of notification, I may mention that out of a total of 549 secondary scarlet fever cases which were notified in Shields during the years 1901 and 1902, no less than 212 were notified at the same time as the primary case, being 38 per cent. During the last four months, of 108 scarlet fever cases notified, 3 notifications were received on the first day, 11 on the second, 34 on the third, 25 on the fourth, 12 on the fifth, 5 on the sixth, 4 on the seventh, and 14 later. Now, of all infectious diseases, scarlet fever is the disease in which early notification is easiest, on account of the early presence of the characteristic symptoms. It is

also a disease which is most infectious in its earliest stages. In the case of the other diseases mentioned, measles and whooping-cough, the notification can never, I fear, be so prompt, and therefore so useful, as in the case of scarlet fever. In measles we have three days of infectivity before the rash appears, and in whooping-cough about a fortnight.

Notification of these latter diseases by the family medical attendant, seeing how comparatively slow and unsatisfactory is such notification of even scarlet fever, is, I consider, of no value. In the different towns where it has been tried it has proved practically useless.

It is by a further development of school notification, and an improvement in the method thereof, that I think we shall obtain that earlier information which is so desirable.

The diseases under consideration are practically confined to children, and an enormous proportion of these children are attending the public elementary schools. The proportion of families represented in these schools, although with certain members either too young or too old to attend, is even greater.

It may be taken as a universal rule that school attendance on the part of the child attacked by infectious disease ceases at a measureably earlier period than his examination by a medical man. In the case of scarlet fever, I find that it is quite an exception for an affected child to go on attending school in the early stage of the disease. The initial vomiting may fairly often happen in school, but the child is at once withdrawn. On the other hand, whilst keeping the sick child away from school, and frequently, also, the other members of the family, it is the commonest thing for the parents to delay sending for medical advice for some days.

Again, I find that notification of infectious disease to the Health Office by parents, although obligatory under the Notification Act, is practically never done and cannot be enforced. Even where notices requiring such notification are prominently posted over the town, as is at present the case in South Shields with reference to chicken-pox, very few cases indeed are so reported. On the other hand, these cases are reported to the school authorities, and by them to the Health Office.

Effects of Delay in Notification.—The evil effects, in the way of spread of the disease, of this slowness of notification are very apparent. During these two or more days not only are the family in the affected house freely exposed to infection, but by the children playing in the back lanes and round about the doors the infection is passing to the surrounding houses.

Now, I consider that a method of school notification might be devised which would give us the important information we require perhaps forty-eight hours earlier than we get it at present.

Attendance Officer.—In the school attendance officer we have an official whose duty it is to inquire into the cause of the absence of school children. In South Shields whenever a child misses two attendances his name is handed to the attendance officer, who visits the house within thirty-six hours of the non-appearance of the child at school. At present any information which he may obtain regarding disease is sent by him to the headmaster of the affected school, who receives it thirty-six hours after the name was sent in. Another twenty-four hours probably elapses before it reaches the medical officer of health. Sometimes the delay is much greater, the school authorities only handing names of absentees to the attendance officer twice a week.

To avoid this delay I consider that every attendance officer should be *ex-officio* a sanitary inspector, with certain limited and defined duties as such. On visiting the house of an absentee, it should be his duty to ascertain as accurately as possible the nature of the illness where such is assigned as a reason for absence.

He should also inquire if there is a doctor attending, and obtain the name of the doctor. Where the disease is of an infectious nature, he should give the parent a printed form of instructions regarding the particular disease in question (a supply of these he would obtain at the Health Office, and carry with him on his rounds). He would be required to forthwith inform the medical officer of health, either by calling at the Health Office on the day of his visit to the case, and leaving a properly filled up form with the necessary particulars, or in cases where the disease was one for which hospital accommodation was available and necessary by telephoning. Where no doctor was attending, the case could then be visited by the medical officer of health.

The parents of all school children should be made to understand that where there is any illness in the family notice of such illness should be sent to the school authorities whether the children are kept at home or not, and whether the disease is supposed to be of an infectious nature or otherwise.

In addition to this visitation of suspects at home, there is the question of the examination of children actually attending school, and suspected by the teachers to be suffering from some infectious disease. I find that the present method of dealing with these is to send them home, and send the medical officer of health their names and addresses, so that he may visit and examine them at

their homes. This method is very laborious and also slow. More frequently than not the symptoms observed by the teacher are not at all those of infectious disease, and the visit of the medical officer is simply time thrown away. The proper arrangement undoubtedly would be to have the children medically examined at the school. This might be done by the medical officer of health just as readily as visiting the home of the child, and would have the double advantage of letting him see any appearances which had been observed by the teacher, which might otherwise have vanished before he made his visit, and of allowing him to take action where necessary without any loss of time.

Inspection.—This leads me on to my second point—the school as an inspection ground. Inspection of children in schools for the purpose of detecting symptoms of infectious disease should be carried out regularly and systematically. It has been proposed that for this purpose, and for the object, I suppose, of examining generally into the health of the children, a medical officer should be appointed to each school or group of schools. It would clearly be impossible for the medical officer of health to make such systematic examinations. Now this would, no doubt, be the ideal system. I believe that in certain other countries—America, I think—such a system has been adopted; but failing such an arrangement, which, I fear, is not likely to be introduced here just yet, I consider that a daily examination should be made by every responsible teacher of the children under his or her care. Any child who presents symptoms of illness, as feverishness, which might be tested by the thermometer, headache, cough, etc., should be sent home at once. They should afterwards be visited by the attendance officer in order to ascertain the course of the illness, and not be allowed to return without a medical certificate either from the family doctor or the medical officer of health.

All teachers ought to be thoroughly well drilled in a knowledge of the early symptoms of the infectious diseases.

In addition to the examination of an individual as just mentioned, it may be necessary to examine a whole class or school in the attempt to discover if there is anyone in an infectious condition, and the cause of a number of known cases from this school. In my experience it is very rare to find such a one.

In conclusion, I must ask you to excuse me for putting before you facts which are no doubt already so familiar. My objects are to impress on you the utility and importance of school notification, and by means of discussion to come to some conclusion regarding the best method of carrying out the details of such a system.

REVIEW.

THE MICROSCOPICAL EXAMINATION OF FOOD AND DRUGS. By H. G. Greenish, F.I.C., F.L.S. Price 10s. 6d. Pp. 321. London: J. and A. Churchill.

This work, which is excellently printed and profusely illustrated, is primarily intended for the use of students, and is accordingly arranged so as to present a series of exercises in microscopical methods, gradually increasing in difficulty as experience is gained, and the plan is carried out so as in no way to interfere with the scientific arrangement of the subject-matter.

The book is divided into twelve sections, dealing respectively with starches, hairs and textile fibres, spores and glands, ergot, woods and stems, leaves, barks, seeds, fruits, rhizomes and roots, with two appendices, one on the preparation of reagents, and the other on the varieties of cell-wall and cell-contents.

The volume contains 168 plates, some only diagrammatic, the majority drawn to scale. They are in no way intended to supplant the practical examination of actual specimens, on the necessity of which the author rightly and strongly insists, but they add very greatly to the value of the book, as a large number of them have been specially prepared for it. Unfortunately, they suffer from a defect which they share with the illustrations of most books dealing with microscopical subjects—that of being on a positively bewildering variety of scales. Those drawn specially by the author or his colleagues are entirely satisfactory in this respect, as they represent all allied structures under the same degree of magnification; but there are a number of plates from other works of which hardly half a dozen are on the same scale, with the result that no less than thirty different degrees of magnification are employed throughout the book.

With a view to economy both of time and of money, it is desirable when working with the microscope to use as few objectives and eye-pieces and to make as few changes of tube-length as possible; but quite apart from this, size is a very important factor in the identification of many structures, and the eye soon gets accustomed to the normal dimensions of objects, so that if they are always viewed under the same degree of magnification any departure from their usual appearance is very easily discerned. It is to be regretted that the illustrations should suggest a practice which the author evidently does not adopt himself, and which we feel sure he would never recommend to others.

Except as regards this one point, the book calls for nothing but praise. The directions for preparing and mounting specimens are clear, practical, and up to date, and the nature and extent of the information given is such as is not to be found in any other single volume.

We should like to see a little more attention given to the detection of the commoner adulterants of food-stuffs, and the list of foods dealt with might, from the public analyst's point of view, be increased with advantage; but as it is the book contains a mass of information of great value to the public analyst and to the pharmacist alike.

LAW REPORTS.

THE HIGH COURT OF JUSTICE.

KING'S BENCH DIVISION.

April 29th, 1903.

BEFORE LORD ALVERSTONE, L.C.J., WILLS AND CHANNELL, JJ.

SOUTHWOLD CORPORATION v. CROWDY.

Public Health Act, 1875, Section 41; Public Health Acts (Amendment) Act, 1890, Section 19—Nuisance—Structural Defect in Drain of more than One House.

If a drain which drains more than one house is a single private drain within Section 19 of the Public Health Acts (Amendment) Act, 1890, and becomes a nuisance by reason of a defect of the structure not due to the original construction, the owners are bound to repair it, or the authority on doing the work may recover the expenses under Section 41 of the Public Health Act, 1875.

This was an appeal by the plaintiff corporation from a judgment of the County Court Judge of Suffolk. The claim was for the sum of 6s. 4d., being the apportioned share of the expenses incurred by the corporation in repairing a drain which took the drainage of three houses belonging to different owners and conveyed it to a public sewer. The Public Health Acts (Amendment) Act, 1890, had been adopted for the district, and it was admitted that the pipe in question was a single private drain without the meaning of Section 19 of that Act. This drain passed under a private roadway, and a nuisance was occasioned by a horse and cart having damaged a manhole on going over it. The authority proceeded under Section 41 of the Public Health Act, 1875, and repaired the drain. The defendant resisted the demand for his share on the ground that the drain was a sewer for the purpose of structural repairs and that the defect was a structural one, and that Section 41 did not extend to structural repairs, which ought to have been done by the sanitary authority. He relied on *Fulham Vestry v. Solomon* (1896), 1 Q.B. 198. The County Court Judge upheld this contention, and gave judgment for the defendant. The High Court allowed the appeal and reversed the judgment.

S. G. Lushington appeared for the appellants, and H. M. Sturges for the defendant.

LORD ALVERSTONE, L.C.J.: I am quite clear that the judgment in favour of the defendant was wrong. The case for the plaintiffs proceeded upon the basis that this drain, draining, as in fact it did, more than one house belonging to different owners, was a "single private drain" within the meaning of Section 19 of the Public Health Acts (Amendment) Act, 1890, for the purposes of proceedings under Section 41 of the Public Health Act, 1875. That is clear from the evidence of the plaintiffs' surveyor as to the nature of the drain, and as to gases escaping from the drain after the accident which caused the drain to be a nuisance and dangerous to health in its defective condition. The defendant contended that this was a structural defect, and that for the purposes of keeping the structure in repair the drain was a "sewer" vested in the plaintiffs, which it was their duty to repair under Section 15 of the Public Health Act, 1875, and that the want of repair did not amount to "bad condition" or make the drain "require alteration or amendment" within the meaning of Section 41 of that Act; and in

support of this point the judgment of Kennedy, J., in *Fulham Vestry v. Solomon*, *supra*, was cited. But I am of opinion that his judgment has no application to the present case. It is clear from the opening words of Section 41 that it applies to all cases where the drain in question is a nuisance or injurious to health. That explains the meaning of the later phrase, "appears to be in bad condition or to require alteration or amendment." In *Fulham Vestry v. Solomon*, *supra*, Kennedy, J., was not dealing with a case where the bad order and condition was alleged to make the thing in that case it was a water-closet) of itself a nuisance.

WILLS, J.: I am of the same opinion, and agree with what Kennedy, J., is reported to have said in *Fulham Vestry v. Solomon*, *supra*, as applied to the facts of that particular case. When those facts are considered, it will be seen that they have not the slightest analogy to the facts of the present case.

CHANNELL, J.: I agree with the other two. Section 41 of the Public Health Act, 1875, applies to the condition of the structure when the condition is such as to cause the drain to be a nuisance or injurious to health. It does not apply to mere defective construction in the first instance, irrespective of nuisance, which was all Kennedy, J., was referring to in the *Fulham* case.

February 3rd, 1903.

BEFORE KENNEDY, J.

ORAGE v. FRY AND ANOTHER.

Public Health (London) Act, 1891, Section 47—Goods unfit for Human Food—Sale to Retail Dealer—Retailer's Right to recover against Vendor—Fine and Costs.

On the sale of "sound tins" of fish the purchaser can recover from the vendor their value, and the costs incurred in defending himself, in the event of the fish being destroyed and proceedings taken against him under Section 47 of the Public Health (London) Act, 1891. He cannot recover the amount of the fine unless he can show that it was not increased by reason of his own default.

This was an action for damages for breach of warranty on the sale of 4,400 "sound tins" of tinned mackerel sold by the defendants to the plaintiff, but with a condition that he should not retail them in England, but should export them. The defendants were aware, and so also were the sanitary authorities, that the fish were unfit for human food; but the latter were willing to allow the fish to be exported for the sole purpose of having the oil extracted from them. The defendants, however, did not inform the plaintiff of these facts, and it appeared that the plaintiff at the time of purchase was not aware that the fish were unfit for human food. The plaintiff exported 500 tins, but afterwards the sanitary authority seized and destroyed the remainder, and took proceedings against the plaintiff under Section 47 of the Public Health (London) Act, 1891, when he was fined £20 and £10 10s. costs. He claimed to recover from the defendants the fine and costs, also the costs he himself had incurred and the value of the fish.

KENNEDY, J., held that the plaintiff was entitled to recover for the breach of warranty. The damages he assessed at £66 for the value of the fish destroyed, and the costs at £17 17s., being the whole costs incurred by the plaintiff. He refused, however, to include the amount of the fine, and said, in regard to it, that the fine was a heavy one, and it might be that the magistrate was led to impose it because he thought

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the plaintiff had not been as diligent or as careful, as he ought to have been in periodically examining his stock; if that was the case, the defendants ought not to be held liable at any rate for the whole amount of the fine. There was no evidence to show what facts influenced the magistrate in imposing such a fine, and upon that item there would be judgment for the defendants.

April 3rd, 1903.

BEFORE LORD ALVERSTONE, L.C.J., WILLS AND CHANNELL, JJ.

SWINBOURN v. HAMMERSMITH BOROUGH COUNCIL.

Metropolis Management Act, 1855, Sections 82, 85; Metropolis Management (Amendment) Act, 1862, Section 64—Defective Drain—Notice to alter and amend—Order—Right to recover Penalties.

In order that a Metropolitan borough council may recover penalties under Section 64 of the Metropolis Management (Amendment) Act, 1862, against an owner for failure to execute works to amend a drain required by the council under Section 85 of the Metropolis Management Act, 1855, it is necessary that the council should make an order requiring him to do certain works, which order can, if necessary, be the subject-matter of an appeal.

This was a case stated by justices in and for the county of London on the hearing of an information against the defendant Swinbourn, that he had made default in complying with the requisition of a notice dated July 15th, 1902, served on him by the Town Clerk of Hammersmith, requiring him to alter and amend a certain drain.

It appeared that on February 15th and 19th, 1902, notices were served on the defendant—the appellant—under the Public Health (London) Act, 1891, requiring him to abate a certain nuisance, being a defective drain on premises belonging to him. The second notice also required him to lay the drain in accordance with the council's regulations and the bye-laws of the London County Council. On March 20th a further notice was served upon him under Sections 82 and 85 of the Metropolis Management Act, 1855, requiring him to do certain works for the amendment of the said drain. In April the appellant executed certain works to the drain, but not those specified. The council subsequently resolved that he be served with a further notice, and on failure that proceedings be taken, and on July 16th a notice was served upon him, requiring him to execute works set out in detail. The defendant did not do the works.

It was contended on behalf of the appellant, that no notice of any order of the respondent council to execute the said works had been served upon the owner or occupier of the said premises, whereas it was a condition precedent to the right of the said respondent council to recover penalties under Section 64 of the Metropolis Management (Amendment) Act, 1862, that notice of such an order should have been served upon the said owner or occupier. Further, that the notice dated July 14th, 1902, was not a notice of an order of the respondent council within the meaning of the said Section 64, or of Section 211 of the said principal Act, 1855, and that by reason of the failure of the respondent council to comply with the provisions of the said Acts in respect of such notice the justices were bound to dismiss the summons. Other objections were also urged, but no decision was given as to these.

The justices convicted the defendant, who appealed, and the court allowed the appeal and quashed the conviction.

Macmoran, K.C., and *S. Bevan* appeared for the appellant, and contended that by Section 64 of the Act of 1862 an order was necessary, otherwise the defendant was deprived of his right of appeal. *R. C. Glen* appeared for the respondents.

LORD ALVERSTONE, L.C.J.: In this case, on the facts stated, I do not think this order to fine can be enforced. I am quite clear of this, that in order to enable them to sue for penalties there must be an order of the sanitary authority which would be subject to appeal, and I think if a valid order is made and not appealed against under ordinary circumstances, the magistrate has only to see if the order which is a valid order has been obeyed. In this case they have given notice to do certain works. The appellant in this case having carried out certain other works, they then pass a resolution that the drain is not in proper order, and tell him to do the necessary repairs. Subsequent to that a notice is served upon him specifying what it is which has to be done. The resolution does not in terms refer to that notice, or to the facts which had been previously reported to them, but it says he is to do such works as may be necessary. Now, it is possible that the appellant regarded that as not a valid order, and therefore did nothing more, because he did not consider he was bound to do anything and he could not appeal against it. He wished to raise the point here. After that nothing was necessary to be done. That matter has not been dealt with by the magistrates. The magistrates have simply decided against him and convicted him, because he did not obey the notice, which was subsequently brought to his knowledge, or served upon him, to carry out certain works. I think, at any rate, it is necessary that there must be an order of the council requiring him to do certain things which can be appealed against. In this case I am not satisfied that there was, and therefore I think this conviction cannot be supported.

WILLS and CHANNELL, J.J., concurred.

THE SUFFICIENCY OF A RAIN-WATER SUPPLY.—The Rochford (Essex) Rural Council have been summoned for refusing to grant a water certificate for a house. The source of supply was to be rain-water, and it was not their custom to grant a certificate where there was a rain-water supply, if there was a better supply obtainable. An underground brick and cement tank, with a capacity of 652½ gallons, was provided, and the water before it entered the tank was filtered through charcoal and sand. The magistrates declined to make an order authorizing the occupation of the house.

CORRESPONDENCE.

DIARRHŒA AND POLLUTED WATER.

TO THE EDITOR OF "PUBLIC HEALTH."

SIR,

It is probable that many medical officers of health may have had brought under their notice outbreaks of diarrhœa which have been attributable to the use of polluted water. I am very anxious to obtain records of any such cases, and I should be greatly obliged if you would permit me to ask medical officers of health to send me accounts of such outbreaks or inform me where such accounts are to be found.

I am, sir, yours, etc.,

JOHN C. THRESH.

CHELMSFORD,

October 20th, 1903.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1881. INCORPORATED, 1891.

EXTRAORDINARY GENERAL MEETING.

AN Extraordinary General Meeting of the Society was held at the Holborn Restaurant, London, W.C., on Friday, October 9th, 1903. Present: Dr. J. Spottiswoode Cameron (in the chair), Drs. A. Bostock Hill, J. Groves, W. G. Willoughby, A. Newsholme, J. Tubb-Thomas, H. W. Roberts, H. E. Armstrong, E. A. Dorrell, Herbert Jones, and J. Priestley.

The HON. SECRETARY read the requisition to convene the meeting.

The minutes of the Extraordinary General Meeting held at No. 9, Adelphi Terrace on Friday, September 18th last, were read, approved, and signed by the Chairman.

It was moved by Dr. HERBERT JONES, and seconded by Dr. PRIESTLEY, that the resolutions* passed at an Extraordinary General Meeting of the Society on September 18th last be hereby confirmed.

The motion was put to the meeting, and declared to be carried unanimously.

ANNUAL MEETING.

The Annual General Meeting of the Incorporated Society of Medical Officers of Health was held at the Holborn Restaurant on Friday, October 9th, 1903. Present: Drs. J. Spottiswoode Cameron, Joseph Groves, W. G. Willoughby, A. Newsholme, J. Tubb-Thomas, H. W. Roberts, H. E. Armstrong, A. Bostock Hill, E. A. Dorrell, J. T. C. Nash, W. H. Symons, J. Housley, W. A. Bond, M. Yunge Bateman, G. B. Millson, Oliver Field, R. Dudfield, E. Seaton, E. F. Willoughby, S. F. Murphy, Herbert Jones, J. Priestley, and W. Whitaker, members of the Society; and Messrs. J. Hardwicke Langston and J. Smith Whitaker, visitors.

INDUCTION OF THE NEW PRESIDENT.—Dr. J. SPOTTISWOODE CAMERON said: This is the first meeting of the new session, and it is my duty to ask the President-Elect to become President in right, and I call upon Dr. Groves to take the President's chair.

Dr. JOSEPH GROVES, in taking the chair, said that on entering on his year of office he again tendered his acknowledgments to his friends who had nominated him for that position, and to the Society for endorsing that nomination. He desired also to offer his congratulations to his predecessor on the success of his Presidency, to say that it was very gratifying to him, whilst suffering from the comparison, to follow such an eminent member of the public health service as Dr. Spottiswoode Cameron. He would have more perturbation if he did not know that he would have the assistance of their very able Secretaries and the support of the Treasurer and Editor, as well as that of all the individual members of the Council.

Dr. H. E. ARMSTRONG congratulated the President on the position he had achieved. He wished him every success in his year of office.

* PUBLIC HEALTH, vol. xvi., No. 1. pp. 56-58, October, 1903.

He moved that the best thanks of the Society be given to the ex-President for his services during the past year. Dr. Spottiswoode Cameron was well known throughout the whole of the land for the able services he had rendered in the cause of public health and sanitation. Not the least of those services was the work he had done as the President of their Society. He had attended strictly to their business, coming to their meetings all the way from Yorkshire. He (Dr. Armstrong) knew the difficulties which that entailed, because when occupying the presidential chair he had had to come from even a little farther North, and therefore he felt himself competent to congratulate Dr. Cameron on his regularity. Dr. Cameron had steered through the business of the year some very important matters, the chief of these, perhaps, being those relating to underground bakehouses and vaccination, both of them matters which were going to bring upon them a great deal of extra, important, and responsible work. Connected with the question of vaccination was a matter which he hoped would be brought before the Society—viz., that dealing with tramps. It was high time something was done in that matter.

Dr. BOSTOCK HILL had pleasure in seconding the vote of thanks to Dr. Cameron. He could add his testimony to the difficulty experienced in coming such a long way to the meetings. Not only had Dr. Cameron's attendances been numerous, but the work he had done had been quite equal to that of any of his predecessors.

The resolution was put to the meeting and carried unanimously. Dr. SPOTTISWOODE CAMERON, in acknowledging the vote, desired to thank Dr. Armstrong and Dr. Hill for the kind way in which they had moved and seconded the vote of thanks, and the members for their kindness in adopting it. In the responsible position of President all would endeavour to do their best. He had attended every meeting of the Council, and every meeting of the Society but one, while he was in office. There certainly had been a certain amount of work, but it was always a pleasure to be engaged in important work. He hoped the Society would prosper under the presidency of Dr. Groves.

PUBLIC HEALTH CONGRESS.—The HON. SECRETARY read a letter from Dr. J. S. Cameron enclosing copy of a report of a deputation appointed by the Corporation of Glasgow to attend the Congress of the Sanitary Institute at Bradford, suggesting that the Sanitary Institute and the Royal Institute of Public Health should be urged to arrange to hold a combined congress of both bodies each year, as it is inconvenient for local authorities to appoint delegates to attend two congresses.

Dr. Cameron in his letter suggested that, failing a combined congress, the two Societies should arrange to hold their congresses in alternate years.

It was moved by Dr. CAMERON, and seconded by Dr. TUBB-THOMAS, that the communications be referred to the Council for consideration.

An amendment was moved by Dr. ARMSTRONG, and seconded by Dr. FIELD, that the words be added, "and to consider the necessity for the existence of two associations."

The amendment was put to the meeting, and declared by the Chairman to be lost.

The original motion was then put to the meeting and carried *nem. con.*

ANNUAL REPORTS.—The HON. SECRETARY submitted the Annual Report of the Council, together with the reports of the Treasurer,

Auditors, and Editor, and stated that the same had been published in the October issue of PUBLIC HEALTH.

Resolved unanimously, on the motion of Dr. NEWSHOLME, seconded by Dr. TURB-THOMAS, that the same be received and adopted.

REPORT OF COUNCIL.—The HON. SECRETARY submitted the following Ordinary Report of the Council:

REPORT OF COUNCIL.

Your Council beg to report:

1. *Ventilation Standards*.—That they have communicated by letter, officially, on behalf of the Society, as instructed, on the subject of the Society's Memorial *re* Ventilation Standards for Factories and Workshops with the following Societies and other bodies concerned:

- (a) British Medical Association.
- (b) National Association for the Prevention of Tuberculosis.
- (c) Association of Certifying (Factory) Surgeons.
- (d) Royal Institute of Public Health.
- (e) Royal Colleges of Physicians and Surgeons of England, Ireland, and Scotland.

2. *Bakehouses*.—That they have written, on behalf of the Society, as instructed, to the Home Secretary, replying to certain questions asked in connection with a minimum air-space for bakehouses, and also in detail to the letter on the same subject sent by the Master Bakers' Association and the London Bakers' Protection Association, a letter which had been forwarded by the Home Secretary to the Society for the Society's observations thereon.

3. *Epidemic Grant*.—That they have received the following letter from the Board of Education in reply to the Society's communication on the subject of the withdrawal from the Provisional Code of Article 101*:

SIR,

Adverting to your letter dated April 28th last, I am directed to state that the Board of Education have carefully considered the question raised by the resolution passed by the Incorporated Society of Medical Officers of Health.

But they cannot suppose that such responsible bodies as the new Local Education Authorities, or (in London) the School Board, will feel any temptation to neglect the exclusion of infectious children for the sake of transferring a very small proportion of the cost of maintenance of elementary schools from the local rates to the Imperial Exchequer.

They cannot, therefore, hold out any prospect of re-establishing the special grant under Article 101* of the Code.

I have the honour to be, sir,

Your obedient servant,

(Signed) H. W. SIMPKINSON.

4. *Sanitary Inspectors' Board*.—That they have received a letter from the Sanitary Inspectors' Board intimating that the Board has decided to pay interest at the rate of 4 per cent. per annum upon the amount (£55) of outstanding loan due to the Society as from January 1st, 1903.

5. *Finance Committee's Report*.—That they have received and adopted the following Report from the Finance Committee:

(a) That the balance up to date to the credit of the Society at the Union of London and Smith's Bank is £189 11s.

(b) That since the last meeting of the Committee the Treasurer has paid accounts amounting to £179 9s. 9d., all of which accounts they have examined and approved.

(c) That they have examined and ordered payment of outstanding accounts amounting to £61 19s. 6d.

(d) That they have arranged for the Annual Dinner and Annual General Meeting of the Society to be held at the Holborn Restaurant on Friday, October 9th, and have voted a sum of (not exceeding) £10 10s. towards the expenses connected with the dinner.

(e) That they have considered the Annual Financial Statement, which will be submitted with the Report of the Treasurer, and are of opinion that the same is highly satisfactory.

(f) That they are still considering the question of permanent office accommodation, and have received an invitation from the Council of the Sanitary Institute to appoint representatives to attend a Joint Committee on the subject of providing new buildings to be used jointly by the Sanitary Institute, Parkes' Museum, and other societies, and have appointed Dr. H. Kenwood and Dr. R. Duffield to attend such Joint Committee accordingly.

6. *Questions referred to Branches*.—That they have referred to the Branches for consideration and report to them on or before the Council meeting to be held in January, 1904, the following matters:

A. Prevention of Tuberculosis.

- (a) Is compulsory notification of phthisis desirable?
 - (b) To what extent (if any) should compulsory powers of isolation (hospital or home) extend to cases of phthisis, advanced or otherwise?
 - (c) Is it desirable to utilize existing isolation hospital accommodation, where practicable, for the isolation of phthisis?
 - (d) What steps (if any) other than isolation should be included in any proposed legislation (bye-law or otherwise) to be enforced for the purpose of preventing infection from phthisis?
- (In connection with this subject your Council has referred a letter sent by Dr. T. O. Duffield on the subject of the Metropolitan Asylums Board providing isolation hospital accommodation for Metropolitan phthisical patients at the Gore Farm hospitals to the Metropolitan Branch for consideration and report.)

B. Food Poisoning.

The resolution passed by the Midland Branch to the following effect:

"That, with the object of preventing outbreaks of food poisoning, such as recently occurred in the borough of Derby, no food should be prepared for sale and for human consumption within the same curtilage as any slaughter-house or premises wherein any offensive trade (within the meaning of the Public Health Act, 1875) is carried on; and that further legislation is urgently needed to bring all premises wherein food is prepared for sale and for human consumption up to the same standard of sanitation as at present applies to milk-shops and dairies."

C. Daily grooming of Cows and the careful washing of the Teats of Cows prior to Milking.

(a) Is it desirable to take steps with a view to securing the introduction of fresh legislation to provide for the compulsory daily grooming of cows, and the careful washing of the teats of cows prior to milking?

(b) What other measures can be taken for generally increasing the cleanliness of the milk-supply?

D. Paying of Expenses of Officials attending Congresses.

The resolution passed by the Northern Branch to the following effect:

"That it is desirable that Local Authorities should be empowered to pay the expenses of the officials when attending sanitary congresses."

7. *Suggested Legislation.*—That they have received, but do not consider it desirable to proceed further at present with, a letter from Dr. McWalter, of Dublin, suggesting the following matters for legislation:

(a) Calcium carbide, now extensively used as a source of light for bicycle lamps, etc., is intensely corrosive when it comes in contact with a mucous surface. There are no regulations to protect workers who handle it in packing small tins, etc.

(b) The clothes of patients who have been removed to hospital for small-pox, typhus, plague, etc., are invariably sent to pawnshops for storage. There appears to be no laws to prevent this, although it is sometimes prohibited.

(c) Strong pressure should be brought to bear on the Government to pass the law giving Local Authorities control over the quality of the gas supplied by public companies. There have been many deaths and numberless cases of illness in Dublin from the use of water-gas by the gas companies.

(d) The drinking of methylated spirits of wine by the poorer classes has largely increased during the last few years. This preparation contains 62 per cent. of absolute alcohol, and there are practically no restrictions on its sale, except on Sundays.

(e) Chronic antimonial poisoning is becoming common amongst printers, largely on account of the alteration in the composition of the type, and to some measure because of the unsuitable size and localities of printing offices. There is no legislation to check its spread.

8. *Physical Culture.*—That they have decided to ask Dr. Lockhart Stephens to read a paper on the subject of "Physical Culture in Elementary Schools," a subject in connection with which the Southern Branch has already passed a resolution in favour.

9. *Reports.*—That they have prepared and approved a Report for the year 1902-1903, to be submitted to the Society at the Annual Meeting, together with Reports which they have received from the Treasurer, the Auditors, and the Editor.

10. That they have received from the Branches the following particulars as to the election of Presidents and Representatives on the Council for the year 1903-1904:

<i>Branches.</i>	<i>Presidents.</i>	<i>Representatives.</i>
Metropolitan.	Reginald Dudfield.	W. A. Bond. L. F. Bryett. S. Davies. O. Field. A. W. Harris. G. Newman. J. F. J. Sykes. Louis Parkes. H. W. Roberts. P. C. Smith. J. Mitchell Wilson. J. R. Kaye.
Yorkshire.	A. Robinson.	T. E. Hill.
Northern.	J. W. Hembrough.	H. Scurfield.
Southern.	A. Mearns Fraser.	Lockhart Stephens.
Home Counties.	Charles Sanders.	W. G. Willoughby. Alfred Ashby. H. M. Richards.
Midland.	J. Howard Wilkinson.	A. Bostock Hill. George Reid.
North-Western.	W. Berry.	T. W. H. Garstang. J. Robertson.
West of England and South Wales.	J. Tubb-Thomas.	R. Pritchard. J. Howard-Jones.
Scottish.	J. Maxwell Ross.	W. Robertson. J. C. McVail.

11. *Payments to Branches.*—That they have decided that the payment by the Treasurer of the Society for the current year shall be 10s. per head for Fellows and Members to the Australian Branch, and that the other Branches be paid 7s. 6d. per head for Fellows and Members.

Resolved unanimously, on the motion of Dr. W. G. WILLUGHBY, seconded by Dr. CAMERON, that the same be received and adopted.

ELECTIONS.

The following candidates, having been duly nominated, were balloted for, and the PRESIDENT declared they were unanimously elected:

AS FELLOWS:—

Sealy-Smith, Richard Leonard, L.R.C.P., M.R.C.S., Eastleigh, Hants.
M.O.H. Eastleigh and Bishopstoke U.D.C.
Brown, Walter F., M.B., D.P.H., 6, Wellington Square, Ayr, M.O.H. Ayr.
Chambers, Antony B., M.D. M.Ch., Long Eaton, Derbyshire, M.O.H. Long Eaton U.D.C.
Cook, James W., M.B., M.S., 26, Manchester Road, Bury, M.O.H. Bury R.D.C.
Davey, Samuel, M.D., L.R.C.P., M.R.C.S., D.P.H., Caterham, Surrey, M.O.H. Caterham U.D.C.
Evans, Edward Prichard, L.R.C.P., M.R.C.S., Mountain Ash, Glamorgan, M.O.H. Mountain Ash U.D.C.
Fisher, Thomas, M.R.C.S., L.S.A., Great Eccleston, Garstang, Lancs, M.O.H. Garstang R.D.C.

- Garland, Edward Charles**, L.R.C.P., M.R.C.S., Yeovil, Somerset, M.O.H. Yeovil M.B.
- Gravelly, Frank**, M.R.C.S., L.S.A., Newick, Lewes, Sussex, M.O.H. Chalvey R.D.C.
- Gunther, Theodore**, M.D., L.R.C.P., Hampton Wick, Middlesex, M.O.H. Hampton Wick and Teddington U.D.C's.
- Holden, John Sinclair**, M.D., East House, Sudbury, Suffolk, M.O.H. Glemsford U.D.C.
- Killick, Charles Rowe**, M.B., Tower Hill, Williton, Somerset, M.O.H. Williton R.D.C.
- Mair, William**, Public Health Hospital, Leith, Assistant M.O.H., Leith.
- Maturin, Henry**, L.R.C.P., M.R.C.S., Oaklands, Hartley Wintney, Hants M.O.H. Hartley Wintney R.D.C.
- Mitchell, Arthur Martin**, M.A., M.D., B.C., D.P.H., St. Vincent's, Guildford Surrey, M.O.H. Guildford M.B.
- Richardson, Thomas William**, M.R.C.S., L.S.A., 35, Unthinks Road Norwich, M.O.H. Erpingham R.D.C.
- Robinson, James**, M.D., L.R.C.P., M.R.C.S., L.S.Sc., Rockfield, Dunsca Bolton, M.O.H. Turton U.D.C.
- Sheppard, Henry Anderson**, M.R.C.S., L.S.A., Elingfield House, Totton Southampton, M.O.H. New Forest R.D.C.
- Sloman, S. George**, L.R.C.P., M.R.C.S., 39, West Street, Farnham, Surrey M.O.H. Farnham U.D.C.
- Steele, William Dyne**, M.D., D.P.H., 7, Nevill Street, Abergavenny, M.O.H. Abergavenny M.B.
- Watkins, Harold Ernest**, L.R.C.P., M.R.C.S., Stone Legh, Newton-le Willows, Lancs, M.O.H. Newton-in-Makerfield U.D.C.
- Weaver, John James**, M.R.C.S., L.S.A., D.P.H., Town Hall, Southport M.O.H. Southport M.B.
- Willis, James George**, L.R.C.P. and S., D.P.H., Bishop Auckland, Co Durham, M.O.H. Auckland R.D.C.

AS MEMBERS:—

- Mostyn, Sydney G.**, M.B., B.Ch., D.P.H., City Hospital, Newcastle-on-Tyne
- Stevenson, Archibald Campbell**, M.B., L.R.C.P., M.R.C.S., D.P.H. 12, Harley House, Regent's Park, London, W.
- Thomson, Thomas Lauder**, M.B., D.P.H., City Hospital, North Liverpool

AS ASSOCIATES:—

- Hughes, David Arthur**, L.R.C.P., M.R.C.S., Greenlands, Ammanfor Carmarthen.
- Tritsch, Isidor**, L.R.C.P., M.R.C.S., Lawn House, Hampstead Heath.

NOMINATIONS.—Several candidates were then nominated for election at the next meeting.

PRESIDENTIAL ADDRESS.—Dr. JOSEPH GROVES then delivered his Presidential Address on "Rural Water-Supplies."*

Dr. CAMERON proposed that the very best thanks of the Society be accorded to the President for his address. It was an advantage to the Society that they had elected as their President a man who, in addition to being a Medical Officer of Health, was also in private practice.

* See p. 89.

was important that the Society should recognise from time to time the position that such men held. Dr. Groves had a very large district, and must have but comparatively little time for general practice. At the same time the practitioner saw a great many things in regard to public health that the whole-time Health Officer did not. The importance of the question Dr. Groves had brought before them must have struck them all, especially those who had practised in rural districts. The importance of cleanliness was very much promoted by a public water-supply. Those in large towns felt also the importance of a pure milk-supply.

Dr. SEATON, in seconding the proposal, said he had been for many years concerned in questions of rural water-supplies. A few years ago he had the advantage of consulting their President on the subject in connection with the epidemics at Worthing and Maidstone. The great convenience of a public water-supply largely determined the question of the growth of the rural population. The tap was a very convenient thing, but it led to a very large quantity of water being used, and that in turn to the expensive question of local sewerage. Mr. W. Whitaker, whom they were pleased to see present at that meeting, had said that if the rules of the Local Government Board were made retrospective, nearly half the existing supplies would have to be closed.

The motion was put to the meeting by Dr. CAMERON, and carried unanimously.

Dr. GROVES briefly acknowledged the vote of thanks.

ANNUAL DINNER.

THE Annual Dinner of the Society was held at the Holborn Restaurant after the Annual Meeting. Dr. Joseph Groves, J.P., presided, and was supported by about seventy gentlemen, among whom were Sir William Church, President R.C.P.; Dr. Griffiths, President British Medical Association, and Mr. Andrew Clark, Chairman of the Council of the British Medical Association; Dr. Dawson Williams, Mr. Guy Elliston, Mr. Whitaker, Drs. J. Tatham, B. A. Whitelegge, Septimus Sunderland, and Kelynaek; Messrs. Donald Armour, Defries, Young and Grigg (Chairman and ex-Chairman of Council of Sanitary Inspectors' Association), Drs. J. Spottiswoode Cameron, A. Newsholme, Henry Armstrong, S. F. Murphy, R. Duffield, Tubb-Thomas, Herbert Jones, F. J. Allan, G. Millson, J. Priestley, J. F. J. Sykes, E. Seaton, W. G. Willoughby, H. W. Roberts, McCleary, A. Bostock Hill, Nash, W. A. Bond, J. Dixon, H. Cooper Patten, Wilcox, Lodwidge, Newman, Kenwood, Hector McKenzie, W. H. Beach, Bateman, Paget, Porter, Symons, Field, Parkes, Collins, Roberts, Clark, etc.

After dinner, the PRESIDENT, in giving the toast of "The King," said: I know that nothing I can say would increase your appreciation of the statesmanlike efforts the King has made for the benefit of this nation. Each section of his subjects finds some ground for specially acclaiming him. We, because of his sympathy with human suffering, for his care of our hospitals, for the amount of interest he manifests in the efforts which are being made to prevent disease.

Sir WILLIAM CHURCH, in proposing the toast of the Incorporated Society, said he felt they wished to pay an honour to his colleagues of the profession he represented in entrusting the toast to him. He spoke as an outsider. He knew not what might be the burning questions of

the day or what the topics which they were debating. The welfare of the public health was their primary object, but what other objects they had he was not acquainted with. If there were disadvantages of being in a position of ignorance, there were also some advantages, because he could speak freely as an outsider and express his own views on one or two points. Of the great value of their Society to its members and to the public there could be no doubt. Their work was done individually, and not in connection with a number of confrères. Therefore it was very desirable they should have a society, with its journal, in which they could discuss questions of interest to themselves and to the general public. These associations had another great advantage—they brought their members together socially, and were of great value in that way. He believed that some sort of Society of Medical Officers of Health had existed nearly as long as had such officers as Medical Officers of Health. If he remembered rightly, the first Medical Officer of Health was Dr. Duncan, of Liverpool, as long ago as 1845, and that within a year or two the City of London followed Liverpool and appointed that veteran of sanitary science (whom they were glad to remember was still amongst them), Sir John Simon. After the passing of the Metropolitan Local Management Act in 1855 their Society took form. It was reorganized in 1884, taking in a number of provincial societies formed after the passing of the 1875 Act, and it was only some ten or eleven years since it became an Incorporated Society. He did not think the country generally realized what it owed to its Medical Officers of Health. He felt sure that their importance had never been duly recognised, and the position they held was increasing in importance from day to day with the increasing knowledge the world was obtaining. During the period their Society had been in existence a great increase of their duties had occurred, and they had reached a much higher plane. When first Medical Officers of Health were appointed they were little more than superintendents of inspectors of nuisances. They were in a very much higher position to-day. With the increase of knowledge going on, their duties and responsibilities had continually increased, so that those of his profession who followed sanitary science and public health were, perhaps, following the highest branch of medicine as distinct from surgery. The old proverb said that "Prevention is better than cure," and it was to them that they looked for the prevention of disease. If they only considered what, by their efforts, aided by other public-spirited and far-seeing people, had been effected they would agree there was great cause for satisfaction and hope. They might say that typhus had been abolished from this country by the action of the Health Officers; cholera and plague had been almost excluded from their coasts. There was one disease, however, which one might wish abolished because it was the one which it would be easiest to abolish—viz., small-pox. Speaking for himself, he could only trust that before many years had passed the whole machinery dealing with vaccination and small-pox might be removed from its present position and placed in the hands of the authorities of the Medical Officers of Health. He need not dwell on the amount of the diminution of disease in late years which they had had a main part in effecting. It had been said that if Medical Officers of Health had greater powers they would be able to accomplish more. That might be true; but it seemed to him if their services could be somewhat better arranged that their powers would be greatly increased without any increase of Parliamentary powers. One of the great misfortunes

in their service was that many of the Medical Officers of Health in rural districts were not sufficiently independent. It would be a very great thing if the Medical Officers of Health throughout the country were really independent of practice. That could only be accomplished by large areas being placed in charge of one man. It was not reasonable to suppose, especially when they considered how badly Medical Officers of Health had been paid, that medical men would spend the time considering what was good for the whole population without taking any care for their own pockets. Until the whole service of public health was separated from general practice there would still be a considerable advance to be made. As he had said, they might consider themselves the highest branch of the profession of medicine. This was generally acknowledged, because to hold any of the highest positions in their branch there was a special educational course after a man had qualified for the practice of medicine in a general way. There were few points which he would like still to touch upon. At the present time he thought the public had just reached that stage when they were sufficiently educated to be willing to do a good deal. They heard and read a great deal about sanatoria, but it did seem to him that they were advancing a little too fast. They must consider ways and means. Sanatoria were being built here and there, which would cost not only one hundred, but several hundred pounds per bed. It seemed to him that that was not quite necessary. He could not help thinking that hospitalism had run a little faster than was necessary for the treatment of disease. He believed the open-air treatment of phthisis could be obtained with as good effect by such simple means (which he believed had been tried) as the conversion of old railway carriages into rooms instead of spending enormous sums of money in these various sanatoria. Another point he would mention in which they had great power: constantly in the country they saw untold sums placed underground in the shape of drains. Could they not preach that in rural districts drains ought not to exist? He was afraid he was entreaching on matters he ought not to speak of, but he was the Chairman of the Rural District Council, and he knew that in his Rural District Council whenever a nuisance was found the first idea was to get somebody else to pay for it in the shape of a drain. He gave to them the toast of the Incorporated Society of Medical Officers of Health, coupled with the names of Dr. Reginald Dudfield, President of the Metropolitan Branch, and Dr. Tubb-Thomas, President of the West of England and South Wales Branch.

The toast having been honoured,

Dr. REGINALD DUDFIELD, in responding, said in 1906—three years hence—the Society would celebrate its jubilee, and he hoped it would then receive some official recognition; by that time he hoped they would receive a charter. The first provincial President of the Society was Dr. Alfred Hill, who had just retired from his office as Medical Officer of Health of Birmingham. During the past year they had lost one of their Vice-Presidents, Professor Corfield, a Metropolitan Medical Officer of Health of more than national reputation. Anybody who read the duties of a Medical Officer of Health in the Metropolitan Management Act, 1855, would be struck by the difference between the duties supposed to be performed then and now. Three or four years ago a book was published in which it was rather cynically stated that a Medical Officer of Health was supposed to be specially qualified in medicine and have a knowledge of chemistry, engineering, geology, architecture, sur-

veying, and law. He need hardly remind that company that if they could have had their way small-pox would have been stamped out long ago. A great deal of work still remained to be done. Two points particularly at the present time struck him—viz., the questions of infantile mortality and cancer. Of these, infantile mortality was the one which promised the earliest results. It was a subject of the utmost importance. As Britons they would deeply regret to see their colonies pass out of their hands, but unless they could find sufficient emigrants to fill those lands this would inevitably happen. Sir William Church was Chairman of a District Council, but perhaps he hardly knew the full powers that Council possessed. In no part of the country were those powers fully exercised, and the people would be very surprised if they were. What they really wanted was a strong Minister of Public Health. He was afraid the Medical Officers of Health present would think it heterodox if he said that he could not help thinking that in the country there was hardly the same need for sanitary legislation as in towns. He felt convinced that whilst in the towns the lack of sanitation could not fail but to be followed with dire results, yet in the country it was not so.

Dr. TUBB-THOMAS also responded. There were many remarks made by Sir William Church with which, as a Medical Officer of Health representing the country districts, he was bound to differ. Sir William Church said a great deal too much money was spent in drains. The question arose whether one should spend the money in drains or in getting an expensive system of water-supply. As a rule, the water-supply was derived from wells which were badly protected. The people got rid of their slops as close as they could to the wells. The usual custom was to dig two holes, one to draw the water and the other to deposit the sewage, and the nearer those holes were together the better the people seemed to like it. Dr. Dudfield had dealt with the matter from a town point of view. He said that sanitation was necessary in the towns, but not in the country. Unfortunately, the country was being pushed on by the town. For instance, Dr. Dudfield and his friends in town insisted that the milk-supply from the country districts should be without reproach. It was impossible in many of the villages to provide the necessary water-supply unless the slop-water was carried away in drains. Another point was the question of hospitals. Sir William Church complained that there was too much "hospitalism." That might be the case in towns, but in the country districts they suffered rather from the want of hospitals. If some of the money spent in large towns for hospitals was sent to the country to be expended so that they could have hospitals, it would be a great advantage. Living in a district where they were now erecting sanatoria for the treatment of consumption, he could not agree with the remarks of Sir William Church on that subject. He did not think anyone could accuse the authorities of recklessness in connection with the building of sanatoria. In Wilts, Gloucester, and Somerset they were erecting sanatoria at a total cost of under £200 per bed. Unfortunately, in many of the country districts consumption was really more prevalent than in the towns, especially where the cottages were very old, and there was an absence of the light and air that was absolutely necessary. It was by the erection of such hospitals that they hoped to educate the people to the advantages of light and air. Medical Officers of Health in London boroughs had fixity of tenure and whole-time appointments, and they were able to speak to their authorities with a freedom that country

officers had not got. Unfortunately, the work of Medical Officers of Health was badly remunerated—they got neither pay nor kudos.

The PRESIDENT, in proposing the guests, said they did not forget that they were medical men first and Medical Officers of Health afterwards. They had with them Sir William Church, President of the Royal College of Physicians, who so ably upheld the dignity of their profession. They had him also in another capacity—as Chairman of a Rural District Council. Many of them would like to have Sir William as Chairman of their Council. They could talk with him, show him the medical man's points of view, and perhaps convert him on some matters about which he seemed a little uncertain. They had with them also the head of the greatest association of medical men that existed—Dr. Griffiths, the President of the British Medical Association. He supposed there was not a medical man in the kingdom who had not Dr. Griffiths in his mind at present, for at Swansea Dr. Griffiths found time for an admirable address, in which he spoke in most sympathetic terms of their branch of the profession, and in which he supported the appeal to the Local Government Board for security of tenure. Another distinguished member of their profession who was with them was the eminent surgeon, Mr. Andrew Clark, Chairman of the Council of the British Medical Association, to whom they owed so much as a Society. Also there was Dr. Dawson Williams, the editor of the *British Medical Journal*, who had been so kind always in his efforts to help forward the interests of preventive medicine and of those engaged in the public health service. The British Medical Association was also represented by Mr. Guy Elliston, the General Secretary, and Mr. Whitaker, the Secretary of the Parliamentary Committee, to both of whom they were indebted for much courtesy. They had also representatives of two great public departments—Dr. Tatham, of the Registrar-General's Office, and Dr. Whitelegge, of the Home Office. They were old friends and colleagues whom they were delighted to see. They did not forget that they were medical men, and although Government officials, they were always accessible, always sympathetic, always helpful. They were indebted to Dr. Tatham in connection with the nomenclature of diseases. They were much indebted to Dr. Whitelegge, through whom they had been in constant touch with the Home Office during the past twelve months. There were great questions which had to be settled by the Home Office, and it was most fortunate for the country that they had an official there so well informed. In such questions as bakehouses, the ventilation of factories, etc., they looked to Dr. Whitelegge to bring about great changes. They hoped that Dr. Tatham would be able to help them in the matter of obtaining the addresses of newly-born infants. They had also with them some distinguished members of other Societies—Dr. Septimus Sunderland, Secretary of the British Balneological and Climatological Society, whose work must help the Medical Officer of Health, especially when broader and more enlightened views were taken of the functions of his office; also Dr. Kelynack, the Secretary of the Society for the Investigation of Inebriety, and who was also investigating and studying the treatment of tuberculosis in the open air. They had also Mr. Donald Armour, who in settling amongst them was emphasizing the sentiment of a united Empire. They might depend upon it that whatever political changes might take place, the medical profession was going to be united throughout the British Empire. There was one question he must hark back to—that of the assistance they had received from the British Medical Association in connection

with the Security of Tenure Bill. They were very much indebted to them on their own account and on the account of the Sanitary Inspectors (representatives of whose Association—the Chairman and ex-Chairman of the Council—they were glad to see present at that gathering) for the active interest the British Medical Association had taken. He believed it would be impossible for many Medical Officers of Health to do their duty without security of tenure if they were not in private practice. With the support they got from their patients and as citizens they could do work that could not be done otherwise. The British Medical Association had already secured the removal of disabilities of members of the profession in the other public services—the Army and Navy and the Poor Law—and now they were promoting this Bill. If one might venture to drop a suggestion, it would be to express the opinion that it might be possible they would get better results if the Bill were introduced at the beginning of the session of Parliament. Members of Parliament had told him that if they wanted to carry a Bill through they must have it before Parliament early.

Dr. GRIFFITHS, in responding, said he was a stranger and an outsider. He had never been a Medical Officer of Health; he had never had a chance to be one. They had an excellent Medical Officer of Health at Swansea, Dr. Davies. He was there when the speaker went to the town forty years ago, and was in harness still. Dr. Griffiths esteemed it a great privilege and a great honour to be present at that gathering. He agreed that they represented a most important section of their profession. The country, no doubt, was greatly indebted to them individually and collectively for the great services they had rendered to the public. They had done a great work under great disadvantages, and in spite of ignorance and prejudice. Their Society had a record of excellent work. They had educated the country for developments in connection with the administration of their Public Health Acts, but it was evident that further developments in that direction could not possibly take place without great reformatations. It was evident they must have greater central authorities, greater control by the central authorities, greater power in the County Councils. They must improve the position of the Medical Officer of Health and give him greater powers, subject to the control of the local authority. If he had any fault to find with them, it was that they had not been energetic enough. They were too modest. They wanted a Chamberlain amongst them to stir them up and assert their rights. He might tell them that notice had been given to the Public Health Committee that at the next meeting a resolution would be moved that the British Medical Association should take steps to secure for Medical Officers of Health security of tenure, adequate salaries, and pensions. If that were done they would have an independent public health service in England which would be of the greatest possible advantage to the country.

Dr. WHITELEGGE said he had been present at many of those gatherings. He knew no place where he could meet so many old friends as he did there. He had not deserted the public health service. He had taken a new turn. He had a little field more or less to himself, but not out of touch with their world. Many subjects had been mentioned that evening that raised the old Adam. There had been references to security of tenure, hospitals, drains, and many other things. Hospitals had always fascinated him. He looked with increased satisfaction every year to the increased number of hospitals. He tried to lend a hand himself a few years ago, when a small advance was made, but it

was nothing to the great advances made since. He thought he should differ from his esteemed chief, the President of the Royal College of Physicians, in supposing that the absence of drains was quite the remedy for the pollution that some of the rural districts suffered from. Recent legislation had brought him closely into touch with Medical Officers of Health with regard to workshops, and when one found districts—and they were only a few—in which the work was not being done as it might be, one appreciated it the more because of the work so well done in other districts. If it occasionally fell to his lot to suggest to the powers that be that a certain Authority was not doing quite all that it might, it usually turned out that that Authority was not supported by the Medical Officer of Health. Then the Home Office, or at all events he, knew what to think and he thought. His own work in other ways came very close to that of Medical Officers of Health. Even when he had a part, in a very humble way, of lending assistance in the cancer inquiry, or in the matter of arsenic poisoning, they were questions of public health. When he came to the questions of the ventilation of factories and workshops and the provision of sanitary conveniences, he felt again he was acting with the Medical Officers of Health. Notification, too, in another form—of industrial diseases—was a reminiscence of old times, and had proved its value, as notification of infectious diseases had proved its value, throughout the country. No one belonged to a Government department without exposing himself to criticisms. They came from many quarters and upon many questions, some even from the Incorporated Society of Medical Officers of Health. They had made suggestions, and no one could question the value of them. He felt that, out of the spirit of old good fellowship, the criticism was more in sorrow than in anger. He felt indebted to the Society of Medical Officers of Health, and was proud of being a Fellow of many years' standing.

Dr. NEWSHOLME, in proposing the health of the President, said that he was sure they would all endorse the congratulations offered to Dr. Groves on the position he occupied. Dr. Groves had done much hard work in the British Medical Association and in their own Society, particularly in connection with the question of Security of Tenure. He desired to warn the President that there was no security of tenure in the chair he now occupied, but there was a continuance of the esteem and regard of every member of the Society, and that was a security of tenure which Dr. Groves, like them all, valued most highly. They like to stand well with their authorities, but they liked best of all to stand well in the opinion of their *confrères*. There was a peculiar appropriateness in the election of Dr. Groves as their President, because he represented the majority of Medical Officers of Health in the country; and, notwithstanding what had been said about whole-time men, the main part of medical sanitary work was done by general medical practitioners engaged in the general practice of their profession. It would be a sad time for them if they ever lost grip of medical work. They in the Southern Branch knew the work Dr. Groves had done in the Isle of Wight. He had gone in for every form of good work—social work, ethical work, even to giving Sunday afternoon addresses to working men, and he (the speaker) knew no better method of advancing their work than educating the working men. One felt the great importance of educating the public, because their work could not advance a step further than the public would allow. He had also to refer to the personal charm of their President. No one could be associated with

him without feeling the better for it. They would join with him in drinking to the good health of their President, and wishing him a most successful year of office.

The toast was drunk with musical honours.

Dr. GROVES said it was very kind of them to drink his health so heartily. Dr. Newsholme was a very old friend of his, and had a way of looking at things from a very optimistic point of view. It happened that sometimes they overestimated the virtues of their friends, and dealt with their vices a little too tenderly. That was how Dr. Newsholme had spoken of him. He was, as Dr. Newsholme had said, a representative of by far the largest number of the Fellows of their Society. His position as their President was a representative one, and he owed it to the fact that he had been longer in the public health service than many. He held his first appointment in London during the cholera outbreak in 1866. He spoke from his own experience, and he was now in practice because Rural Sanitary Authorities would not pay a man enough to live on. They said: "We give you so much a year, and you must eke out a living by practice. We shall restrict your practice. We don't allow you to dispense or to do surgical work. You must do the best you can." It was rather a bad day for many men if they were going to do their duty and obey the law laid down by the State. He believed very much that a man who strove to maintain a high ideal got help in public work. His ideal had been that of good citizenship, and when his Authority began to knock him about, the public stepped in, and said, "Stop it." If he was not backed up by the people of all classes, he could not possibly hold his appointment. Therefore he was the more concerned for the many who lived miserable lives. It was shameful that Medical Officers of Health and Sanitary Inspectors should be the Ishmaels of the twentieth century, subject to constant persecution because they would not obey a jerry-builder or the interested Chairman of a Sanitary Authority. It was absurd that the State should impose upon them directions and orders which in honour they were bound to carry out, and permit them to be dismissed at any moment. What were they to do? Should they give it up? No, he replied; let them stick to their guns and try and interest themselves in the affairs of the people. Try to be good citizens. The more they strove to do all they could in every relation of life for the good of their fellows, the more efficient would their public health work be, and the more they would be encouraged even by those who could not understand the why and wherefore of many things, or why they wanted this, that, or the other.

Dr. J. SPOTTISWOODE CAMERON proposed the toast of the "Officers of the Society." He had been allotted the duty because he was the retiring President, and ought to know something about those gentlemen and their work during the past year. PUBLIC HEALTH, the Journal of the Society, had been steadily improving. It was becoming more and more important, and he hoped it would in the future become a very great power in that department of public work in which they were particularly interested. He congratulated the Society on having so capable a Secretary as Dr. Jones. He had been assiduous during the year, travelling many times to London on the Society's business, and devoting a lot of time to their work. Not less assiduous was Dr. Priestley. In Dr. Millson they had a most conscientious and careful Treasurer. Indeed, they were most fortunate in having such officers. The success of the Society was due, not to the President, but to the way the officers

carried out their duties. He would ask them to drink to their health, and he would like to add the name of Mr. Kent, their Assistant Secretary, whose labours had been most successful. As a Scotsman he asked them to accord musical honours to the toast.

Dr. ALLAN, responding, said he had endeavoured to make PUBLIC HEALTH as far as possible not only a scientific journal, but of practical use to every member of the Society. It was impossible to carry out one's desires in every respect, but as long as he had their confidence he should continue to do his best.

Dr. HERBERT JONES desired to remind them that the Society had done a great deal in the past. They knew that a great past was a glorious thing, but more glorious, indeed, was a great future. If they were to make the Society what they thought it ought to be; if they were to keep their Journal in the position it held to-day, the leading Public Health Journal of the world, with an assured position such as that of the *Times*, the *Lancet*, and the *British Medical Journal*; to have, as they intended to have, a public health library second to none in the world; their Society such that the public would take their opinion as authoritative, and the Local Government Board and the Home Office would look to them for that help to which they were entitled—it was necessary for every member to do what they could individually to increase the membership of the Society. It was impossible for officials to do everything, and he begged every member to feel that the success and prosperity of the Society was dependent on the individual action of its members.

Dr. PRIESTLEY and Dr. MILLSON also responded.

During the evening a programme of music was interspersed between the toasts.

Birmingham and Midland Branch.—The annual meeting was held in the Council House, Birmingham, on October 1st. Present: Dr. Millard, President, in the chair, Messrs. Beasley, Ridley, Bailey, Beatty, Boobyer, Chatelier, Gepp, Reginald Green, A. Hill, Bostock Hill, G. Reid, Richmond, Robinson, Snell, Stevenson, Whitaker, and Wilkinson.

A vote of thanks to the Right Hon. the Lord Mayor and the Corporation of the City of Birmingham for the use of the Council House for the meetings of the Branch was cordially agreed to.

Dr. MILLARD then inducted Dr. Thomas Robinson as President.

Dr. ROBINSON briefly returned thanks, and proceeded to deliver his presidential address on "Joint Hospitals for the Isolation of Small-pox."

Dr. A. HILL proposed a hearty vote of thanks to the President for his address.

Dr. G. REID seconded, and Dr. BOOBYER supported the vote, which was carried unanimously.

The PRESIDENT proposed a vote of thanks to Dr. Millard, the retiring President, for his services during the past year.

Dr. BOSTOCK HILL seconded, and the vote was carried by acclamation.

A vote of thanks was given to the Leicester Corporation for its kindness in entertaining the Branch on its visit to Leicester in July last.

Votes of thanks were given to the Hon. Treasurer and Secretary for their services.

CURRENT PUBLIC HEALTH LITERATURE.

British Medical Journal, 1903.

- (No. 2,228.) On the Inoculability of Human Tuberculosis upon Bovines. D. J. Hamilton. (A reply to criticisms.)
 Miners' Phthisis. Thomas Oliver, J. G. Adami, and D. J. Hamilton agreed that it is a non-tuberculous fibrosis.
 Splenic Anæmia: Pathology. H. D. Rolleston, R. S. Trevor, H. Senator, J. Mitchell Clarke, W. Ewart, F. M. Sandwith, D. J. Hamilton.
 Changes in the Spinal Cord in a Case of Diphtherial and Alcoholic Paralysis. J. M. Clarke.
 Classification Cards for Use in Bacteriology. K. Goadby.
 The Report of the Commission on Dysentery and its Relation to Enteric Fever.
 Prehistoric Sanitation in Crete. T. H. M. Clarke. (A water-borne sewage system dating from 2800 B.C.)
 The Cost of Public Vaccination. (Editorial.)
 The Sanitary Lessons of the South African Campaign. (Editorial.)
 The Prevention of Water-borne Disease in the Army.
 International Congress of Hygiene: Summary of Proceedings. (Continued in subsequent numbers.)
 Annual Report of Local Government Board. (Summary.)
 Annual Report of Registrar-General. (Summary.)
 (No. 2,229.) Disposal of Excreta in the Tropics. W. J. Simpson, A. Duncan.
 Influence of the Septic Tank on Pathogenic Bacteria. L. Rogers. (Is inimical to most of the pathogenic organisms tested, except anthrax; but *B. coli* and *B. enteritidis* sometimes escaped, and even survived drainage through land.
 Discussion on above by Clarke, Bassett Smith, Manson, F. M. Sandwith, Sambon, Cantlie, King Penny, Christy, Goadby, and Nuttall.)
 Pathology of Acute Rheumatism. E. W. Ainley Walker and J. H. Ryffel.
 (No. 2,230.) Leprosy. Jonathan Hutchinson, H. M. Fernando, P. S. Abraham, F. M. Sandwith, P. Manson, Sambon, Cantlie, and Hillis.
 Varioloid Varicella in Trinidad. J. R. Dickson and C. F. Lasselle.
 Plague in Domestic Animals. J. Cantlie.
 India: Report of the Imperial Sanitary Commissioner for 1901.
 The Systematization of Efforts to Reduce Infantile Mortality. (Editorial.)
 The Registration of Deaths from Alcoholism. (Editorial.)
 An Extensive Epidemic of Diarrhœa apparently due to the Pollution of a Public Water Supply. J. C. Thresh.
 Revaccination in Orange River Colony.
 The Age Distribution of England and Wales.
 Anti-tuberculous Dispensaries in Belgium.
 (No. 2,231.) Isolation Hospitals: Neglects in Respect of Site, Structure, and Arrangements for Administration. (Recent illustrative cases.)
 (No. 2,232.) Hygiene of Girls' Schools. (Editorial.)
 International Views on the Prevention of Tuberculosis. (Editorial.)
 The Opening of the Oyster Season.
 Spitting and Education.
 (No. 2,233.) On the Etiology of Phthisis. Professor von Behring. (Editorial.)
 The Teaching of Domestic Subjects in London School Boards. (Editorial.)
 Reports of the Royal Society's Commission on Sleeping Sickness. (Editorial.)

Tuberculosis and Food.

The International Sanitary Conference in Paris.

The Mortality from Tuberculosis in Relation to Age, Sex, and Alcoholism.

Diphtheria and Milkmen.

The Lancet, Vol. CLXV., 1903.

- (No. 4,176.) The Virulence of the Bacillus of Bovine and Human Tuberculosis for Monkeys. Allan Macfadyen.
 National Physical Deterioration. (Editorial on the committee appointed to inquire into the matter.)
 The International Congress of Hygiene: Report. (Continued.)
 (No. 4,177.) The Artificial Feeding of Infants. R. Hutchison.
 Tuberculosis and Cancer in New Zealand. W. J. Barclay.
 Laundries, Sanitary and Insanitary. (Editorial.)
 The Distribution of the Bacilli of Diphtheria and of Tuberculosis in Dwelling-rooms. H. W. Hill.
 Annual Report of the Medical Officer of the Local Government Board.
 (No. 4,178.) Perforation in Typhoid Fever. Hector W. G. Mackenzie.
 Puerperal Septicæmia: Successful Use of Antistreptococcic Serum. J. M. Mackenzie and W. B. Blandy.
 Typhoid Fever in Arnies. (Editorial.)
 The Geography of Disease. (Editorial.)
 Annual Report of Registrar-General. (Continued in subsequent numbers.)
 Typhoid Fever in Belfast. J. Lorrain Smith.
 (No. 4,179.) Infant Feeding. G. F. McCleary.
 The Immunization of Animals to the *Bacillus typhosus*. W. Vernon Shaw.
 (No. 4,180.) On the Protective Effect achieved by Antityphoid Inoculation as exhibited in Two Further Statistical Records. A. E. Wright.
 A Tube for the Cultivation of Anaerobic Organisms in Fluid Media. G. L. Tuck. (Illustrated.)
 (No. 4,181.) The Quantitative and Qualitative Relations of Toxin and Antitoxin. E. F. Bashford. (Illustrated.)
 On the Etiology of Bubonic Plague: An Epidemiological Contribution. J. Ashburton Thompson.

Birmingham Medical Review, SEPTEMBER.

- Some Effects of Tobacco. J. A. Henton White. (Sickness Statistics. Ballantyne's Opinion with reference to Large Infantile Mortality of Children of Women Workers.)

The Journal of State Medicine, Vol. XI., SEPTEMBER.

- (No. 9.) The Sanitation of Congested Areas and Rehousing the Dispossessed. Austin Taylor, M.P.
 The Gospel of Health. Rev. John Watson, D.D.
 Infectious Hospitals. W. J. Simpson.
 Rehousing the Poor on the Outskirts of Large Cities. James Niven.
 A Uniform Scheme of Examination to be adopted in the Bacterioscopic Analysis of Water. William G. Savage and G. Leslie Eastes.
 Action of Alum on the Typhoid Bacillus. H. S. Willson.
 (No. 10.) Preventive Measures against Tuberculosis in Large Towns. Nathan Raw.
 Bovine Tuberculosis and Public Health. J. McLauchlan Young.

- The Susceptibility of the Pig to Human Tuberculosis. George Dean and Charles Todd.
- Latent Scarlet Fever and its Importance Epidemiologically. P. Caziot.
- Supply of Sterilized Humanized Milk for Infants. A. A. Mussen.
- The Nature of the so-called Pseudo-Diphtheria (Hofmann) and its Significance (if any) in the Bacteriological Examination for Diphtheria. Louis Cobbett, J. C. Heaven, F. J. Tanner, E. C. Bousfield, M. A. Stanley Kent, Buchanan, and Hewlett.
- The Staining of Bacterial Flagella with Silver. J. W. W. Stephens.

Journal of Tropical Medicine, Vol. VI.

- (No. 17, September 1st.) Observations on Akatama, a West Central African Disease. F. C. Wellman.
- Mosquitoes in Relation to Malaria in the Province of Huelva, Spain. Ian Macdonald.
- Remarks on the Report of the Royal Commission on the South African War. (Editorial and in No. 18.)
- Malarial Remittent Fevers. Leonard Rogers.
- (No. 18, September 15th.) An Account of Antimalarial Work carried out with Success in Selangor, one of the Federated States of the Malay Peninsula. E. A. O. Travers.
- Municipal Sewerage. Major F. Smith. (Continued.)
- A Breeding-place of Certain Forest Mosquitoes in Malaya. G. F. Leicester.
- (No. 19, October 1st.) Notes on Collecting Mosquitoes. Herbert E. Durham.
- Malarial Fevers in West Africa. Major R. Crofts.

The Practitioner, Vol. LXXI., 1903.

- (No. 8, September.) Is the Urban Hospital Treatment of External or Surgical Tuberculosis Justifiable? A. H. Tubby. (The chances of cure are much greater when cases are treated in the country or at the seaside.)
- Impressions of the Sanatorium Treatment by a "Healthy Patient." P. Horton-Smith.
- (No. 4, October.) An Inquiry into the Relations of Leucæmia and Tuberculosis. W. J. Susmann.
- A Review of Recent Literature on Diphtheria. Claude B. Ker.
- A Review of Recent Work in the Field of Venereal Diseases. J. Ernest Lane.
- Organotherapy in Addison's Disease. E. W. Adams. (About 88 per cent. seem to derive temporary benefit, 16 per cent. apparently permanent benefit. There is frequently tuberculosis of other organs, but in some cases the adrenals were atrophied, and no tuberculosis elsewhere.)

The Bristol Medico-Chirurgical Journal, SEPTEMBER, 1903.

- The Antibodies in Disease. F. Bushnell.
- The Practical Value of Blood-counts. W. Gordon.

Water, Vol. V., SEPTEMBER 15TH.

- Cape Town's Water-supply: Water Waste and its Prevention. W. S. Crandall.
- Raising of Water from Deep Wells and Borings by Compressed Air. W. H. Maxwell. (Continued.)
- (October 15th.) Standard for the Bacterioscopic Analysis of Water Tracing Underground Streams. (The use of Fluorescein.)

The Australian Medical Gazette.

- Fleas and Plague Convection. J. S. C. Elkington. (Considers it reasonable to believe that infection may be carried by fleas.)
- Two Acute Cases of Tetanus successfully treated with Antitoxin. R. R. S. Mackinnon.
- Diphtheritic Intertrigo. W. F. Litchfield.
- Measles with Nephritis. E. E. Moule.
- The Declining Birth-rate. (Editorial.) (A Royal Commission has been appointed to inquire into the matter.)
- The Spread of Typhoid Fever. (Editorial.)

The Journal of the American Medical Association, Vol. XLI.

- (No. 8.) The Apparent Immunizing Value of Attenuated Tubercle Bacilli. E. A. de Schweinitz.
- Amœbic Dysentery. H. F. Harris, T. B. Fletcher, and J. M. Anders.
- (No. 9.) Streptococci in Relation to Specific Diseases. (Editorial.) (None of the sera regarded as specific for scarlet fever are so.)
- (No. 10.) Fourth of July Tetanus.
- The Value of County Laboratories.
- Lemon-juice and Typhoid Fever Bacilli. W. Johnson and W. D. Greene. (Lemon-juice is not at all to be depended upon in rendering polluted water safe for drinking, and it cannot affect bacilli within the body of an oyster.)
- (No. 11.) Eye Complications of Small-pox. A. R. Baker. (In Cleveland Ohio, the medical officer of health, whose vigorous and successful policy of vaccination and quarantine in a previous epidemic did not meet with approval, was replaced by a Dr. Frederick, who relied on disinfection "Dr. Frederick is a most efficient officer, a thoroughly educated gentleman an indefatigable worker, with great patience and perseverance. He had placed at his command every resource to combat an epidemic without vaccination. A more competent man for such an undertaking could not have been found, and his complete and disastrous failure ought to be sufficient to close the mouths of every antivaccinationist in the country.")
- Should the Tuberculous Patient know the Truth regarding his Condition? C. P. Ambler. (It is the duty of the physician to explain to the patient the dangers to himself and others, and to appeal to him to make an effort to protect his friends. Impossibility of getting his co-operation without telling him the truth.)
- (No. 12.) Precision in the Determination of Human Parasites. Henry B. Ward.
- The Milk-supply of Cities and Towns: Milk as an article of diet—Attention lately given to the milk-supply of towns—Report of the Bureau of Animal Industry—Amount used per capita in various cities on the average—Method of delivery—Laws regulating the sale of milk—Improvements recently instituted or suggested.
- Disease and Municipal Responsibility: Greater value attributed to human life of recent years—Our better knowledge of the causes of disease and its result—Typhoid fever as an example—Responsibility of municipal authorities and those holding franchises under them for water-supplies, etc.
- Infant Mortality and the Law of Natural Selection: The assumption that the high infant mortality weeds out the unfit—Its fallaciousness—The possible value in the future of weakly-appearing infants—Recent work by Prinzing

showing that there is no relation between later mortality and reduced infant mortality; hence the preservation of weakly infants does not indicate a depreciation of the average health—Malnutrition and environment, more than congenital weakness, the causes of infant mortality.

American Journal of the Medical Sciences, AUGUST.

Bacteriology of the Blood. R. C. Rosenberger. (Examination during life may afford valuable information, especially where the use of antitoxic and bacteriologic sera are indicated. Post-mortem examinations are liable to mislead.)

Medical Review of Reviews, New York, JULY 25TH.

A Clinical and Bacteriologic Study of a Number of Outbreaks of Dysentery in which "Dysentery Bacilli" were found. William H. Park, Edward K. Dunham, and H. M. Carey. (At least two distinct varieties of bacilli are found in the intestines of those suffering from dysentery and colitis which have not as yet been met with in other conditions. They differ from each other in certain cultural characteristics—indol formation and mannite fermentation—and also in their agglutinating reaction. Different cultures made at widely separated places, though agreeing in their agglutinating reaction with most sera, still differ from each other when tried with various normal animal sera. They think it probable that Shiga, if he carries his cultural and agglutinative tests as far as necessary, will find that not one but several varieties are present in the intestines of different and perhaps the same patients in Japan as well as in the United States. The use of more accurate agglutinative tests along with additional culture media has shown that in different epidemics the bacilli found vary so greatly from the Shiga cultures that it can hardly be determined whether or not it can be brought within one single dysentery group.)

American Medicine.

(August 15th.) Rubella. F. H. Billingham.

(August 22nd.) Treatment of Typhoid Perforation. W. C. Voorsanger. (Stress is laid on the white blood-count in the diagnosis of typhoid; much, if not more, importance is attached to it than to the Widal reaction.)

(August 29th.) The Destruction of Bacteria in Vaccine Pulp with Potassium Cyanide. Harvey R. Gaylord and D. E. Wheeler.

Medical Record, New York, SEPTEMBER 12TH.

Post-typhoid Sepsis. Francis Delafield. (At the end of typhoid fever there may come in a new infection resembling the streptococcus infection, either mild or severe. Suggested that with care this can be usually distinguished from typhoid, and the practical point is that it calls for different management. The best results are obtained if the patients are fed and taken out of bed.)

Archives of Pediatrics, New York, AUGUST.

Varicella Gangrenosa: its Apparent Frequent Association with Tuberculosis. W. E. Edwards. (While calling attention to this relation, he holds that it is probably due to ordinary pathogenic organisms. The lack of resistance of a tubercular patient to infection of all kinds, and the probability of his having staphylococci and streptococci already in the respiratory tracts, favours its occurrence.)

New York Medical Journal, SEPTEMBER 12TH.

The Leucocytes in the Summer Diarrhoea of Infants. John Zahorsky.

The Value of Confirmatory Cultures in Diphtheria. John S. Billings, junior. (Billings finds that, while in a certain small percentage of cases the diphtheria bacillus fails to appear in the first cultures, the failure is generally due to a conjoined infection with the septic micrococci. Aside from these cases, the statement that the case is probably not diphtheria can be made on one negative culture up to the tenth day of the disease. Valid reasons for requesting a confirmatory culture in negative cases are: (1) Where there is no growth whatever on the culture media; (2) where there is complete contamination and liquefaction of culture media in cases which are clinically diphtheria; (3) cases where there are suspicious bacilli; (4) in croup cases where the membrane is limited to the larynx, and the duration of the disease is less than five days. Dryness of culture media, scanty growth, and the recent use of antiseptics with satisfactory growth of other organisms than the diphtheria bacilli, do not alone furnish sufficient grounds on which to request a confirmatory culture. These regulations govern the system of second cultures in the diagnosis laboratory of New York City.)

Bulletin of the American Academy of Medicine, AUGUST.

The Teaching of Hygiene in the Public Schools. The Teaching of Personal Hygiene. Walter L. Pyle.

Physiology v. Hygiene in our Public Schools. George G. Groff.

The Teaching of Physiologic Breathing. G. Hudson Makuen.

The Desirable Organization for a Department of Hygiene in Public Schools. Helen C. Putnam.

The Michigan Method of teaching Sanitary Science or Hygiene in the Public Schools of the State. Victor C. Vaughan.

The Training of Teachers of Hygiene for Public Schools. Thomas D. Wood.

Bulletin of the Johns Hopkins Hospital, Baltimore, AUGUST.

The Pathology of Small-Pox. W. R. Stokes. (Although we have only studied five cases of small-pox at autopsy, yet some conclusions can be drawn from the work. The early skin lesions indicate that the primary infection in small-pox takes place in the lungs, probably by inhalation. The poison, when it enters the circulation, shows a selective influence on the epithelium of the skin and respiratory tract, and many cases are probably not further affected. The serious and fatal lesions of small-pox are caused by the secondary infection from the skin and respiratory tract, and the infectious agent is usually the *Streptococcus pyogenes*. This organism is so distributed throughout the lesions as to explain most of the visceral changes, such as thrombosis, local necrosis, and the various pulmonary changes. This streptococcic septicæmia is the most striking feature of fatal small-pox, and if it were possible to overcome this condition by a special serum, the mortality from the disease would be greatly reduced.)

Journal of Medical Research (Boston), AUGUST.

The Relation of Specific Gravity and Osmotic Pressure to Hemolysis. Clarence Quinan.

The Dysentery Bacillus in a Series of Cases of Infantile Diarrhoea. Martha Wollstein.

- The Reaction of Certain Water Bacteria with Dysentery-immune Serum. D. H. Bergey.
- The Connection between the Alkalinity of Certain Bacterial Filtrates and their Hæmolytic Power. Edwin O. Jordan.
- A Study of the Proteolytic Enzymes and of the so-called Hæmolysins of some of the Common Saprophytic Bacteria. A. C. Abbott and N. Gildersleeve.
- An Experimental Study of the Bacteriolytic Complement Content of the Blood Serum in Normal, Vaccinated, and Variolated Rabbits. Ralph L. Thompson.
- The Non-identity of Agglutinins acting on the Flagella and on the Body of Bacteria. Theobald Smith and Arthur L. Reagh.
- Mucin as a Bacterial Product. Leo F. Rettger.
- The Physical Chemistry of Milk. Lawrence J. Henderson.
- The Pathologic Changes in the Nervous System in a Case of Lead Poisoning. William G. Spiller.

Medical News (New York), SEPTEMBER 5.

The Reduction in the Infant Mortality in the City of New York, and the Agencies which have been instrumental in bringing it about. Rowland G. Freeman. (The influences that contribute to the high mortality are defective feeding, the active cause, and heat and humidity and bad surroundings as contributory causes. There has been a marked decline in infant mortality during the last ten years in the United States, and especially in New York City, due, for the most part, to the decline in mortality from summer diarrhoea. This striking decline in infant mortality is due to many agencies. The general adoption of pasteurization and sterilization of milk for infant feeding is by far the most important of these, and applies to New York City and the whole of the United States. Other agencies in New York City are the improved city administration, the milk inspection of the department of health, the Straus Milk Charity, the fresh-air work of St. John's Guild and similar charities, cleaner streets and asphalt pavements, the new small parks, playgrounds and recreation piers, the improved tenements, and the use of diphtheria antitoxin.)

DAMAGE DURING DISINFECTION.—On January 20th, 1903, steps were taken by the Ayr assistant sanitary inspector, under the provisions of the Public Health (Scotland) Act, 1897, to disinfect a house by means of a sulphur candle. The door and windows of the room were closed, and the candle was left burning in the room, intimation being given that the room was not to be opened for three hours. When the room was opened, after a period of four hours, it was found to be on fire. A claim was made for £8 4s. to repair the damage done to the house, and £40, the amount estimated by an insurance company, for damage to furniture and clothing. The Sheriff Substitutor, in giving judgment for these amounts, said: "It is quite impossible to arrive at any conclusion as to what may have been the cause of the fire. It is possible that a lighted cinder may have fallen out of the fire on to the hearth-rug, but all that is certain is that the defender's assistant inspector left the disinfectant, placed in what is considered a position of safety, burning in the closed room, and that four hours afterwards the room was found to be on fire. In these circumstances I think the onus of proof is on the defenders to show that the fire was not caused by their operations."

PUBLIC HEALTH:

The Journal of the Incorporated Society of
Medical Officers of Health.

VOL. XVI. No. 3.

DECEMBER, 1903.

EDITORIAL.

THE PROVISION OF SANATORIA FOR TUBERCULOUS PATIENTS.

THE laying of the foundation-stone of the King Edward VII. Sanatorium by His Majesty is an event of great importance and of great interest from a health point of view to all those who have been fighting the "White Plague," as our American colleagues have called it. The circumstance cannot fail to direct the attention of local authorities to the subject, and must prompt them to take steps for the provision of sanatoria throughout the country. We look forward, moreover, to the active co-operation of our great Friendly Societies. From the statistics furnished from Germany, where no less than eighty-nine sanatoria have been provided through the instrumentality of the German Imperial Board of Insurance, we learn that 22,000 patients are being treated annually with most satisfactory results.

The impetus towards the erection of sanatoria which will result from His Majesty's gracious act in deciding to devote Sir Ernest Cassel's princely gift for the benefit of consumptives makes it imperative that careful consideration be given to the lines on which such sanatoria should be provided. It has been suggested by various medical men who have had practical experience in treating consumptives on the open-air principle that buildings on the "hospital" system are unnecessary; in fact, some go so far as to say that it is a mistake to erect such, as much better results can be obtained by simpler and much less expensive means. This is a matter of importance to the ratepayer, who will have to find the money, and who might readily be deterred by a large sum which would add materially to his burdens.

In the *Health Resort* for October, Dr. Charles Reinhardt points out that the "chalet" system has great advantages over the hospital system. "No patient," he says, "who has occupied a sleeping chalet will exchange it for a room. The air passing through a chalet is as agreeable, when compared with a draught in a room, as a gentle morning breeze meeting one in a country lane is pleasant in comparison with the chilling draught experienced on a railway platform. The initial cost of chalets is much less than that of rooms. The patients are isolated. Incipient cases are cured in 25 per cent. less time where chalet patients are concerned than is the case where patients occupy rooms. Nothing can be more convincing than the effect produced upon a patient with a high temperature, when transferred from a room to a chalet. The drop in the temperature often amounts to an average of a degree in a few days."

The experience of other men leads them to similar conclusions; one, a pioneer on the subject in this country, says: "The patients in chalets simply race away from those treated in rooms." At a recent meeting of representatives of the various district councils in the county of Denbighshire, this view was forcibly brought before them by Dr. Whitaker, of Shrewsbury.

Mr. Malcolm Morris, speaking* on behalf of the National Association for the Prevention of Consumption at Edinburgh lately, emphasized strongly the danger likely to arise if palaces of the most sumptuous character were provided for consumptives. It could not be too widely known that the disease could be met by the very simplest possible means, and the Association felt that if great, costly palaces were demanded great harm would result, as, rather than spend large sums of money on bricks and mortar, the treatment of the disease might be neglected.

We are glad to see that the Association is taking up a strong position on this subject, thus, through its local branch it has pointed out to the inhabitants of Belfast what bungalows have done, all that is needed being an old country house with an administrative block and some cheap shelters. A month at such a place for each patient, on the lines demonstrated by Dr. Newsholme at Brighton, would teach him the value of fresh air and the importance of dealing properly with the expectoration. Such a place with 100 beds would give 1,200 patients four weeks' treatment each year.

Is London to lag behind in its means to deal with this problem? The Metropolitan Asylums Board have ample buildings and extensive grounds at their disposal for the care of hopeless cases, as well

* *Tuberculosis*, vol. ii., No. 8, October, 1903.

as for the treatment of persons in the early stage of the disease, when there are good prospects of cure.

The opinion of London medical officers, ably voiced by Dr. T. Orme Dudfield and Dr. L. C. Parkes, is unanimous in favour of prompt provision for both classes of cases.

ON THE AGENCY OF MILK IN THE DIFFUSION OF TUBERCULOSIS.—Dr. C. Tongig has contributed an important paper (*Annali d'Igiene Sperimentale*, vol. xi., fasc. i., 1901) on the vexed question of the influence of milk in the diffusion of tuberculosis. It has been the subject of practical investigations by the author, which he has undertaken on many samples of milk consumed in Padua. Many important results have been obtained, which are recorded in this paper.

Forty-six specimens of milk have been employed in inoculating 103 guinea-pigs. In not a single case was death the result of acute tuberculosis; and, still further, in not a single instance was any trace of tubercle found post-mortem. Many of the animals died of acute peritonitis, but the entire freedom from tuberculosis is certainly a striking fact. The acute peritonitis was the result of the presence of numerous micro-organisms—the *Bacillus coli*, *Staphylococcus aureus et albus*, etc.—sometimes only one organism being present, while at others several were found together.

The conclusion drawn, and one which seems perfectly legitimate, is that, at all events as concerns Padua, milk is not dangerous as a source of tubercular infection.

The results obtained with regard to the milk of cows which give a positive reaction to the tuberculin test are contradictory. In some cases the inoculation of the milk of such cows on guinea-pigs has been followed by the appearance of tuberculosis in a very high percentage of the cases dealt with; in others, again, there has been a positive result in one of the cases only. And the same observation applies to the localization of the tubercular lesion on the nipple. All that can be said is that in cases in which the tubercular lesion is not obvious on the mamma the milk does not necessarily contain tubercle bacilli, and the danger is by most investigators limited to those animals whose mammary gland is obviously the seat of tubercular disease.

A very important question is the relationship, if any, between the milk-supply and the occurrence of abdominal tuberculosis. The researches of the author clearly prove that intestinal tuberculosis is not excessively frequent in those districts in which the consumption of cow's milk is greatest, and that the disease is not more frequently met with in localities where the mortality from all forms of tuberculosis is highest. Thus it follows that in regions where milk is but sparsely consumed the frequency of intestinal tuberculosis cannot be satisfactorily explained by the assumption that the infant is infected from a tubercular mother.

The danger of the transmission of tuberculosis through the milk-supply is further diminished by the fact that, when brought into the market, the fluid is really a mixture of the milk of many cows. Hence it follows that by dilution the risk of evil results arising from the presence of the bacillus is rendered still less.

In spite of all this, however, the author is of opinion that milk should always be boiled for at least ten minutes before being taken, and there can be no doubt at all that this recommendation is thoroughly sound.

THE SOURCE OF INFECTION IN TUBERCULOSIS.*

By SIDNEY DAVIES, M.A., M.D., D.P.H.,
Medical Officer of Health for the Borough of Woolwich.

IN a disease like phthisis and other forms of tuberculosis in which the onset is so gradual and uncertain and the duration so prolonged, it is impossible to say with definiteness when a person begins and ceases to be infectious. Further, the infection being widespread, it is impossible to say which of several conceivable sources of infection is the real one. Also, since the extent and severity of the disease is dependent on the amount of the infection, it is possible that for one case there may be several sources of infection to be taken into account—*e.g.*, a man may be able to resist the few bacilli he is exposed to from a mild case in his home, but if to these are added bacilli in the public-house and the workshop, the enemy is able to effect an entrance, and it is impossible to say which detachment of microbes had the principal share in overcoming the resistance of the vital tissues. All that can be said as to the source in any case of tuberculosis is that the exposure of a patient to a particular source of infection has been more frequent or more prolonged, or that the infection is more actively disseminated in one case than in another, and that therefore that source is probably the principal one.

Thus the home would be taken as the source of infection whenever a previous case of active disease is known to have existed there. The home being free from infection, the workshop would be looked to, and next neighbours, the public-house, milk, etc.

When a previous case has occurred in the home, the date of commencement of illness is important. It is probable that some symptoms would be noted within twelve months of infection, but in view of the fact that tuberculosis may exist and give rise to no marked symptoms for several years, the infection has been attributed in some cases to inmates of the home, though these died several years before the supposed commencement of symptoms in the secondary case.

The present paper is based on an examination into 50 deaths of children under ten, certified to be from tuberculosis or from meningitis, and into 178 notified cases of phthisis during the twelve months July, 1902, to June, 1903, as well as on the Registrar-General's Annual Reports.

* Read at the meeting of the Society of Medical Officers of Health, November 13th, 1903.

1. THE SOURCE OF TUBERCULOSIS IN CHILDREN UNDER TEN.

The majority of deaths from tuberculosis in children are attributed to meningitis. As tuberculous meningitis is not easily diagnosed from simple meningitis, I have examined into all the deaths from meningitis, and those from simple meningitis are given in a separate list.

Autopsies are stated to prove that tuberculous meningitis is rare under one year of age; that simple meningitis is exceptional over two years of age, and that between one and two the two diseases are equally common. Other important points in the diagnosis are the existence of previous delicate health in tuberculous cases (which may mean susceptibility to tuberculosis or its actual existence) and the duration of the disease—*e.g.*, an illness of a few days in a previously healthy child would probably mean simple meningitis. A post-mortem was made in two only of the cases; in four others regarded as tuberculosis the diagnosis was made after observation of the case at a hospital.

The above and other considerations have led me to exclude from the list of tuberculous children (Table A) 3 cases (all under one year of age), and to add to it 6 out of 20 deaths certified during the same period from "meningitis" (all over two years of age).

All the remaining cases of meningitis and the 3 excluded cases of tuberculous meningitis are given in another list (Table B) for comparison.

Of the 36 deaths in Table A, 23 were from meningitis, 9 from acute or general tuberculosis, 2 from tuberculous peritonitis, and 1 from tuberculous hip disease. Six were under one year of age (4 of these being general tuberculosis), 8 between one and two years, 11 between two and five, and 10 between five and ten; 18 were males, and 18 females.

Of the 2 abdominal cases, 1 probably was due to milk, and the other to personal infection.

There were no deaths certified as *tabes mesenterica*, and the small number of cases of abdominal tuberculosis is noteworthy. The "Annual Summary" of the Registrar-General for 1902 shows that in London the deaths from tuberculous peritonitis and *tabes mesenterica* have diminished by one-half since 1892 (*viz.*, from 1,298 in 1892 to 661 in 1902). During the same period there has been a diminution, but a much smaller one, in the deaths from tuberculous meningitis; these seem to follow very closely the deaths from phthisis, increasing and diminishing as the latter rise and fall. In England and Wales the deaths from *tabes mesenterica* per

TABLE A.
Deaths from Tuberculosis in Children under Ten Years.

No.	Initials.	Age.	Sex.	Duration of Illness.	Certified Cause.	Source of Infection.	Remarks.
1903.							
1	A. E.	1 year	F.	3 weeks	Tubercular meningitis	Mother ?	Mother has chronic cough and phlegm.
2	L. W.	2 years	F.	1 month	Tubercular meningitis	Father	Previously healthy; father has phthisis mild
3	A. B.	6 years	M.	6 years	Tubercular meningitis	Mother ?	Tubercle bacilli (one examination) not found; mother, chronic morning cough and sputa; previously delicate
4	E. I.	3 years	F.	3 months	Tubercular meningitis	Mother	Mother, phthisis advanced
5	E. B.	1 year	M.	2 months	Tubercular peritonitis	—	Post-mortem, previously healthy; had fresh milk from outside London
6	G. H.	1 year 11 months	F.	2 weeks	Tubercular meningitis	Lodger	Lodger has phthisis (mild form)
7	E. G.	3 years	F.	3 weeks	Tubercular meningitis	Father	Father has phthisis (at work)
8	G. G.	3 years	M.	3 weeks	Tubercular meningitis	Father	Father has phthisis (at work)
9	E. K.	1 year	F.	2 weeks	Tubercular peritonitis	Neighbours ?	Two neighbours had phthisis; Nestlé's milk
10	A. C.	7 months	M.	7 months	General tuberculosis	Mother	Mother, phthisis mild
11	A. H.	5 years	F.	3 months	Tubercular meningitis	Mother	Mother, tuberculous; bronchitis (in bed)
12	A. D.	1 year 1 month	F.	6 weeks	General tuberculosis	Mother ?	Mother, chronic cough and morning sputa
13	M. B.	10 months	F.	3 months	Tubercular meningitis	Father	Father has phthisis (at work); disinfects sputa and avoids kissing
14	E. H.	8 months	M.	2 days	General tuberculosis	Father	Previously delicate; father, fistula; chronic winter cough and sputa; dirty house
15	J. L.	5 years	F.	4 years	Tubercular meningitis	—	Several cases of bronchitis, pneumonia, and chronic cough in house; phthisis four doors off
16	W. H.	1 year 8 months	M.	10 weeks	Tubercular meningitis	Uncle	Uncle, living with family, died of phthisis three months before

TABLE A—continued.

No.	Initials.	Age.	Sex.	Duration of Illness.	Certified Cause.	Source of Infection.	Remarks.
1903.							
17	A. R.	2 months	M.	2 months	Phthisis	Lodger	Mother delicate; previous lodger six months here; left four months ago; had chest complaint
18	M. J.	8 years	F.	9 weeks	General tuberculosis	Aunt	Favourite aunt died of phthisis five years before; always delicate
19	F. S.	2 years	M.	3 months	Tubercular meningitis	Neighbour ?	Woman next door died of phthisis a year before; Nestlé's milk; strong before
20	J. T.	3 years	M.	6 months	Tubercular morbus coxae	Milk ?	Previously lived at Blackheath; fresh milk from outside London
21	E. G.	1 year 10 months	F.	6 months	General tuberculosis	Neighbour ?	Strong previously; phthisis notified next door nine months before
1902.							
22	E. D.	9 months	F.	1 month	Tubercular meningitis	Mother	Mother died of phthisis one month before
23	B. B.	4 years	F.	3 weeks	Tubercular meningitis	Lodger	Lodger's daughter (at fourteen) had cough and phlegm and hæmoptysis twelve months; never strong
24	E. B. W.	1 year 1 month	M.	3 weeks	Tubercular meningitis	Father ?	Previously delicate; father had chronic cough
25	D. C.	11 months	M.	11 months	General tuberculosis	Mother ?	Delicate from birth; mother, winter cough and sputa
26	F. G.	10 months	M.	5 months	General tuberculosis	Father	Father has phthisis
27	H. W.	6 years	F.	10 months	Tubercular meningitis	Mother ?	Mother delicate; anæmia; chronic cough and phlegm
28	L. C. G.	1 year	M.	9 months	General tuberculosis	Father	Father, phthisis

TABLE A—continued.

No.	Initials.	Age.	Sex.	Duration of Illness.	Certified Cause.	Source of Infection.	Remarks.
1902.							
29	V. B.	5 years	M.	6 weeks	Tubercular meningitis	Milk ?	Milk from source known to have contained tubercle bacilli two years ago; post-mortem after fall
30	B.	8 months	F.	9 weeks	Acute tuberculosis	—	Healthy previously; humanized and boiled milk
31	G. T.	3 years	M.	2 weeks	Acute meningitis	Father ?	Previously delicate; Nestlé's milk; father had constitutional cough and phlegm
32	C. S.	2 years 9 months	M.	1 week	Acute meningitis	Mother	Much phthisis and alcoholism in immediate neighbourhood; previously delicate; mother died of phthisis, January, 1901; room dark
33	C. R.	1 year 8 months	M.	4 months	Tubercular inflammation of lungs and left femur	—	Always delicate; Nestlé's milk; bronchitis and pneumonia at four months
34	T. G.	6 years	M.	2 weeks	Broncho-pneumonia meningitis	Neighbour	Neighbour of, and friendly with, E. J., No. 4, where mother died of phthisis two months later; bronchitis one week before death; always ailing
1903.							
35	J. C.	3 years	F.	4 weeks	Acute meningitis	Mother ?	Mother had lupus erythematosus of nose; kitchen dark
36	P. D.	2 years 9 months	M.	2 weeks	Meningitis	Nurse-girl	Tubercle in house; nurse-girl had phthisis
37	A. G.	5 years	F.	2 days	Meningitis	Mother ?	Previously delicate; measles in April; mother, winter cough and old tuberculous cervical glands; previously lived next door to case of phthisis

TABLE B.
Deaths from Acute Meningitis—not Tubercular.

No.	Initials.	Age.	Sex.	Duration of Illness.	Certified Cause.	Remarks.
1902.						
1	M. B.	7 years	F.	3 days	Meningitis	Brother died one year before of multiple abscesses; healthy before; followed dental abscess; father and mother strong
2	I. M.	6 months	F.	1 week	Acute meningitis	No tubercle in house; fed at breast; house clean; previously healthy; two other children died of convulsions; no bronchitis
3	W. M.	5 months	M.	2 weeks	Acute meningitis	Previously healthy; fed at breast; father and mother strong; relative in house opposite died of phthisis in June, 1903; began after fall, August 12th; post-mortem, acute meningitis, following fall on August 12th
4	H. I.	7 months	M.	5 weeks	Acute meningitis	Father and mother strong
1903.						
5	F. N.	3 months	F.	3 weeks	Acute tubercular meningitis	Dirty house; cow's milk
6	B. K.	9 months	F.	2 weeks	Tubercular meningitis	Previously delicate; Nestlé's milk
7	McG. E.	9 months	F.	2 weeks	Tubercular meningitis	Fed on breast and Nestlé's milk; dirty house; mother stated she was quite well at date of child's death, but was notified with phthisis of twelve months' duration, July 28, 1903
8	—	11 months	F.	—	Acute meningitis	No information; people gone; father, soldier abroad; mother strong
9	F. M.	1 year 1 month	M.	—	Measles and acute meningitis	Meningitis followed measles one week after rash
10	E. G.	1 year 1 month	F.	5 days	Acute cerebral meningitis	Had sores on skin before; father, mother, etc., strong; no tubercle in house
11	W. C.	8 months	M.	5 days	Meningitis	Bronchitis at beginning; healthy before; no tubercle
12	I. M.	5 months	M.	4 weeks	Acute meningitis	Strong before; head retraction; no tubercle
13	G. F.	1 year	M.	5 days	Meningitis	Dentition; healthy before; no illness or tubercle in house; cutting double teeth; had bronchitis
14	V. H.	2 years	F.	2 weeks	Acute meningitis	Healthy before; no catarrh; father has epilepsy; no tubercle
15	R. C.	9 months	M.	3 days	Acute meningitis	Healthy before; no illness or tubercle in house; cutting double teeth; not weaned
16	C. E.	1 year 4 months	M.	2 weeks	Acute meningitis	No catarrh; previously healthy; no tubercle in house; phthisis next door
17	E. M.	9 months	F.	1 week	Acute meningitis	Probably pneumonia; no tubercle in house

million population increased up to 1880, and since then have readily diminished from 290 in 1881-1885 to 196 in 1896-1900, the last quinquennium showing two-thirds of the whole decrease.

I am informed by the medical officer of the Woolwich infirmary (Dr. Boulter) and other medical practitioners that they have observed a very marked reduction in abdominal tuberculosis in children during recent years, and the decline is attributed to the success of efforts made to eliminate tuberculous cows from cowsheds. Approximately this has been actually done in London cowsheds, and there can be no doubt that the efforts made by many sanitary authorities to obtain a milk-supply free from tubercle bacilli, besides their small direct effect, have had a large educational result.

The above facts, therefore, strongly support the conclusion that infected milk is the principal source of infection of abdominal tuberculosis.

Of the 34 cases from general and meningeal tuberculosis a clear history of contact with a declared case of phthisis was obtained in 7 and with a doubtful case in 7, while in 4 there was probable contact with neighbours who were certainly suffering from phthisis. In 1 case there was contact with lupus erythematosus. There were thus only 4 cases in which it was not possible to discover a clear and probable source of infection.

Taking first the 18 decided cases in which there was clear contact with a declared case of phthisis—

In 7 the child was infected by the father,
 „ 5 „ „ „ the mother,
 „ 1 „ „ „ an uncle living in the same house,
 „ 1 „ „ „ an aunt, a frequent visitor,
 „ 1 „ „ „ the nurse-girl,
 „ 2 „ „ „ a lodger,
 „ 1 „ „ „ a neighbour,
 or in 14 by relatives and 4 by persons not related.

Of the 12 cases of doubtful infection—

2 were infected by the father,
 7 „ „ „ the mother,
 3 „ „ „ neighbours.

Of the 18 cases of decided infection, in 7 the source was an advanced case of phthisis, and in 11 an early case—*i.e.*, such as not to prevent the usual occupation being carried on.

The case of lupus is included among the doubtful sources, as it seems improbable that tuberculosis should be conveyed by contact

with this disease. The concurrence of the two diseases is, however, striking.

In 1 case of tuberculous meningitis and 1 of morbus coxæ, milk is suggested as a probable source; in 1 of these the supply is known to have contained tubercle bacilli about a year before the patient's death, and in both cases the supply was derived from outside the county of London.

In 1 case the source (the father) had been notified as having phthisis, and precautions, I was assured, had been taken as regards disinfecting sputa and avoiding kissing.

In another case the source (uncle) had been notified, and was found to be an advanced case taken in by a devoted sister to nurse, who refused to let him go to the infirmary, in spite of the danger of infection to herself and children being pointed out. The sick-room was a basement, and not kept very clean. In other cases either the presence of phthisis was not recognised or, if it was, no precautions were taken. "He won't allow that there is anything wrong with him," was often said of men; or "I can't persuade him to see a doctor."

Since writing the above, the mother of a case—No. 7 in Table B—has been notified as phthisis. At the time of her child's death she stated that she was, and appeared to be, perfectly well. She now, however, admits that she had a cough six months before the child died. If, as would appear, the medical attendant's diagnosis of tuberculous meningitis was correct, this is a striking instance of infection in the early stage of the disease.

Notified Cases in Children.—Seven cases of tuberculosis in children under ten were notified in addition to the cases in Table A. Two of these were between one and two years, and the remainder from five to eight years old; 2 were infected by the father, 1 by the mother, and 1 probably in hospital. All these infecting parents were early cases—*i.e.*, pursuing their avocations.

2. THE SOURCE OF INFECTION IN ADULTS.

173 adults over ten were notified in Woolwich from July, 1902, to June, 1903, 129 being males, and 44 females.

The following table gives the sex and ages:

10-20.		20-30.		30-40.		40-50.		50-60.		Over 60.	
Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
10	5	28	12	34	11	38	7	16	8	3	1

Thus, under the age of thirty, the males exceeded the females as 2 to 1; over the age of thirty the males exceeded the females as 3 to 1.

Previous Duration.—The duration of the disease previous to notification in 50 cases in which reliable information was obtained averaged five years and four months, varying from a few months to twenty years.

Source of Infection.—A personal source of infection was discovered with more or less probability in 14 males and 12 females—i.e., in 10 per cent. of the males and 25 per cent. of the females. Among the males the infecting persons were: 1 father, 1 stepfather, 8 brothers, 1 sister, 1 fellow-student, 1 lodger, and 1 "friend he nursed." For the females the infecting persons were: 2 husbands, 1 fiancé, 1 father, 1 mother, 2 brothers, 1 sister, 1 son-in-law, 1 neighbour, 1 lodger.

Of the remaining cases, I have attributed the infection in 27 males to the workshop, in 2 females to their occupation in nursing, and in 40 males and 3 females to the public-house.

Table showing Probable Source of Infection.

Source.	Males.	Females.
Personal or home	14	11
Work or workshop	27	2
Public-house	40	3
Doubtful	48	28
Total	129	44

Workshop Infection.—The majority of the men—64—were employed in the Royal Arsenal, mostly in workshops, giving a phthisis incidence of 3.9 per 1,000 men employed; 15 were dock-labourers, carmen, and others employed in conveyance, giving an incidence of 5.2 per 1,000 men thus employed in the borough. Only 3 men and 3 women were employed in workshops outside the Arsenal.

Three workshop employes were aware of personal contact with other employes suffering from phthisis; these are included under workshop infection.

Many of the workshops in the Arsenal are so lofty, and the cubic space per employe so large, that the conditions of labour approach those of open-air work. In most the ventilation is good, much improvement having taken place in recent years, and the usual practice is to thoroughly sprinkle and sweep the floors every morning. Notices are posted in every shop forbidding expectoration, and

though the rule against spitting is not yet rigidly enforced, breaches are exceptional. All men found by the medical officer to have phthisis are, if able to continue at work, specially warned against spitting, and told to obtain pocket-spittoons.

Taking everything into consideration, I regard the workshop in Woolwich as offering opportunity for personal infection, but not in itself an important source of infection—i.e., through infected dust, etc.

All those have been classed as infected by the workshop for whom no personal infection outside the workshop was discovered, who worked in enclosed shops, and who were not found to be intemperate.

Public-house Infection.—The connection of alcoholism with phthisis is well known. Professor Brouardel considers alcoholism as the most powerful factor in the spread of tuberculosis ("British Congress on Tuberculosis," vol. i., p. 48). Baudran (of Beauvais) found that tuberculosis mortality increased proportionally with the consumption of alcohol. The "Supplement to the Fifty-Fifth Annual Report" (Part II., pp. xci, clvii, clxi, etc.) of the Registrar-General shows that those occupations having the highest mortality from alcoholism have also the highest mortality from phthisis. But there is one occupation in which the phthisis mortality far exceeds (as 257 to 100) that of all others—viz., the public-house servant in London and industrial districts. More than one-third of these men die of phthisis (*loc. cit.*, p. 44). In addition to suffering in a marked degree from alcoholism, it is they who sweep out the bars of the public-house.

Costermongers (after those engaged in the liquor trade and tin-miners) have the highest phthisis mortality. Their employment is out of doors, but they suffer largely from alcoholism, and, perhaps more important still are among the early visitors at the public-house, at a time when it is frequently being swept out.

The comparative positions of the two sexes as regards phthisis mortality is suggestive in this connection.

Alcoholism among women is prevalent and increasing, but women drink less at the public-house, and probably more at home, than men; women boozers, too, choose the afternoon in preference for their visits to the tavern. They are very seldom early morning visitors, and, compared with men, mostly absent at night, the times when there is most danger of infection.

Now, we find from the Registrar-General's Annual Reports that phthisis is diminishing much more rapidly and steadily in women than in men. In men it fell from 1,920 per million in 1881 to

1,570 in 1900; in women it fell from 1,735 per million in 1881 to 1,110 in 1900.

In men phthisis increased with alcoholism in 1899 and 1900; in women phthisis continued to diminish in these years, though alcoholism increased.

All these facts point in one direction—viz., that not only does alcoholism strongly predispose to phthisis, but that the public-house is a great centre of infection.

Consumptives too advanced to go to work are able to visit the public-house. I have heard of one such who, though in an advanced stage of the disease, has been for years hanging about public-houses in the intervals of his admission to the poor-law infirmary. Such persons have no money to spend on drink themselves, but their more opulent friends (?) treat them.

It may be safely said that in poor and industrial districts one or more consumptives are daily present in the bars of most public-houses, and that these consumptives are almost sure to spit on the floor during their visit.

There is thus no doubt that the public-house is a potent source of the infection of tuberculosis.

In deciding the source of infection, however, for the above table, I have given precedence to the workshop, in view of the fact that more time is spent there. Those cases only have been attributed to the public-house who either had outdoor employment, and were known to be partakers of alcohol, or who, if they had indoor employment, were known to be intemperate.

Information was obtained as to the drinking habits of 63 cases: 5 (4 men and 1 woman) were said to be teetotalers, 34 temperate, and 24 intemperate (including 1 woman).

The teetotalers were so described by their friends, and perhaps they would not themselves have confirmed the description. Two young men, whose mothers told me they were teetotalers, themselves allowed that they frequented certain bars. Two of the women whose infection is attributed to the public-house were employed there.

During 1902 there were 76 deaths from phthisis among persons employed in workshops and offices, and 36 deaths among those employed out of doors and shopkeepers or assistants, the majority of the second class being dock labourers, general labourers, or carmen.

These numbers, calculated on the total numbers occupied in the borough of each class, give respectively 3·5 and 3·7 per 1,000 as the phthisis incidence. Thus, phthisis appears to be slightly more

prevalent among outdoor employes than among indoor. It is well known that the class who mainly compose the outdoor employes frequent the public-house more than workshop hands, and this fact more than counterbalances the advantage of an outdoor life.

I submit that the statistics of the Registrar-General and my own inquiries agree in showing that, important as is undoubtedly the workshop as a source of infection, the public-house is more important still.

At times in the evening the public bars are more crowded than any workshop, and infection then probably takes place by infected spray when coughing as much as by injected dust raised from the floor.

In order to test the conclusions come to above by bacteriological diagnosis, samples of sweepings from the floors of six public-house bars and six large Arsenal workshops were taken and examined by inoculation experiments. The result was that the sweepings from two public-houses were shown to contain tubercle bacilli, but none of the workshop sweepings.*

DISCUSSION.

Dr. NEWSHOLME said the subject was one of great importance, and as public health administrators they were greatly interested in it, and particularly in the aspect of it which was connected with alcoholism. He was sorry Dr. Davies had omitted to mention Dr. Niven, who was the first to draw attention to the important part that public-house infection bore in the spread of phthisis. Dr. Niven had shown from many instances that in Manchester the public-houses played a larger part in spreading consumption than did the workshops. It was questionable which one should describe as of greater importance—the debilitating effect of alcohol itself, or the effect of frequenting public-houses as a source of infection. Dr. Davies mentioned the fact that, although alcoholism was increasing amongst women (he supposed that was proved, although he had never seen the proof), yet the phthisis death-rate had not also increased, which seemed to support the idea of direct infection in the public-house. In Brighton they had taken this matter in hand very actively. He believed there would be no single public-house bar in Brighton where there would not be displayed a notice about spitting. The Corporation were providing permanent tablets, pointing out the danger of indiscriminate spitting, and one was being fixed in each bar. The brewers had taken the matter up, and had obliged their tenants to put up the cards; and he was informed that since this had been done there had been a great diminution in the amount of indiscriminate spitting in such bars. The difficulty was to know what to do with the

* I have to acknowledge my indebtedness to Major Mellin, R.A.M.C., late P.M.O. Royal Arsenal, both for information regarding Arsenal employes and workshops, and also for the energetic measures taken to prevent infection in the workshops.

expectoration that did take place. He had never seen his way to recommend spittoons on the floor. It was usually a case of hit or miss, and generally miss. Undoubtedly, the present method of spitting into sawdust was very bad, but what the substitute was to be it was very difficult to say. There could be no doubt that workshop infection was very prevalent, and one of the great difficulties connected with workshops was to get a satisfactory method of wet cleansing; but if there was dry sweeping a large amount of infected dust got distributed about the workshop. Dr. Davies said that statistics did not point to very much harm being done in the workshop. He (Dr. Newsholme) believed an enormous amount of harm was being done, and the mere giving out of instructions to the patients was not sufficient to prevent the harm. Those instructions were not carried out, and in Brighton they took the patients to the sanatorium for a month to train them. A man who had acquired the habit of spitting during his whole life was not likely to give it up in a moment because he had a card given to him, or because a doctor speaks seriously to him for a few minutes. He had to be taken into the sanatorium and trained. It could not be done in a day; it took time, and it was best done in the place where the patient benefited by the open-air training and treatment. With regard to milk infection, he ventured to say that the fact that tuberculosis was conveyed to the abdomen was not evidence that it was received from food. One knew that the disease might not appear where it was received. It might pass through the lymphatics, and only appear when it got to the place of least resistance. It was not proved that because a disease was confined to the lungs that it may not have been received through the alimentary canal.

Dr. ALLAN said of course Dr. Davies did not mean his paper to be more than suggestive, because, from the number of figures with which he had dealt, definite conclusions could hardly be attempted. The suggestions put forward in the paper were very valuable, and would be welcomed by the Society as showing the lines on which they might pursue their investigations. In his opinion Dr. Davies had not laid enough stress on workshop infection. He thought they would find that workshops bore a little more strongly on the subject than Dr. Davies' figures seemed to show. They got a great deal of indiscriminate spitting in workshops, particularly where there was a considerable want of ventilation, and the workers came into close contact with one another, as, for example, tailors and printers. He had several cases showing that not only workpeople, but also clerks in offices, might infect one another very considerably, their sedentary occupation making them, of course, more liable to infection. A recent case was that of a charwoman who cleansed a certain set of offices, where a consumptive clerk who worked there was in the habit of spitting into the waste-paper basket. As Dr. Newsholme had said, it was probably more often miss than hit, the result being very often a filthy mess on the floor. This charwoman had to sweep this room up. In a few months she developed a rapid form of consumption. The effective and regular cleansing of the floors in workshops was a very difficult question. He knew of one large warehouse where they had adopted the system of spraying the floor with a disinfectant solution every morning. The fact that phthisis had not been reduced in man so much as in woman might be because so much attention had not been paid in past years to workshops as to private houses. It was comparatively lately that they had focussed their efforts on workshops,

and there was still a great deal to be done in the direction of workshop sanitation generally. He was very interested in Dr. Davies' figures as to tuberculosis in children. Of course, unless they had a post-mortem on each of the cases, it was difficult to say that they really had died from tubercular meningitis. On the face of it, the method adopted by Dr. Davies appeared to be correct, but only post-mortem examination could actually tell. He was not sure that it was altogether a question of milk infection. A good deal of infection took place through the tonsils. The crawling about on the floor in infected rooms gave rise to considerable risk of infection through the tonsils. Anyone who had taken an active part in dealing with consumption must have noticed that there was spreading a knowledge of the danger from the disease amongst the laity generally. Many people seemed quite to understand what was necessary to be done. They were all grateful to Dr. Newsholme for having initiated the method of educational training of phthisical cases as he had done at Brighton.

Dr. E. F. WILLOUGHBY referred to Brouardel's classical instance of twenty-three clerks in one office succumbing to tuberculosis in eleven years after the disease had been introduced by one of them, fresh cases ceasing to appear after spittoons were provided and the rough floor was planed and waxed, and mopped with damp cloths, instead of being dry-swept so that the air was full of dust when the clerks entered in the morning.

Dr. MILLSON said that he had been struck with the large amount of personal infection of young children. In inquiring into the history of cases amongst children, one found a large percentage had probably contracted the disease from some member of the family, or some friend who regularly visited the family. He was struck, too, with the large amount of infection in workshops. In certain workshops he had had cases occurring times out of number, but when they had secured the efficient ventilation of those workshops, and the proper precautions had been taken, cases of phthisis had become very rare in them. He had adopted a system of sending round a man once a week to all the cases of phthisis that remained at home, so that they could keep in touch with them. They had the place disinfected, and tried to impress on the people the necessity of continuing their efforts in the way of prevention.

Mr. S. F. MURPHY, referring to the question of infection by milk, said that London had a very limited number of cows, and a strong and wealthy population able to deal with them. In rural districts the administration, so far as cows was concerned, must be a larger and more serious one, and he was wondering whether any large and serious effort had been made to get rid of tuberculous cows. He would not have anticipated that any general steps had been taken throughout the country. In London he thought the practice of boiling milk had become more general than it used to be. If that was becoming also more general throughout the country, they were probably getting some benefit from dealing with milk in that way. He thought a possible reason for the larger reduction of phthisis amongst women than men was that of increased and better food. One knew perfectly well that, in poor households, whoever starved, the man did not; invariably it had been the woman. But now food was much cheaper, and woman was probably now coming in for her share of it. He only mentioned this as a consideration worth thinking about alongside Dr. Davies' figures.

Dr. F. G. CROOKSHANK would not deprecate any measures for stopping spitting, but they were a little out of focus if they regarded merely spitting itself as spreading tuberculosis, and omitted all the secondary causes which prepared the soil for the spread of the disease. He had been very much impressed with the fact that no section of the population had so large a percentage of tuberculosis as the insane population in asylums, for as a whole there was exceedingly little spitting amongst them. When one watched a tuberculous lunatic, and found he rarely, if ever, spat, and when the attendants bore out the fact, one could not but be impressed.

Dr. NEWSHOLME asked whether the insane patients coughed and did not spit, or did they neither cough nor spit?

Dr. CROOKSHANK's experience was that they neither coughed nor spat, except in cases of mania.

Dr. SYMONS suggested the desirability of Medical Officers of Health, when reporting on special subjects, adopting as a basis some common line. If, for instance, they could investigate phthisis with some common basis, they would surely be able to get more important results. He attributed the reduction in the death-rate of phthisis in Bath to the improved social condition of the people. Fifty years ago there was considerable overcrowding in the city; at present he did not know of a single case of overcrowding. He was of opinion that the number of tuberculous cattle in the South of England was very small indeed. He personally examined the cows in Bath, and found only eight or ten which might have been doubtful. He examined the milk and declared one cow to be tuberculous. Similar inspections had been carried out in the rural districts by the large dairy companies. He was surprised that the reader of the paper did not mention public conveyances. They must constitute a large factor in the spread of the infection.

Dr. C. CHILDS said they were rather overrating the sputum as a ground of infection, and overlooking other particles which on *a priori* grounds were as great—viz., the direct infection through coughing, sneezing, and even ordinary articulation. With regard to the human breath, their best observers had failed to find tuberculous bacilli in the quiet expirations of tuberculous patients, but the ordinary articulation was sufficient to throw the bacteria to a considerable length—for instance, from mother to child. He had no doubt that many of them had cases in their own mind of infection conveyed in that way. They searched for bacteria on the floors, but the walls and furniture ought to be searched rather than the floors. They would have a better chance of finding bacteria there, for the reason that the bacteria were driven from their lair on the floor by the sweeping, and a considerable number became spread about the room. Dr. Coutts, of Manchester, made some experiments in that direction, and found on the walls of houses where there were infectious patients dust which infected guinea-pigs.

Dr. BOND said he had lately visited a large number of public-houses in order to see the condition of the floors in the public bars. A great many he found in a disgustingly dirty condition, and there appeared to be an enormous amount of expectoration. In the majority sawdust was used, which helped to absorb some of it, but that might only help to pulverize the sputum still further and make it the more readily carried about in the air. He was glad to hear the remarks of Dr. Childs, because they appeared to overlook the fact that a great deal of tuberculous matter was ejected by means of coughing and speaking loudly. That was a factor that ought to be taken into consideration.

They ought to try to encourage spittoons in public bars at a level where they could easily be made use of. People who had been in the habit of spitting would not give it up all at once, and they ought therefore to try to get receptacles provided for people to spit into. In the streets he had often wished himself that there was some convenient receptacle to spit into. It would be most convenient if there was some form of spittoon—for instance, on the sanitary bins, attached at a reasonable height. They ought, of course, to encourage wet sweeping or spraying with water before brushing the floors. It would be a good thing if some of their sanitary authorities did not brush the streets until they had been well sprayed.

Mr. WOLF DEFRIES said it would be a great inducement to the use of the spittoon if it were self-cleansing. The spittoon was a dirty sort of thing. It might be worth consideration whether some sort of canalization might not be possible, and the sputum washed down into some common receptacle.

Dr. SIDNEY DAVIES, in reply, said he was grateful for the kind way they had received his paper. Dr. Newsholme blamed him for not referring to the work of Dr. Niven. He was not consciously aware that he had taken anything from Dr. Niven, although he had probably taken a great deal from him unconsciously. He was only aware, however, that he had given a very little shove to Dr. Niven's cart. He agreed with Dr. Newsholme that the spittoon should be looked upon as a cause of infection rather than a prevention. Then came the great difficulty, What were they to have? In his notice he suggested a pocket spittoon, or, as he put it at first, "Go outside." The publicans did not like that, so he met them by putting, "Spit outside." That seemed to be the only way of getting over the difficulty. He sympathized with Dr. Bond, and thought they must allow spitting outside. On the subject of workshops, he agreed with Dr. Allan that his paper was only suggestive. He spoke of what he found in Woolwich. There he found the public-houses to be a more important source of infection than the workshops. Probably where the workshops were not under the same control as they were at Woolwich they would find a different condition of things. He, however, felt that they could not expect to reduce the phthisis mortality until they dealt with public-houses. Dr. Childs had referred to the danger of infection from the emissions due to coughing and speaking. He recognized the importance of that, but the public-house was of all places just the place where that was so likely to be a source of infection, because, when people got excited by drink or company, the chances of their coughing without putting up their hands to their mouths, and of speaking in louder tones, was very largely increased. For this there did not seem to be any practical remedy other than the isolation of those suffering from consumption. Dr. Crookshank had referred to the amount of phthisis in asylums, and to the spread of it in spite of the absence of spitting amongst the consumptive lunatics. That was a most interesting point, and the only suggestion that occurred to him at the moment was the possibility that the patients came to the asylum already infected with phthisis, although the disease was not recognised at the time of their admission. With regard to Mr. Murphy's question as to the diminution of tuberculous cows, although they could not say there was any great diminution of tuberculous cows throughout the country, he maintained that the fact of isolating even one or two cows was of some educational value.

THE PROVISION OF SANATORIA FOR LONDON CONSUMPTIVES.*

By LOUIS PARKES, M.D., D.P.H.,
Medical Officer of Health for the Borough of Chelsea.

THE more generally recognised causes of tuberculosis in man are: (1) Overcrowding in tenements; (2) dirty and defectively lighted and ventilated living and sleeping rooms; (3) insufficient ventilation and lighting, and uncleanly conditions of workshops, offices, etc.; (4) defective methods of removal of dust from the air in dusty occupations; (5) intemperance in alcohol; (6) deficient food and unwholesome diets; (7) the failure to take precautions to prevent the spread of the infective agent of tuberculosis by means of dried expectoration, or of moisture ejected from the lungs of the sick.

The first six causes are predisposing; they are not arranged in any order of importance, as opinions may differ as to the relative values of these predisposing causes. The seventh is the exciting cause, but a cause which is probably for the most part inoperative in the absence of any of the predisposing causes above tabulated. If this were not so, tuberculosis would be infinitely more prevalent than it is; in fact, it is doubtful if the human race could have survived its onslaughts if the tissues had no resistive powers of their own.

The death-rate from phthisis or pulmonary tuberculosis in London has never been excessively high—during the past half-century, at any rate—if comparison is made with other large cities, both in this country and abroad. The site of the Metropolis is, for the most part, open and airy, not shut in by hills obstructive to the circulation of air-currents, and much of the soil is dry and gravelly. Even in low-lying, damp situations drainage and sewerage have done much to cause drying of the subsoil. On the whole, the town is well built, the majority of the streets are fairly wide and well laid out, and there are many open spaces. The general character of the houses is good; there are but comparatively few houses built back to back and without through ventilation, and some of the worst slums of a former period have been demolished. All these characteristics of London are undoubtedly favourable to the growth of a population naturally immune to tubercular diseases.

The phthisis death-rate of the Metropolis would probably be even lower than it is were it not for two factors which exert an unfavour-

* Read at the meeting of the Metropolitan Branch of the Incorporated Society of Medical Officers of Health on October 23rd, 1903.

able influence—namely, (1) that the great charitable institutions of London attract from other parts of the country the phthisical sick and the ailing, some of whom die in the hospitals and infirmaries of the Metropolis; (2) there is a very large tramp and casual labouring population in, or constantly passing through, London, whose phthisis death-rate is probably very much above the rate of the general population of similar ages.

There has been a satisfactory reduction in the phthisis death-rate of London during the past forty years, as the following table demonstrates:

London Phthisis Death-rate per Million in
Quinquennial Periods.

Years.	Per Million.	Reduction.
1860-1864	2,774	—
1865-1869	2,891	—
1870-1874	2,561	11 per cent.
1875-1879	2,475	8 "
1880-1884	2,203	11 "
1885-1889	1,954	11 "
1890-1894	1,935	1 "
1895-1899	1,803	7 "
1900-1902	1,715	4 "

There has been a reduction of 38 per cent. in the death-rate from phthisis in London in the course of forty years.

The average number of deaths yearly from phthisis in London during the past three years has been 7,795.

I do not know the proportions of deaths from phthisis occurring in Poor Law infirmaries, and in hospitals and other public institutions in London generally; but in Chelsea during the past five years I find that 36 per cent. of the deaths from phthisis have occurred in the Chelsea Workhouse Infirmary, 11 per cent. in hospitals and other public institutions, and 53 per cent. of the deaths have occurred in the patients' own homes. These figures are probably not largely departed from, taking London as a whole; and it is safe to assume that about half the deaths from phthisis occur in the patients' own homes.

The average number of persons suffering from this disease in London at any one time is probably about three or four times the number of annual deaths—say, 27,000; but of this number probably a considerable proportion are in the early stage, when the disease has not been recognised, and the patient has not as yet come under medical treatment.

Such reduction in mortality from phthisis as has been manifested in London during the past thirty years and in other places has been in all probability due, in greater part, to improved sanitary administration, involving the abatement of overcrowding, the better housing of the people, the more cleanly conditions now prevailing in the houses of the working classes, and the better ventilation of workshops, factories, and offices. To a lesser extent, perhaps, cheaper food and the more temperate habits of the people have had some effect in reducing the mortality from consumption. The attention of the public has only recently been called in any marked manner to the possible infectivity of the disease, and there appears to be no ground for assuming that any of the recent reduction in phthisis mortality is due to a lesser prevalence of the disease owing to the adoption of precautionary methods for dealing with expectorated matters from the lungs of the sick.

The table above given shows the percentage reduction of mortality from phthisis in London from quinquennium to quinquennium. The small reduction of 1 per cent. in 1890-1894 as compared with 1885-1889 is probably due to the years 1890-1894 having been influenza years, when a heavy mortality prevailed, and many consumptives fell victims to influenza, their deaths, however, having been registered as due to phthisis.

The table also appears to indicate that the reduction in phthisis mortality is a gradually decreasing quantity, and that, although measures of sanitary improvement may continue for a time to operate favourably in this direction, the time may not be far distant when a residuum of phthisis mortality will be reached, which is uncontrollable by the ordinary methods of municipal sanitary administration.

It seems probable, therefore, that, if any great advance is to be made in the prevention of phthisis, it will be necessary to provide means by which those who are suffering from pulmonary tuberculosis, and are unable, through poverty or the nature of their homes, to carry out those precautions which are necessary to prevent them from being sources of infection to their fellow-lodgers, may be isolated in specially-constructed sanatoria for the treatment of this disease. It is undoubtedly true that the great majority of the wage-earning classes, and even the classes slightly above them, are unable to carry out in their own homes the necessary precautions in anything like an effective manner. Moreover, if others are dependent on them, adults afflicted with phthisis continue their work so long as their strength permits, and are a constant source of danger to their fellow-workers.

To be a success, any scheme for the isolation and open-air treatment of consumptives in sanatoria should be carried out on a large scale, and should be independent of the Poor Law. In London the proper body to provide sanatorium treatment for consumption is the Metropolitan Asylums Board. The principle involved in the isolation and treatment of consumptives in sanatoria is the same as that involved in the isolation and treatment of scarlet fever, diphtheria, and enteric fever. It is a measure necessary to safeguard the public health, and it also holds out the prospect of a more hopeful mode of treatment for the poorer class of consumptives than is available for them at the present time. The general hospitals in London are averse to the reception of phthisis patients for any but short periods; nor are such patients, as a rule, very materially benefited by stay in the wards of the general hospitals. The special hospitals for consumption in London are too few to be able to deal with any but comparatively small numbers of such cases, and there is often a long period of delay after application before a case is admitted. The wards of the workhouse infirmaries receive a very large number of cases from amongst the poor, but they do not as a rule seek admission until they find that they are unable to continue their occupations, and they are generally in an incurably advanced stage of the disease.

No compulsion should be exercised to secure the isolation of consumptives in sanatoria. As public opinion becomes better informed, it appears probable that the sufferers from this disease will realize the benefits to be derived from early resort to sanatorium treatment, and will consent to undergo such periods of isolation in the sanatoria to which they are sent as the medical superintendents consider advisable.

To sum up the benefits which might be expected from the provision of sanatoria by the Metropolitan Asylums Board for the treatment of consumptives:

1. The public health would benefit by the withdrawal from amongst the general population of active foci of disease. A reduction in the prevalence of consumption would ensue when the system was thoroughly established.
2. The sanatorium treatment made available for sufferers in the early stages of the disease would restore to health and activity a certain proportion of those who under present circumstances succumb.
3. In the event of a patient being discharged relieved, but uncured, or in the event of a recurrence of the disease after discharge, the precautionary habits acquired by the patient whilst under treatment would largely tend to prevent during his illness the diffusion

of infection which would otherwise occur in his own home and place of occupation.

In the event of sanatoria for consumptives being provided by the Metropolitan Asylums Board, the system of voluntary notification of cases of pulmonary tuberculosis, already existing in several Metropolitan boroughs, should be adopted generally throughout London. In cases where application is made for admission of the patient into a sanatorium of the Board, inquiry could then be undertaken by the medical officer of health receiving the notification as to the circumstances of the patient, the desirability of removal from a public health point of view, and the suitability of the case for sanatorium treatment. The Metropolitan Asylums Board would probably also find it desirable to have a medical examination of the patient proposed for admission to its sanatorium by a medical officer of its own staff prior to his removal. This could probably be best and most economically effected by a system of examination of proposed patients at some central office of the Board, the applicant being requested to present himself for such examination at a certain time on a certain day, of which he would receive notice from the Board. If found to be a suitable case, he would then receive an authority to present himself at a certain date at the sanatorium, to which, of course, he would travel at his own expense, as no ambulance system would be required. In the event of there being no present accommodation at the sanatorium, the case would be entered in a book, and when his turn came the patient would be duly informed that he could be admitted.

It would seem to be desirable that the Board's sanatorium should be situated at no great distance from London, so as to avoid the fatigue of a long journey for patients travelling to the institution, and to render a journey by road in an ambulance carriage possible for such cases as failed to improve in the sanatorium or deteriorated in health, and, desiring to be sent back to their homes, were found not to be sufficiently strong to travel by rail or other methods.

Inasmuch as the period of detention in a sanatorium should be prolonged for some months if the maximum of benefit to the patient is to be derived, it would seem necessary that there should be some system of financial aid available for the support of the family of a bread-winner who has become consumptive, and has been received into a sanatorium. It is impossible to discuss this question in the present short paper, but it is a consideration of great importance, as much of the success of the suggested scheme of combating phthisis by sanatorium treatment will depend on the satisfactory solution of this problem.

THE INFLUENCE OF OCCUPATION ON THE PRODUCTION OF PHTHISIS.*

By JAMES NIVEN, M.A., M.B.,

Medical Officer of Health of the City of Manchester.

THIS is a question of great complexity. We know from the statistics which have been prepared by the Superintendent of Statistics in the Registrar-General's office that phthisis falls much more heavily on certain classes of work than on others. In some of these there are special factors at work, such as the production of an excessive amount of dust, or some influence specially enfeebling the system, as with workers in lead. In the case of publicans and their servants intemperance plays a prominent part in predisposing the system to attack. In many of the rougher classes of work there is uncertainty of work, with its frequent attendant intemperance. Here there is exposure to infection in the public-house, or in a certain proportion of cases in the common lodging-houses, in which a terrible mortality is exacted by this disease. Hence, in determining the influence of occupation on the production of phthisis, it is necessary to ascertain not only the statistical facts and the circumstances of employment correlated to them, but the social circumstances and habits of the operatives, and the part which these play in the production of the phthisis death-rate. It is also evident that the care or absence of care shown by the operatives in different employments as regards spitting in the workshops, and especially in the closets attached to them, will have an important influence, since a certain number of the workpeople, especially in the more unfavourable classes of work, will have phthisis, and the mischief resulting will depend largely on how they manage their expectorations.

The questions involved are of the utmost moment. Are the causes of our heavy industrial mortality removable? Do they explain the not infrequent obscure occurrences of phthisis in quarters in which it was not to be expected, and in which no trace of its origin can be ascertained?

In tracing the causes of phthisis in our large centres of industry, certain broad facts were first ascertained from the figures relating to the occupations furnished by the Superintendent of Statistics in the Registrar-General's office. It was found that in nineteen out of forty-four counties the female death-rate from phthisis exceeded the male, and that these were either agricultural or coal-mining counties. Further, it appeared that, while at early ages, both in town and country, the female phthisis death-rate exceeds the male, and at advanced ages the male phthisis death-rate exceeds the female, at intermediate ages, in nearly all large towns, the male death-rate begins to exceed the female at a much earlier age than in the country. There are thus factors at work in the towns, bearing heavily on males by comparison, which do not exist in the country. From the same statistical work it was possible to get an exhaustive view of the comparative mortality in different employments pursued by males between the ages of twenty-five and sixty-five. These could be classified into

* Abstract from Annual Report, 1902.

three main groups: first, one containing a large number of certain labourers, etc., publicans and their servants, etc., known to suffer specially from intemperance; secondly, a purely industrial group; thirdly, a mixed group, comprising various classes of workpeople. It was very manifest from this classification that, apart altogether from specific injury inflicted by particular occupations, a special tendency to phthisis was manifest amongst the intemperate classes.

A special study of figures relating to alcoholism obtained from the same work appeared to show that workers in our large industrial centres suffer more from intemperance than workpeople living in the country. There is another set of conditions which affects the result, which may be classified as social, though its elements are difficult to determine. They comprise, however, insanitary houses, overcrowding, smaller wages, more precarious work, and so on.

We thus arrive at the classification of the factors operating to produce the high phthisis death-rate amongst males in our large centres as—social, alcoholism, effects of the occupation (direct and indirect).

Now, phthisis is an infectious disease, lasting usually some years, during which a very large amount of matter is expectorated, which contains frequently great numbers of tubercle bacilli. These bacilli possess great persistence of vitality, except in presence of direct sunlight, but do not readily produce the disease when inhaled, except in persons with weak lungs, or having constitutions in some way enfeebled. Nevertheless, the presence of the infective matter is a central fact, without which phthisis would not be communicated. Now, where does spitting go on to the greatest extent? It is easy to ascertain that this is most abundantly practised in common lodging-houses, in many public-houses, in railway carriages, and in the homes of careless consumptives. In the case of workshops, a most complete examination was made for a number of works, including two rubber factories, a cotton mill, a blacking manufactory, two large ironworks, a rag-sorting establishment, a large tailoring establishment, a chemical works, a small-ware establishment, a gasworks, a glass manufactory, a machinist's, and a cotton-spinning mill, in every detail which could be supposed to affect the health of the operatives. As regards expectoration, the marks of sputum on the floor were almost exclusively found in the male departments only. Hence males are much more exposed to infection than females in the workshops, on account of the deposit on the floor of a much larger amount of infection in proportion to the persons affected. That this is an important element in the propagation of phthisis is proved by these considerations. Dust taken from various portions of living rooms in which consumptives have expectorated on the floors is in a high proportion of instances capable of producing the disease.

The mortality from phthisis in common lodging-houses, where persons are often crowded together in living-rooms not well lighted, and in which cases of phthisis are often present, is very excessive. Publicans and their servants undergo a very high mortality from phthisis, and it is certain that infective matter plays an even more important part than alcoholism in producing phthisis. It may therefore be assumed that in those works in which spitting is practised by the males the disease is certain to be propagated by tuberculous expectoration. Amongst the parts of workshops requiring attention especially are the attached closets, since expectoration was observed in these even when it was not present in the workshop and the disease

is here especially liable to be conveyed, the space being small, confined, and often dark. Thus, males are exposed to two specially disastrous influences, which affect females to a much smaller extent—viz., infection in the public-house, and infection in the workroom and attached closets. It is worth while inquiring whether the fountain of phthisis which is present in common lodging-houses and similar places cannot flow over into other classes of society.

In inquiring into the mortality from phthisis in one particular occupation, in which there did not seem much risk of infection through the employment, I found that some of the infected persons went to public-houses frequented by persons living in common lodging-houses. Phthisis is also comparatively prevalent amongst persons working at the Corporation gasworks and amongst the market porters, not a few of these also living in the common lodging-houses, while others use the same public-houses as persons living in common lodging-houses. No doubt these public-houses are a source of infection to many workmen not living in common lodging-houses, and who frequent also other public-houses. In this way the disease spreads outward from this intensely infected quarter, and probably passes from public-house to public-house.

When we come to inquire into the influence of common lodging-houses exerted indirectly through infection of articles passing through the hands of consumptive persons living in them, we are not able to ascertain that this is very great. Thus, from the return prepared by the Chief Constable in 1898 showing the occupations of the inhabitants of these houses, we find that, out of a total of 5,831, only 117 were tailors, and it is not possible positively to say of any other occupation yielding a considerable number of persons living in common lodging-houses that the articles produced in it would carry the disease. Out of these 117 tailors, perhaps 2·3 persons would die per annum from phthisis, an insignificant contribution to the occupational infection. Yet it can hardly be doubted that phthisis occurring in persons engaged in tailoring, or the manufacture of wholesale clothing, or in upholstering, or in house-decorating or painting, is liable to bring a sufficient amount of infective matter into the house to light up the disease in susceptible persons. At the same time, these influences must be small compared with the direct effect of contact with infective dust in the workshop and in the public-house.

How complicated is the relation of phthisis to occupation is seen from the fact that, when we investigate the incidence of notified cases of phthisis on different works of the same kind, some works stand out of conspicuous in respect of the number of cases occurring in them and reported to us, and on investigating the individual cases, we find that there is not infrequently reason for connecting the occurrence of these cases with the social circumstances and habits of the workman. If, then, the social circumstances and habits of the workman affect the phthisis mortality in the calling which he pursues, does not the calling in return affect the social circumstances and habits of the workman? Undoubtedly such is the case.

Occupations such as those of market porters, messengers, and labourers, require that the persons pursuing them should live near the centre of the town, and that they should not pay very highly for their house room. They are thus often under conditions of overcrowding and exposed to infection. Persons exposed to very high temperatures—strikers and moulders, cotton-spinners, glass-blowers, people in

underground bakehouses, etc.—have, by virtue of the high temperature at which they work, a special tendency to consume large quantities of beer, and so to be injured in their constitutions as to be exposed specially to infection, and in this way the conditions of employment act indirectly on the health of the operatives. When, therefore, we come to consider the high mortality from phthisis which afflicts those pursuing special callings in which the statistics afford no proof of special addiction to alcohol, such as lead-workers, file-cutters, metal-workers generally, porters, tailors, etc., we must first make a considerable allowance for social conditions and habits, while recognising that these occupations present special injurious conditions which have to be dealt with. Some light is thrown upon the causes leading to a high occupational mortality by a study of the ages on which phthisis falls most heavily. If the chief incidence is on ages twenty-five to forty-five, probably there is intemperance or some specially injurious factor in the occupation. If the incidence is high on an earlier age, the cause of the high mortality is, doubtless, occupational. If the chief incidence is on a later age, the cause is progressive, and may be the continued effects of the occupation or continued exposure to a high degree of infection.

The mortality from phthisis at different age-groups has been calculated for a number of occupations pursued in Manchester for the three years 1899, 1900, and 1901.

Applying the above considerations, law clerks, coachmen, grooms (not domestic), and cabmen, persons employed in storage and portage, messengers, porters, watchmen (not railway or Government), boot, shoe, slipper, patten and clog makers, inn and hotel keepers, publicans, etc., either suffer especially from intemperance and consequent special exposure to infection, or the occupation is specially injurious. There can be no doubt that the former is here the prevailing influence.

In the case of women, phthisis is most severe at ages fifteen to twenty-five amongst laundrywomen, and also amongst costermongers, hawkers, and street-sellers. Probably in the first occupation this must be taken to mean special exposure to infection, coupled with the effects of a severe occupation; amongst the latter it is probable that intemperance and hardship are conjoined. Charwomen also suffer heavily at early ages. They are exposed specially to infection, and probably suffer also from intemperance and domestic hardship. Charwomen, tailoresses, shirt-makers, and seamstresses suffer most heavily at ages twenty-five to forty-five. It is probable that this is due in the first class partly to infection, partly to habits, and that in the last two occupations the stress falls on more advanced ages—commercial or business clerks, ironworkers, painters, decorators, glaziers, plumbers, glass manufacturers, cotton operatives (males), tailors, costermongers, hawkers, street-sellers, general labourers, cotton operatives (females).

In the case of ironworkers, there is no doubt the fact that they do not readily succumb to infection. With regard to the next two classes, their occupation exposes them much to house infection, and the effect increases with each year in which the calling is pursued. As regards glass manufacturers, the adverse influences are complex. These workers begin to suffer at an early age, and are known to be intemperate; but the work is throughout severe. In the case of cotton operatives, the system gradually gives way under the stress and strain of the work. It is the same with female cotton operatives; the atmo-

sphere is unfavourable to health generally. The effect of occupation tells on tailors at a later age than on tailoresses. This is due, no doubt, to the persistence of infection in the male workrooms.

As regards the next two classes, the progressive mortality is due, no doubt, to the persistent presence of infection in the houses in which they live, which overrides the other influences. There can be little doubt that ironworkers, cotton operatives in Manchester, hawkers, and general labourers are, as classes, more intemperate than the average worker; but the other formidable influences at work keep piling up the death-rate. Thus, a cumulative death-rate, though it shows other powerful factors besides alcoholism to be at work, does not disprove the effects of intemperance, but merely obscures them. A notable feature in the Manchester table of occupational mortalities is the much higher mortality prevailing amongst men than amongst women following the same occupations at corresponding ages. This is, in all probability, due to the two factors on which stress has been already put—namely, spitting in the workrooms and closets used by the men, and intemperance amongst the males, in what relative proportions it is impossible to say.

The conclusions at which we arrive as the result of the analysis of our tables may be stated as follows:

The occupational mortality from phthisis is due in different occupations to very different groups of causes. There are, however, two outstanding factors which cause men to have much higher death-rates than women—viz., spitting in the workroom and drinking in public-houses. These enter into different occupations in very different degrees, and vary considerably even in the same occupations. They do, however, produce an effect on all, and their aggregate effect is much greater than that of particular occupational causes. Hence our first effort must be to diminish their general influence. For this reason notices with regard to spitting have been posted conspicuously in the various rooms of common lodging-houses. Other sets have been prepared for public-houses and for workshops. Another lesson which is practically enforced in common lodging-houses is the need for frequent and systematic cleansing. This is quite as necessary in public-houses and in workshops.

SANITATION AND POVERTY.—The more one sees of public health work, the more one is impressed with the fact that the problem of sanitation is essentially the problem of poverty, and that the two are very largely interchangeable terms. It is the poorest who are the worst offenders against sanitation, and this is not to be wondered at, having regard to their conditions and surroundings. Moral precepts and sanitary principles, which appeal as mere platitudes to those nursed in the lap of plenty, necessarily lose their significance in the crowded hovels occupied by the poorest section of the community. If the problem of how to render the poor less poor can be satisfactorily solved, then along with it will be solved half the sanitary problems of the day. Doubtless it must be to education that we must look chiefly for improvement, but it must be education of the right sort. It must be education which enlarges mind, strengthens judgment, and elevates character and aim. Whenever such a stage of education is reached sanitation is easy.—
DR. HENRY KENWOOD: *Annual Report*.

CREOLIN: A NOTE OF WARNING.

By SAMUEL RIDEAL, D.Sc. Lond., F.I.C.,
Fellow of University College.

THE term "creolin" seems to have been invented many years ago as a fancy name for an emulsion of cresols and neutral tar oils in a soap solution, and disinfectants under this name have been sold in different parts of the world and manufactured by several firms, who have from time to time modified the nature and the proportions of the various constituents without warning to the public.

It is therefore important at the present time to consider whether a generic name of this character is of any scientific value as a means of classifying a particular group of disinfectants, or whether it should be expunged altogether as having become too vague and indefinite to have any value. Thus, for example, Dr. Redard, in his paper at the Brussels Hygiene Congress, has abandoned the word altogether, and its nearest equivalent in his list of disinfectants as used by the principal railway companies in France gives "Crésyl Jeyes." Similarly, in the "General Instruction of Public Health in Spain," published in July, 1903, Dr. Cortezo recommends as an official disinfectant for municipalities in Spain amongst others a solution of 50 grammes of créoline in 1,000 grammes of water without any reference to its composition or disinfectant value. In Italy creolin is also sold and manufactured, and E. Baroni describes,* in addition to the liquid creolins, a solid creolin melting at from 55° to 58° C., which consists of a mixture of Venetian turpentine, caustic soda, coal tar (specific gravity 1.03 to 1.035), colophony, and beef fat. According to this authority, a good creolin should be a brownish-red clear liquid of a not unpleasant coal-tar odour (specific gravity 1.03 to 1.08), and should form on mixing with water (2.5 grammes per 100 c.c.) a milky alkaline emulsion, which should remain permanent for several weeks, but which, on the addition of excess of acid, should become brown owing to the separation of coal tar.

He finds that they vary considerably in the amount of tar acids they contain, but does not allude to any bacteriological tests of their relative merits.

Dr. A. J. Martin, also at the Brussels Congress, in reviewing the decree of February 10th, 1903, of the city of Paris, based upon the French law of February 15th, 1902, classifies in a special group the compounds of the aromatic series, such as carbolic acid, with or without soda; the cresols or higher phenols; crésyl or créoline (an

* *Giorn. farm. Chim.*, 51, 289-295.

emulsion of cresol in a resin soap, with hydro-carbons); solveol, solutol, lysol, and the neutral or alkaline solutions of cresol. It is also well known to workers in this country that some of the commercial creolins frequently contain an appreciable quantity of pyridine bases, and that these not only give a very strong and characteristic odour to the disinfectant, but probably do not contribute to their germicidal properties.

At Bradford the author, in conjunction with Mr. Ainslie Walker, incidentally drew attention to the great difference which exists between the disinfectant value of the cresols according to the chemical and physical condition of the disinfectant. Thus, a disinfectant containing 10 per cent. of tricresol in emulsion is equivalent in bactericidal efficiency to one containing 30 per cent. in solution when tested against an active culture of *B. typhosus*.*

In Germany an attempt to meet the difficulty has been met partly by the manufacturers, who sell creolins marked "phenolfrei" and "phenolhaltig" (the former usually contain not only no phenol, but also no cresol nor any homologous body), and partly by the Pharmacopœia, which has now as an official preparation a mixture of cresols and soft soap in definite proportion.

I have therefore recently, for the purposes of this communication, determined the carbolic acid coefficient† of purchased samples of creolin in Brussels, Hamburg, and London, which are summarized in Table I.

The disinfectant value of a creolin, from these samples alone, may therefore vary as much as from one and a half to sixteen times that of pure carbolic acid.

From the above tables it is therefore evident that both in Germany and England, at any rate, there are at least two distinct qualities of creolin, and, further, that both the English creolin disinfectant and the English creolin medical are several times superior in efficiency to the creolin sold on the Continent.

I have also made chemical examinations of these creolins. As would be expected, I find that the percentages of tar acids and neutral oils are widely different, but it is important to notice that these figures are not proportional to the bactericidal efficiencies, and therefore that a valuation based on their content of tar acids alone would be entirely erroneous. This is explained by an examination of the precipitated tar acids (so called), which show that they all contain fractions which distil at the same temperature as the

* *Journal of the Sanitary Institute*, October, 1903, p. 425; also PUBLIC HEALTH, vol. xv., p. 658.

† For the meaning and the conditions of this test, *loc. cit.*, p. 426-434; also PUBLIC HEALTH, vol. xv., p. 657.

neither carbolic acid nor a mixture of cresylic acids. The German nomenclature of "phenolfrei" and "phenolhaltig" does not therefore help to explain the whole of these differences, so that we are forced to conclude that the English creolin of the present time is entirely different both in its chemical constitution and in its bactericidal action to the creolin sold on the Continent.

It is clear, therefore, I think, that if the name "creolin" is to remain in the literature of the subject, a statement of the germicidal value of the disinfectant in terms of some standard should be insisted on in all cases.

The unfortunate confusion which thus arises in comparing the literatures in the different countries must be my excuse for this communication.

TRAUMA AS AN ETIOLOGIC FACTOR IN PHTHISIS PULMONALIS.—Dr. William T. English, Pittsburg (*Journ. A. M. A.*, October 24, 1903) believes that passive predisposition is often rendered active by the intervention of traumatism. Out of 128 cases in injury followed by traumatic pneumonia the writer finds that about 63 per cent. were associated with fracture. The conclusion seems justified that over 48 per cent. of those recovering from the immediate results of the injury and pneumonia developed pulmonary phthisis.

THE TONSILS AND TUBERCULOSIS.—E. E. Escomel regards the tonsils as "the most tuberculizable organs in the entire digestive tract" (*Revue de Médecine*, vol. xxiii., No. 6). He found them the seat of tuberculous lesions in 21 out of 25 cadavers of consumptives examined. In 11 non-tuberculous cadavers the tonsils were intact. In the tuberculous cases the follicles almost always contained other parasites, which may have favoured the lodgment and growth of the tubercle bacilli.

THE CONTAMINATION OF MEAT OF HEALTHY ANIMALS WITH TUBERCLE BACILLI THROUGH NON-DISINFECTED SLAUGHTER OR INSPECTION INSTRUMENTS.—G. Decker (*Zeitschr. Fleisch u. Milchhyg.*, 12 [1902], No. 8) instituted experiments to determine whether, in the practice of meat inspection or during the slaughter of animals, healthy meat might become infected by the instruments of the butchers or by the knives used in inspection, and also to discover suitable means of preventing this infection. The results of experiments on the first point were positive. Of 47 pieces of meat and meat products handled in the ordinary manner, it was found that 19, or 40.42 per cent., had become contaminated with virulent tubercle bacilli. An examination was made of 13 meat inspectors' knives, and 10 of these, or 76.59 per cent., were contaminated with the tubercle bacillus. A similar examination was made of nine butchers' knives, showing that three were infected. In experiments to determine the best method of preventing infection by these means it was found that the tubercle bacilli on the knives of meat inspectors and butchers could be readily destroyed by placing these instruments in a 2 per cent. solution of soda at a boiling temperature.

MILK ANALYSIS.

THE following circular to local authorities for the purpose of the Sale of Food and Drugs Acts, 1875 to 1899, has just been issued by the Board of Agriculture:

The fact that samples of milk referred to the Government Laboratory under the provisions of the above Acts are invariably sour when received has occasionally given rise to inquiries, by magistrates' clerks and others concerned with the working of the Acts, as to the practicability of making a satisfactory analysis of sour milk, with a view of substantiating or disproving an allegation that the milk has been mixed with water, or that fat has been abstracted from it.

It therefore appears desirable that the Board should state that, except in a limited number of exceptional cases to be hereafter referred to, there is no practical difficulty in accurately inferring the composition of the milk when fresh from the analysis of the milk when sour.

The change which takes place in a sample of milk kept from contact with air, as in a bottle nearly full of the sample, and fitted with a good sound cork sealed with wax, is, as a rule, comparatively slight. The causes and nature of this change have been carefully studied by many observers, and they have been found to be perfectly definite in character. Without going into details concerning the fermentative changes to which milk is liable, it may be stated that the changes which affect the analysis, and therefore the inference to be drawn from the results, are concerned with the non-fatty solids only, and more particularly with the milk-sugar. The milk-sugar gives rise, either proximately or remotely, to a variety of products, the most important of which are lactic acid, ethyl alcohol, and acetic acid; but it can be shown that the only quantitative determinations which need be made in order to determine the loss in the non-fatty matter by keeping are the proportion of alcohol, reckoned as proof-spirit, and the amount of free volatile acid, together with the ammonia derived from the alteration of the casein or proteid substance in the milk. The slight alterations in weight consequent on the hydrolysis and conversion of lactose into lactic acid, and the formation of certain so-called by-products of alcoholic fermentation, are partly positive and partly negative in direction, but their joint effect is too small to have any appreciable influence on the result.

The entire correction, which, of course, is always additive, in the case of a properly-preserved sample from three to six weeks old is fairly constant, and may be said to range from 0.2 to 0.3 per cent. In a few cases it has been found to be as low as 0.1 per cent., and in very exceptional cases, as in badly-secured samples, or in bottles only partially filled, it has risen to 0.7 or 0.8 per cent.

If the fermentation has passed into the butyric acid stage, the amount of free acid is greatly increased, and, owing to the separated casein, it is sometimes impossible to get the sample into a proper and uniform condition for analysis. In such cases the Government Laboratory declines to proceed with the examination. Such a result, however, practically never happens in the case of samples which have been properly taken and kept by the inspectors pending the appeal to the Government Laboratory.

The details of the methods of analysis adopted in the Government

Laboratory were fully inquired into by the Committee which precede the issue of the Sale of Milk Regulations in 1901, and are given in Appendix XXIX, to the Minutes of Evidence taken before the Departmental Committee on Milk and Cream Regulations (Cd. 484).

The following tables (Cd. 484, Appendix XXIX.) give the result of the analysis of a series of milks analyzed in the fresh state and after the lapse of several weeks. The examination was carried beyond the time at which a milk would be referred to the Government Laboratory under the Food and Drugs Acts, but it will be seen that the changes can be accurately followed and allowed for. The comparison of the corrected non-fatty solids with the solids of the fresh milk show that the variations are not greater than may occur in duplicate determinations of the constituents of a fresh milk.

Whole Milks.

No.	Fresh Milk.		Time in Days.	Kept Milk.		Total Loss.	
	Non-fatty Solids.	Fat.		Non-fatty Solids.	Fat.	Calculated.	Actual.
1	8.97	4.08	21	8.71	4.02	0.20	0.26
1A	8.97	4.08	27	8.74	3.97	0.21	0.23
1B	8.97	4.08	50	8.61	4.00	0.34	0.36
2	8.97	4.08	85	8.49	4.09	0.49	0.48
3	8.99	3.17	27	8.60	3.16	0.35	0.39
3A	9.12	4.16	42	8.82	4.18	0.33	0.30
3B	9.12	4.16	102	8.88	4.18	0.25	0.24
4	9.02	4.72	41	8.56	4.65	0.58	0.46
5	9.02	3.28	52	8.76	3.25	0.20	0.26
5A	9.02	3.28	79	8.53	3.34	0.49	0.49
5B	9.02	3.28	93	8.35	3.27	0.61	0.67
6	9.13	4.49	57	8.88	4.35	0.23	0.25
8	9.52	4.06	74	9.25	3.92	0.35	0.27
9	9.27	4.07	77	8.91	4.06	0.32	0.36
10	9.11	4.19	91	8.24	4.14	0.76	0.87
11	9.34	4.07	91	9.01	4.01	0.41	0.38
12	8.42	3.70	91	8.14	3.69	0.26	0.28
13	8.83	5.32	91	8.56	5.20	0.31	0.27
14	9.20	3.98	91	8.80	3.83	0.39	0.40

Milks to which approximately 10 per Cent. of Water has been added.

No.	Fresh Milk.		Time in Days.	Kept Milk.		Total Loss.	
	Non-fatty Solids.	Fat.		Non-fatty Solids.	Fat.	Calculated.	Actual.
1	8.14	3.44	14	7.96	3.41	0.27	0.18
2	8.14	3.44	30	7.81	3.40	0.42	0.33
3	8.24	2.79	38	7.88	2.78	0.33	0.36
4	8.24	2.79	38	7.73	2.76	0.50	0.51

Separated Milks.

No.	Fresh Milk.		Time in Days.	Kept Milk.		Total Loss.	
	Total Solids.	Fat.		Total Solids.	Fat.	Calculated.	Actual.
1	9.66	0.14	27	9.25	Not determined	0.22	0.41
1A	9.66	0.14	36	9.34		0.13	0.32
1B	9.66	0.14	65	9.35		0.26	0.31
2	8.91	0.09	28	8.62		0.28	0.29
2B	8.91	0.09	37	8.60		0.20	0.31
3	8.61	0.13	30	8.33		0.24	0.28
3A	8.61	0.13	37	8.29		0.28	0.32
3B	8.61	0.13	91	7.93		0.58	0.68

Separated Milks to which approximately 10 per Cent. of Water was added.

No.	Fresh Milk.		Time in Days.	Kept Milk.		Total Loss.	
	Total Solids.	Fat.		Total Solids.	Fat.	Calculated.	Actual.
1	8.18	Not determined	21	7.86	Not determined	0.24	0.32
1A	8.18		387	6.71		1.50	1.47
1B	8.18		388	6.64		1.56	1.54
1C	8.18		401	6.71		1.50	1.47
2	7.67		22	7.22		0.33	0.45
2A	7.67		387	6.24		1.49	1.43
3	7.76		73	7.11		0.55	0.65
4	7.80	Not determined	185	6.22		1.59	1.58
4A	7.80		188	6.19		1.69	1.61

[The following report has been made on the subject by three public analysts—Messrs. Cassal, Cribb, and Richards:]

"The subject of the circular is of a highly technical nature, and could only be dealt with in detail in a very lengthy report.

"The circular purports to contain all the experimental evidence on which the Somerset House procedure in connection with the analysis of decomposed milks is based; and this being so, we have to state that the facts and figures put forward are utterly inadequate to substantiate the claims made in regard to the process, and that they fail to do so in the following respects: (1) The conditions under which the samples experimented with were prepared and kept were altogether different from those which exist in actual practice. (2) The analyses made were not sufficiently numerous. The analyses of whole milk and of separated milk to which no water had been added are altogether valueless as evidence, inasmuch as the disturbing influence of the added water does not come into play, so that, as far as ordinary milk adulteration cases are concerned, the proof of the accuracy of the Somerset House method rests on four analyses of two milks. Of these four, two show errors equivalent to 1 per cent. of added water out of a total of 4 per cent. indicated by the analysis. (3) The amounts of water added were the same in every case, and no experiments were made with the larger

amounts usually present in the samples which are the subject of prosecutions under the Acts.

"In a matter so serious as the confirmation or otherwise of a certificate issued under a criminal Act of Parliament, a course of procedure so obviously open to criticism should only be accepted if supported by evidence so strong as to put the validity of the claims made beyond all reasonable doubt. In our opinion, as already stated, such evidence is not contained in the letter under consideration, and the results of the practical application of the process to the comparatively small number of cases referred to Somerset House under the Food and Drugs Acts in no way warrant the confidence in it expressed by the letter."

BUTTER SAMPLES FOR ANALYSIS.

In fulfilment of the promise to make the sale of impure or inferior butter as difficult as possible, if not absolutely impossible, the Board of Agriculture has issued a circular drawing the attention of local authorities to the importance of exercising greater care in the preservation and transmission of samples of butter intended for analysis. Sir Thomas Elliott, in emphasising the urgency of the point, remarks that samples of butter are frequently received at the Government Laboratory after the lapse of one or two months from the time that the samples were taken, and that subsequent to the date of purchase they have been kept by the inspector in the paper in which they were originally bought. It is hardly necessary to say that in these circumstances it is quite impossible to avoid nullifying discrepancies in the analytical results. As the circular states, it is very desirable that there should be uniformity of procedure in collecting and retaining samples of butter taken under the Sale of Food and Drugs Acts, and the following recommendations have been drawn up for the guidance of the local officials employed in this work:

1. The quantity to be purchased should not be less than one pound, except that it may be expedient to purchase only half a pound in cases where there is reason to believe that the object of the purchase would be defeated if a greater quantity were demanded.
2. The division of the sample into three parts should be made as equally as possible, so that the portion reserved by the purchaser may be not less than one-third of the whole. It is desirable that each portion should consist of one piece only.
3. The portions should not be wrapped in paper, but should be placed, without pressure, in dry and clean screw-capped bottles in such a manner that the water present may be retained in the butter.
4. The screw-capped bottle should be provided with a cork-lined metallic lid. The mouth should be as nearly as possible the full width of the bottle, and the cork lining of the lid should be firmly screwed down against the edge of the bottle.
5. The bottle, labelled with the necessary particulars, should be enclosed in an envelope of stout paper, which should be secured with the official seal.
6. The reserved portion should be kept in a cool, dark place pending its production in court in the event of proceedings being taken, and if directed by the court to be referred to the Commissioners of Inland Revenue it should be carefully packed in order to ensure its safe transmission to the Government Laboratory.

LAW REPORTS.

THE HIGH COURT OF JUSTICE.

CHANCERY DIVISION.

June 9th, 1903.

BEFORE EADY, J.

Re WARRINER, BRAYSHAW *v.* NINNIS.

Repair of Drains by Tenant—Right to recover from Landlord—Covenant to pay Impositions.

If a tenant for three years agrees to pay all assessments and impositions whatsoever that might become due or assessed in respect of the premises, he cannot recover from his landlord the costs of sanitary work required by the local authority and executed by him.

This was a claim by a tenant to prove for a sum of £118 1s. against the estate of his deceased landlord, which sum the tenant had paid in respect of certain sanitary work which had been executed in order to abate a nuisance, and which had been required by a notice served by the local authority under the Public Health (London) Act, 1891. The notice had been served on both landlord and tenant, but the former had done nothing. By the agreement, which was for a tenancy for three years at the rent of £54 per annum, clear of all deductions except property tax, the tenant covenanted to pay the said rent, and to pay and discharge all rates, taxes, assessments, and impositions whatsoever, whether Parliamentary, parochial, or otherwise, that may become due or assessed in respect of the premises; and to keep, and at the expiration of the said tenancy to quit and deliver up, quiet and peaceable possession of the premises, together with all fixtures and fittings, in as good state, order, and condition, and repair as the same should be at the commencement of the tenancy, fair wear and tear and accidental damage by fire in the meantime only excepted.

G. Lawrence appeared for the plaintiff, and St. John Clerke for the defendant.

EADY, J., in giving judgment for the defendant, said: In my opinion the obligation fell upon the tenant, because she covenanted to pay the rent clear of all deductions whatsoever, and to pay all impositions. What, then, is an "imposition" within the meaning of the covenant? I should say, apart from authority, that in this covenant it means a sum of money payable by the landlord or tenant in respect of an imposition. A duty imposed appears to me to be an imposition, and I should say that the word "imposition" is, if anything, rather larger than the word "duty." In my view compliance with the sanitary notice and payment of the costs was an imposition due in respect of the messuage. At first it was said that it is only when the contract imposed the duty on the tenant by words such as "payable by either landlord or tenant" that he is liable. But there are cases in which those words are not used, but in which a tenant has been held liable. The present case is clear when we consider Section 121 of the Public Health (London) Act, 1891, although the section does not apply, because the sanitary authority did not do the work. That section provides that the costs and expenses may be recovered from the occupier, and the owner shall allow the

occupier to deduct any money so paid from the rent; but "nothing in this section shall affect any contract between any owner and occupier of any premises whereby the occupier agrees to pay or discharge all rates, dues, and sums of money payable in respect of such premises, or shall affect any contract whatsoever between landlord and tenant." Moreover, if the sanitary authority had done the work and recovered the cost from the occupier, and the occupier had claimed to deduct the amount from the rent, she would have been making a deduction, although the covenant is to pay rent clear of all deductions whatsoever. The case cannot be distinguished from the case of *Stockdale v. Ashenberg*, *infra*, where, as here, the agreement for a lease was for three years. On these grounds I am of opinion that the claim fails.

KING'S BENCH DIVISION.

April 23rd, 1903.

BEFORE WRIGHT, J.

STOCKDALE v. ASCHERBERG.

Reconstruction of Drains by Landlord—Right to recover from Tenant—Covenant to pay Outgoings.

If a tenant agrees to pay all outgoings payable in respect of the premises, he is bound to repay the landlord the cost of reconstructing the drains as required by the local authority, and the fact that his tenancy is only for three years is immaterial.

The plaintiff agreed to let a house to the defendant for a term of three years at a yearly rent of £55. By the agreement the tenant agreed to pay "all taxes, rates, assessments, and outgoings of every description for the time being payable in respect of the premises as they become due, landlord's property tax only excepted." During the tenancy the district council served upon the plaintiff a notice under the Public Health Act, 1875, stating that a nuisance existed on the premises, and requiring the plaintiff, in order to abate it, to take up and relay the drain. The plaintiff did the work at a cost of £83 10s., and brought this action to recover the amount from the tenant.

Hohler appeared for the plaintiff, and Fox and A. Brown for the defendant.

For the defence it was contended that upon a short tenancy it was not contemplated by the parties that the tenant should pay for these structural repairs.

WRIGHT, J., in giving judgment for the plaintiff, said there was a tendency in the courts to restrict the *prima facie* meaning of the covenants by reference to the circumstances of each case. He, however, agreed with KAY, J., in *Batchelor v. Bigger*, 60 L.T. 416, where he said: "It is extremely difficult to say that a covenant the words of which would, in the case of a term of twenty-one years, include a payment by a tenant, must be construed not to include it because the term is only for three years." The effect of the decisions was that the obligation to remedy a structural defect would come within the terms of such a covenant as this. If the covenant is to be construed on the basis that it relates only to matters which may reasonably be supposed to have been contemplated by the parties, then the possibility of the

landlord being called on to put the drainage of the house in order cannot be regarded as altogether outside the contemplation of the parties, and it is equally so whether the term is twenty-one years or three years.

KING'S BENCH DIVISION.

May 25th, 1903.

BEFORE LORD ALVERSTONE, L.C.J., WILLS AND CHANNELL, JJ.

HINDS v. ELSAM.

Vaccination—Certificate of Unfitness at Time of hearing complaint—
Defence.

Where a person is summoned for failing to have his infant child, aged eleven months, vaccinated within six months of the date of child's birth, a medical practitioner's certificate to the effect that the child at or near the date of the hearing was unfit to be vaccinated affords no defence.

This was a case stated by justices of Surrey on the hearing of a complaint against the appellant for neglecting to have his child, aged eleven months, vaccinated within six months after the birth of the child, contrary to Section 29 of the Vaccination Act, 1867.

It was proved that the child had not been vaccinated. For the defence it was stated that before the child had reached the age of four months the appellant had made application for a certificate of exemption from vaccination under Section 2 of the Vaccination Act, 1898, which certificate was refused by the justices then sitting. The appellant also produced before the justices the following certificate: "Somers, Wimbledon Hill, Surrey. This is to certify that Walter Allsebrook Hinds is at present, and has been since October 8th, 1902, under my care, suffering from febricula and dentition, and that it would be unsafe to vaccinate him at present. (Signed) L. R. COLLIER, M.D., November 4th, 1902."

The hearing took place on November 5th, so that the certificate was given on the day previous. It was contended that this was a sufficient defence by reason of Section 34 of the Vaccination Act, 1867. The justices convicted.

Schultess Young appeared for the appellant, *Clarke Hall* for the respondent.

The appeal was dismissed.

The appeal was dismissed. LORD ALVERSTONE, L.C.J., in the course of his judgment, said the only certificate produced at the hearing of the case was a certificate dated three or four days after the summons, and it, of course, could only refer to the state of health of the child at the time it was given. That being so, there still remains a period of about five months after the child had attained the age of six months during which an offence was committed. There was nothing in the certificate to show that the child could not have been vaccinated before it was six months old. If the certificate had covered the period during which the child ought to have been vaccinated, it might have furnished a good defence. The decision in *Allen v. Worthy* (1870), L.R. 5, Q.B. 163; 34 J.P. 563, is an authority to show that the decision of the justices was quite correct.

WILLS and CHANNELL, JJ., concurred.

May 27th, 1903.

BEFORE LORD ALVERSTONE, L.C.J., AND CHANNELL, J.

SANDYS v. RHODES.

Sale of Food and Drugs Act, 1875, Section 6—Tapioca sold for Sago—
Prejudice of the Purchaser.

On a summons under Section 6 of the Sale of Food and Drugs Act, 1875, for selling tapioca as sago, it is open to the justices to find that the sale was not to the prejudice of the purchaser when it is shown that it has been the custom of the trade for some years to sell this quality of tapioca as sago, and there is no appreciable difference in the value of the articles.

This was a case stated by the justices for the county of Derby upon the hearing of an information against the respondent under the Sale of Food and Drugs Acts for that he did sell to the appellant, to his prejudice, one pound of sago, not of the nature, substance, and quality demanded, in that it contained 100 per cent. of tapioca.

For the respondent it was proved that it was the custom of the trade to sell as sago tapioca of the quality and description sold to the appellant. That samples had been taken, which were produced to the court, of what was sold as sago by other dealers, and was of the same quality and description as that sold to the appellant. That the article now known as sago was scarcely ever kept for sale, and that the public would not buy such article. That there was not any appreciable difference in the values of the respective articles, sago and tapioca. That for a number of years the article as supplied to the appellant had been bought by the public as sago, and the manufacture of the same had been forced by the public through demanding the white-looking article and not the darker coloured as formerly sold as sago.

The justices considered that there was no sale to the prejudice of the purchaser, as the public consider that pearl tapioca is sago, and dismissed the information.

Etherington Smith appeared for the appellant; the respondent was not represented.

The Court dismissed the appeal.

LORD ALVERSTONE, L.C.J., said it was open to the justices upon the evidence to find, as they had done, that the sale was not to the prejudice of the purchaser, because the two articles were of the same value, and for a number of years the public have asked for and bought this quality and description of tapioca by the name of sago, so as to establish a custom in the trade to sell this description of tapioca by the name of sago.

CHANNELL, J., concurred.

ANKYLOSTOMIASIS.—A special series of preparations and drawings illustrating the life-history of the parasite producing what is known as "miners' worm disease" is now on view in the great hall of the Natural History Museum at South Kensington. The worm is believed to have been introduced to the Continent by workers coming from mines in the tropics, and attracted attention in 1880 during the excavation of the St. Gothard Tunnel. It has now invaded this country, particularly Cornwall. The Home Office is preparing regulations in the hope that its spread to other mines may be prevented.

REVIEWS.

EIGHTEENTH YEARLY REPORT ON WORK AND PROGRESS IN THE DOMAIN OF HYGIENE IN THE YEAR 1900. Edited by Dr. A. Pfeiffer of Wiesbaden. *Supplement to the German Public Health Quarterly*, vol. xxxii. 674 pages, with full index. Brunswick, 1902.

The first division begins with a consideration of the laws and regulations in the domain of public health in the German Empire and its several constituent States and towns, as well as in other parts of the world.

Then follows a review and an abstract of the literature of general and special hygiene, by Dr. H. Pfeiffer. These parts do not lend themselves readily to abstraction.

Dr. Heimann, of Berlin, then discusses the health statistics of the year 1899 of the following European countries:

	GERMAN EMPIRE.		FRANCE.		GREAT BRITAIN.		IRELAND.	
	Per 1,000 Inhabitants.		Per 1,000 Inhabitants.		Per 1,000 Inhabitants.		Per 1,000 Inhabitants.	
Births { not including }	85.9	...	21.2	...	29.4	...	22.9	...
Deaths { still-births }	21.5	...	21.1	...	18.4	...	17.6	...
Excess of births	14.4	...	0.1	...	11.0	...	5.8	...

	BELGIUM.		NETHERLANDS.		ITALY.		SWEDEN.		NORWAY.	
	Per 1,000 Inhabitants.		Per 1,000 Inhabitants.		Per 1,000 Inhabitants.		Per 1,000 Inhabitants.		Per 1,000 Inhabitants.	
Births { not including }	28.8	...	32.0	...	84.2	...	26.2	...	30.9	...
Deaths { still-births }	18.5	...	17.1	...	22.1	...	17.6	...	16.8	...
Excess of births	10.3	...	14.9	...	12.1	...	8.6	...	14.1	...

In 1899 in Germany, 1,980,304 living and 64,982 still-born children were born, and 1,185,197 persons died. The death-rate, including the still-born children, was 22.68. The average death-rate, 1881-90, was 26.48. Since 1876 the death-rate has gradually gone downwards from 42.61. The excess of births over deaths has steadily gone up from 11.9 per 1,000 in the decade 1871-80 to 13.9 in the years 1891-99. The illegitimate births numbered 8.97 of the total births. In the towns the death-rate for males was 272.9, for females was 224.9. In the towns of 100,000 inhabitants the infantile death-rates varied from 320 in Chemnitz to 154 in Frankfort-on-Maine.

The fruitfulness—i.e., the number of births per 1,000 women at child-bearing age—has fallen in France from 102 in 1866 to 88 in 1890, in England from 139 in 1871 to 118 in 1891; has risen in Austria from 140 in 1869 to 144 in 1890, in Sweden from 114 in 1870 to 116 in 1890, in Prussia from 138 in 1867 to 148 in 1890.

The fruitfulness of married women fell from 166 in 1880 to 148 in 1890 in France, from 253 in 1871 to 229 in 1891 in England; but rose from 244 in 1880 to 248 in 1890 in Austria, from 224 (1870) to 229 (1890) in Sweden.

In German towns the fruitfulness of marriages in the years 1894-97 was 240, in country places it was 290.

In 1897 in the German Empire the infantile mortality was 216, 76 being due to gastro-enteritis and 31 being due to debility from birth. Gastro-enteritis in infants was specially common in the kingdoms of Saxony and Württemberg and Bavaria in the east of the Rhine, giving rise to mortalities of 171, 126, and 132 respectively. In large towns the

infantile mortality was 228, 118 being due to gastro-enteritis, whilst in the country the mortality was 216, 70 being due to gastro-enteritis.

In nineteen large German towns the infantile mortality has fallen substantially, as a whole, from 1875 to 1897. This is attributed undoubtedly to sanitary improvements in the towns (housing, water-supply, drainage, control of milk-supply, and the like). In Austria the infantile mortality falls as a rule from east to west, being highest in the Czechs, Bohemians, and Moravians, and lowest among the Tyrolese Germans.

Deaths from Infectious Diseases in 1899.

In German towns measles caused a death-rate of 0.22. There were big epidemics in Nuremberg (death-rate 1.31), Bamberg (1.44), Inowrazlan (2.02), and several other towns.

Scarlet fever caused a mortality of 0.24 in twenty eight German towns. Death-rates ranged from 3.43 in Lipine to 0.88 in Witten.

Diphtheria and croup caused a death-rate of 0.32 in thirty towns; the rate ranged from 3.61 in Eisleben to 0.85 in Zerbst.

Figures collected by Dr. Johnisk of Vienna from all sources show a great diminution in diphtheria mortality in the years 1894-97 as compared with the death-rates prevailing before anti-diphtheritic serum was used. Of 52,215 cases treated with the serum, the death-rate was 7.6 per cent. in 23,058 treated on the first and second day, the death-rate was 15.6 per cent. in 13,203 treated on the third day, and 25.9 per cent. amongst 16,254 treated later.

The Swiss Health Office collected statistics of diphtheria for the years 1894-98. In 16,590 cases notified the fatality was 7.6 per cent.; 72 per cent. of these were examined for bacilli, and 77 per cent. of them gave positive results. Of 1,970 cases in which a doubt existed, 1,324 were proved to be diphtheritic on bacteriological examination.

It appears that measles and whooping-cough caused a higher mortality in London (0.62) than in nine large Continental towns and New York in the years 1889-98, St. Petersburg running it close with 0.60. The scarlatina rate in London was low (0.21) compared with St. Petersburg (0.72), and the diphtheria death-rate of these two cities were 0.55 and 0.82 respectively.

Small-pox.—In 1899 Prussia had twenty-five fatal cases of small-pox, twenty-four being in the eastern provinces and seven being infants under a year old, ten being from one to five years old, and eight being older. As in previous years, Russian and Galician farm labourers and their families had carried the disease into the distant border provinces of Prussia.

Thus in February two children of a Russian labourer's family fell ill, and soon after their arrival at Iserlohn (Arnsberg district) nine inhabitants were infected, and one adult died. In the Magdeburg district in April and May seven foreign female labourers (seven from Russian Poland and one from Galicia) fell ill within a week of their arrival, infected two inhabitants, but there was not a death. In the Merseberg district, also from April to May, one female and three male labourers fell ill. None died.

In Austria there were 6,358 cases, with 1,162 deaths, in 1899; in Hungary 1,363 died of small-pox.

Typhoid fever caused a mortality of 0.10 in the German towns. The death-rates were largest in Pforzheim, 1.37; Löbtau, 1.9; and Allenstein 1.05. In other countries the death rates were: London, 0.2; St. Petersburg, 0.8; Madrid, 0.8; Rome, 0.4; Paris, 0.3.

Small-pox—Statistics of Small-pox Deaths in 1898, from the Imperial Health Office.—In 1898 there were 112 cases of small-pox in Prussia, and 13, or 11.6 per cent., died. Of the 112 cases, 34 were foreigners and 34 lived in border districts of Prussia; six were unvaccinated children under a year old. In the second year of life there were ten unvaccinated, and two very slight cases were vaccinated on the right side only; in the third to the fifth year were thirteen children, of whom five were unvaccinated; one of these and eight vaccinated children had slight attacks; the other four unvaccinated children had very bad attacks. In the sixth to the tenth year there were seventeen attacks; twelve of these were vaccinated on the right side and had slight attacks, in the other five cases, which were not vaccinated, or the condition as to vaccination was not stated, the illnesses were severe, or moderately severe, and one died. In the eleventh to the fifteenth year there were eleven cases; a boy, eleven and a half years old, vaccinated once, had a severe attack; nine once vaccinated, and one who had had small-pox once, had slight illnesses. In the sixteenth to the twentieth years there were nine attacks; a boy of fifteen, revaccinated at twelve with success, died; a girl of eighteen, revaccinated, and five who had had small-pox before, were slightly ill. In the twenty-first to thirtieth years of age there were eighteen cases, eight vaccinated once on the right side, of whom two were revaccinated too late, and the others had had marks; six were revaccinated, and three had small-pox in infancy. In the thirtieth to the fortieth year, twelve cases. Female vaccinated successfully in infancy, and a man, thirty-seven, vaccinated with unknown result as an infant, died. A Portuguese of thirty, vaccinated nineteen years before, had a moderately severe attack, and a woman of thirty-eight, successfully vaccinated in infancy, had a severe attack. The rest had slight attacks. Of these, two had been vaccinated once, four had been revaccinated, and in two cases the condition as to vaccination was unknown. In the forty-first to the fiftieth years there were ten cases; four vaccinated in infancy, and two revaccinated twenty-nine and thirty-three years previously, had severe attacks. Three, vaccinated once, and one revaccinated fourteen years previously, had slight attacks. In the fifty-first to the sixtieth year, a man of fifty-two, revaccinated without result twenty-eight years previously, died; and a woman of fifty-seven, who had had small-pox thirty-four years before, had a slight attack. In ages over sixty a widow of sixty-five died. She had been vaccinated as a child and again a few days before her attack. A male of unknown age and unvaccinated had a slight attack.

In the other States of the German Empire and in Alsace-Lorraine seventeen cases came under official notice, with three deaths—17.6 per cent. Three were in Bavaria, one each in Saxony and Baden, two in Bremen, nine in Hamburg, and one in Alsace-Lorraine. In Bavaria, at Berchtesgaden, the child (eleven months old) of a tailor died, unvaccinated. The father kept an old clothes shop, and often visited Salzburg. In Munich a woman of sixty-five fell ill, and in Oberndorf a female cook, forty-three years old, had an attack both without any proof of contagion. In Saxony a seventeen-year-old "gymnasiast" fell ill soon after returning from Thuringia; he had been revaccinated successfully in his twelfth year. The origin was unknown. In Baden, at Sinsheim, the unvaccinated eleven months' old child of a strolling pottery-ware dealer; origin unknown. In Bremen the attacks were in two persons who had just come from Russia. In Alsace-Lorraine (Fort Bismarck, near Wolfisheim) a soldier who was unsuccessfully revaccinated on

entering the army a year previously. Of the three deaths, one was a child under a year old, unvaccinated; a soldier successfully re-vaccinated a year before; a woman of sixty-seven in whom the state as to vaccination was unknown. Three of the cases were moderately severe; one of the cases had been vaccinated successfully forty years previously, in the other two the condition as to vaccination was unknown. In the remaining eleven cases the illness was slight.

VACCINATION STATISTICS FOR GERMAN EMPIRE IN 1897 (IMPERIAL HEALTH OFFICE).

	No. to be vaccinated.	Actually vaccinated.	Successful result stated.
Primary vaccinations	1,787,878	1,455,349	1,409,312
Revaccinations	1,222,672	1,174,827	1,076,045

	With Glycerine Animal Lymph.	With Animal Lymph otherwise preserved.	From Body to Body.
Primary vaccinations	1,413,326	47,046	340
Revaccinations	1,135,125	38,980	322

Almost always the vaccination is by cuts, so as to make four to six slight wounds on one arm only. The instrument should be readily cleansed and sterilizable, such as Weichardt's vaccination knife or the platino-iridium lancet. No deaths were due to the action of the lymph or to germs inoculated at the same time with it. The anti-vaccination movement derived no aid during the year from any defects in vaccination which are worth mention. Two mothers in Schleswig wiped the lymph off their children's arms with their pocket-handkerchiefs in order to render the vaccination useless. They succeeded only in vaccinating themselves on the nose. As a rule, in such cases the vaccination goes on well.

VACCINATION STATISTICS FOR GERMAN EMPIRE IN 1898 (IMPERIAL HEALTH OFFICE).

	Children to be vaccinated.	Vaccinated.	Vaccinated successfully.
Primary vaccinations	1,763,442	1,480,810	1,438,542
Revaccinations	1,234,276	1,195,205	1,097,135

	Animal Lymph.	Human Lymph.	Lymph not stated.
Primary vaccinations	1,480,209	361	411
Revaccinated	1,194,973	87	145

In revaccinations often nine insertions are made. No deaths were noted. Pustules outside the site of vaccination were noted tolerably frequently. The anti-vaccination movement continued as vigorously as ever, and in one district, Bruck, in Bavaria, all the children kept unvaccinated. In Bavaria it is common for mothers to wash away or suck off the lymph from the arms, or to apply spittle to the insertions. Sometimes the vaccination appears to be not so good after these proceedings.

The Imperial Board of Health, Berlin, has also issued the statistics for the year 1899. The total number of small-pox deaths in all Germany, with a population of 54,000,000, is 28, giving a rate per 1,000,000 of 0.52. The 28 deaths belong to 21 different places in Germany. The largest number of deaths in any one locality was only 3. Most of the cases occurred near the frontiers of badly-vaccinated countries. The attacks numbered 346, the fatality being 8.1 per cent. Eight children died of small-pox during the first year of life; of these, 6 were not vaccinated, and as to vaccination the facts were unknown in 2 cases. Six children died in the second year, 3 not vaccinated, 3 unknown.

Eighteen of the 28 deaths belong to Prussia, mostly near the Russian frontier. No death occurred in any German city of over 50,000 population, and only 4 deaths in the 285 towns of Germany with a population of 16,000,000, giving a rate per 1,000,000 in the towns of 0.3. As a contrast, in 58 Austrian towns with a population of nearly 4,000,000, the small-pox deaths were 77, giving a rate of 20.0; in 72 Belgian towns (population 2,414,000) the deaths were 126 and rate 52.2; in 33 English towns (population 11,404,400) the deaths were 145, and the rate 12.7; lastly, in 116 French towns with a population of 8,668,000 the deaths were 600, giving a rate per 1,000,000 of 69.2. Thus the English town small-pox mortality in 1899 was 42-fold the German, the Austrian was 67-fold, the Belgian was 174-fold, and the French as much as 231-fold that of German towns.

The extremely low small-pox mortality of Germany is not an occurrence of one year only; it has been low ever since their law of 1874 made the revaccination of all school children compulsory and abolished epidemics of small-pox.

Order made October 17th, 1899: Workmen from Russia or elsewhere coming to work on the land or in factories in Germany must be vaccinated.

Typhus caused 11 deaths in Prussia, 505 in Austria—481 of these being in Galicia, 422 deaths in Hungary.

Acute bowel complaints caused a death-rate of 2.84 in German towns, ranging from 7.01 in Lichtenberg downwards. The high figures are due to outbreaks of summer diarrhoea among infants.

Praussnitz gave the following figures on the subject of summer diarrhoea of infants of four classes—(1) the rich, (2) those in comfortable circumstances, (3) the poor, (4) the indigent. In 100 infantile diarrhoea deaths the proportion borne by each class is given as follows:

Town and Period.	Class 1.	Class 2.	Class 3.	Class 4.
Graz, 1880-84	0	4.6	37.6	57.8
1885-88	0	4.7	37.8	57.5
1890-94	0	6.5	39.6	59.9
1895-99	0	4.2	35.9	59.9
Brünn, 1885-89	0.2	6.2	44.9	48.7
1890-94	0.1	5.3	40.4	54.2
1895-99	0.4	5.6	36.6	57.4
Brunswick, 1890-94	0.1	7.6	41.0	51.3
1895-99	0.2	9.6	38.5	51.7
Salzburg, 1881-85	0.2	8.4	37.0	54.4
1895-99	0.5	6.6	28.5	64.4

Phthisis.—Death-rate in German towns, 2.22. In some towns the rate was high, ranging from 4.10 in Nuremberg and 4.59 in Remscheid to 3.08 in Heidelberg. In Stuttgart it was 1.42.

The second part commences with a consideration of hygienic topography in general, and of European and tropical countries in particular. Infectious diseases are then considered generally, and specially in each disease.

Bacteria in the Breath.—In the general bacteriological part mention is made of the projection into the air from the mouth when speaking of bacilli which had been placed in a fluid with which the mouth had been previously washed. The higher the note uttered the more bacilli were found in the air of the room used for the experiment. No bacilli were found in the air of the room one hour after speaking (Koeniger).

Infection from Bowel.—Mention is made of the attempt of Markus to ascertain whether simple stasis of faeces without any injury to the mucous membrane can lead to any absorption of bacteria into the circulation, and so give rise to urinary infection. The large intestine was closed generally after intrarectal introduction of bacterial cultivations. In thirty-one cases the peritoneum was infected, the urine in thirty-five cases, and the blood in three cases. In thirty-one cases in which mechanical injury of any kind of the large intestine was avoided, five times only was there a passage of germs in the intestines, and in six cases a passage to the peritoneal cavity. Markus found that a slight injury of the mucous membrane is sufficient to produce general infection or an infection of the bladder when there is faecal stasis. The infection is mostly by the lymph channels, and not by the blood-vessels.

Immunity, natural and specific, and disinfection are considered.

Tuberculosis in Prisons.—Schaefer (Munich), after five years' experience in prison practice, found that prisoners suffered oftener than had been supposed, although it was known that prison life favoured the disease. In the infirmary at Kaisheim prison 13 per cent. of the prisoners were admitted suffering from tuberculosis. An examination of all the prisoners showed that almost half of them were suffering from some form of tuberculosis. Schaefer gives many reasons for the spread of tuberculosis in this prison. He lays special stress on the food as a vehicle for the transference of tubercle bacilli into the human body. He succeeded in finding cultivable tubercle bacilli in the turned-up tins of cooking-dishes even after the dishes had been washed. To prevent the spread of tubercle in prisons he recommends the isolation of the sick from the healthy, and the provision of country colonies for tuberculous prisoners; but first of all cleanliness must be rigidly sought.

Büdingen Theodor also discusses prisons as foci of tuberculosis. He thinks prison tuberculosis is even worse than statistics would show, because (1) they favour a rapid form of phthisis; (2) the tendency to spontaneous cure or inactivity found outside is not noticed in prisons; (3) they favour in a high degree the continuance of endemics of tubercle. Tuberculosis among prisoners is a danger to the public.

The German Imperial Public Health Office issued a small leaflet in 1900. It contained the following divisions: (A) What is tuberculosis? (B) How is it got? (C) How can you avoid tuberculosis? (D) Advice to those who are specially disposed to tuberculosis. (E) Advice to sick persons. One hundred copies cost three marks (3s.).

The Tuberculosis of Animals.—A. de Jong describes three cases of tuberculosis in cattle, in which sputum containing tubercle bacilli were found in the stalls, also the results of the autopsy of three tuberculous cats which had eaten the flesh of a tuberculous cow. There was tubercle of the intestines and of the mesenteric glands.

Bang found that out of 224,969 head of cattle in Denmark 28.8 per cent. reacted to the tuberculous test. The best results in prevention were due to isolation of the sick cattle, to isolation of the newly-born calves from the mothers, and feeding them on non-tuberculous milk. The milk on which the calves are fed coming from the farmers' associations and the cream for the preparation of butter are, and have to be, heated to 85° C. Bang wants for Denmark compulsory notification of tubercle in cattle and State compensation.

Bacillus of Dysentery.—An account of outbreaks of dysentery in the Westphalian industrial district on the lower Rhine is given. Kruse,

who gives the history of dysentery in this district since 1870-71, describes a bacillus which he thinks is the cause of the disease. It differs from *Bacillus typhosus* in being motionless, and from *B. coli communis* in not forming gas in its cultivations. Inoculation in animals did not produce any disease resembling dysentery.

Cerebro-spinal Meningitis.—In a fusilier regiment at Homburg v.d. Hohe, and in a field artillery regiment at Darmstadt, there were in spring 1,900 cases of epidemic cerebro-spinal meningitis. The *Diplococcus intracellularis meningitidis* of Weichselbaum was found in three cases, once in the nasal mucus, once in the fluid got by lumbar puncture, and once at the post-mortem exudation. The origin was not found. In Homburg the barracks were overcrowded. Emptying the barracks, disinfecting and cleansing them, seemed to stop the spread of the epidemic. An epidemic prevailed among the civil population at the time.

Tetanus.—Von Behring recommends in the use of tetanus antitoxin that—(1) the antitoxin should be used not later than thirty hours after the first symptom of tetanus appears; (2) the dose for one injection should be not less than 100 Behring's antitoxin units, but for man it should not exceed 200 such units.

FIRST AID IN ACCIDENTS. By R. J. Collie, M.D., and C. F. Wightman, F.R.C.S. Price 6d. London: George Gill and Sons, Ltd., 1903.

This manual has been written in the hope that it may be useful in the many accidents daily occurring, and to students attending police, fire brigade, and other ambulance classes.

The work is divided into chapters, each of which corresponds to the lectures set forth in the London School Board's Syllabus, and at the end of each chapter there will be found three specimen questions, selected from those actually set in past examinations, together with suitable answers. The illustrations are extremely good, colours being used. It is a marvel at the price.

REGULATIONS AS TO MILK STORES.—Revised regulations as to milk stores and milk shops have been issued by the city of London. These agree mainly with those in force in the rest of London, but they contain one important new provision, requiring covers to be placed on all receptacles that contain milk for sale.

PREHISTORIC TUBERCULOSIS IN AMERICA.—Among some other interesting facts in regard to Indian medicine and recent Canadian medical folklore, Addison reports (*Jour. Amer. Med. Ass.*, May 24th, 1902) that he examined an ossuary near Big Bay Point, in the county of Simcoe, Ontario, in which he found some trephined crania, and, what was still more of interest, in several skeletons the evidence of Pott's disease. The bones were those of natives of the Huron nation, and had undoubtedly been underground over two centuries. He thinks the evidence shows there was tuberculosis among them, not only before the European invasion, but that it was far from uncommon, and that these cases occurred in a nation which was not nomadic, but had permanent places of abode, there being thus a tendency to the accumulation of infective material.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

A General Meeting of the Society was held at No. 9, Adelphi Terrace, London, W.C., on Friday, November 13th, 1903. Present: The President, Dr. J. Groves (in the chair), Drs. A. Newsholme, F. J. Allan, R. Dudfield, G. Millson, W. A. Bond, J. Howard Jones, F. G. Crookshanks, S. F. Murphy, C. Childs, Sidney Davies, H. Meredith Richards, W. T. G. Woodforde, W. H. Symons, J. A. H. Brincker, W. A. Evans, A. M. Fraser, E. F. Willoughby, J. T. Nash, Oliver Field, D. L. Thomas, J. Priestley, Herbert Jones, and Mr. Wolf Defries.

The minutes of the last ordinary meeting, held on April 3rd, 1903, were read, approved, and signed by the President.

REPORT OF COUNCIL.

The HON. SECRETARY read the following report:

Your Council have to report:

1. The receipt of a letter from the Glasgow Corporation, dated September 18th, 1903, asking the Incorporated Society of Medical Officers of Health to support an appeal by the Corporation to the effect that "in future the Sanitary Institute and the Royal Institute of Public Health should arrange to hold a combined Congress instead of independent Congresses," and that in connection therewith they have decided to take no action.

2. That they have appointed Dr. James Wheatley, County Medical Officer of Health, Shropshire, as a representative of the North-Western Branch on the Council of the Society, vice Dr. Robertson, resigned.

3. The receipt of an offer from the Metropolitan Branch (as practically the originator of the Incorporated Society) to provide at the expense of the Branch, and to present to the Incorporated Society, a badge of office, in the form of a jewel or medal, to be worn by the Presidents of the Incorporated Society during their years of office, and we suggest that the Society should accept this offer of the Metropolitan Branch with hearty thanks, the presentation to be made at the Annual Dinner of the Metropolitan Branch, to be held January 29th, 1904.

4. The receipt of a letter from the Clerk of the Worshipful Company of Plumbers stating that the Company is organizing, through its District Councils and otherwise, lectures in which the subject of plumbing (in connection with public health work) is dealt with; and that in connection therewith we recommend the Society to approve of this new effort which is being made by the Worshipful Company.

5. The receipt of a letter from the Hon. Secretary of the Australian Branch asking for the Australian Branch to be dissolved, and that we are taking steps to have this wish of the Australian Branch carried out in conformity with Article 35 of the Book of Constitution and the bye-laws of the Association.

6. The receipt of a letter from the Metropolitan Branch, stating that the members have approved of the Metropolitan Asylums Board being the authority for the Metropolis for the providing of sanatoria and the

treatment therein of persons suffering from consumption within the Metropolis, and suggesting that the Gore Farm Hospitals (originally built for small-pox purposes) should be used for the purposes of such treatment.

7. The receipt of a letter from the Home Office stating that the Secretary of State has, after careful consideration, come to the conclusion that a case has been made out by the Society for an Order modifying the present standard so far as regards underground bakehouses and bakehouses in which work is carried on at night by artificial light other than electric light, and enclosing draft of the suggested Order, in which 500 cubic feet per person is to be substituted for 250 as regards underground bakehouses, and 400 cubic feet for 250 (in respect of the period between nine in the evening and six in the succeeding morning) as regards bakehouses where work is carried on at night by artificial light other than electric light.

8. The receipt of a letter from the Royal College of Physicians of London stating that the College is unable to see its way to take any action in connection with the subject of the ventilation of factories and workshops, and the adoption of ventilation standards in regard thereto.

9. The receipt of a letter from the Southern Branch reporting a resolution passed by that Branch on October 23rd, 1903, on the subject of hospital isolation of scarlet fever, and that we have given instructions to the Hon. Secretaries to acknowledge the receipt of the same with thanks.

10. The appointment of the following Fellows to form the Finance and Journal Committee for the ensuing year: Drs. R. Dudfield, A. Bostock Hill, J. R. Kaye, H. W. Roberts, J. Wheatley, J. Spottiswoode Cameron, J. Howard Jones, and Sidney Davies, together with the following *ex-officio* members: President, Treasurer, Editor, and the two Hon. Secretaries.

11. The appointment of the following Fellows to form the Parliamentary Committee for the ensuing year: Dr. J. Spottiswoode Cameron, S. F. Murphy, A. Newsholme, W. T. G. Woodforde, J. C. McVail, T. W. H. Garstang, J. Mitchell Wilson, Louis Parkes, H. Meredith Richards, and R. Dudfield, together with the following *ex-officio* members: President, Treasurer, Editor, Hon. Solicitor, and the two Hon. Secretaries.

12. The appointment of a new Committee, to be called the Library Committee, consisting of the following Fellows: Dr. R. Dudfield, J. Mitchell Wilson, J. Meredith Richards, and A. Newsholme, together with the following *ex-officio* members: President, Treasurer, Editor, Hon. Librarian (when appointed), and the two Hon. Secretaries.

13. The discontinuance for the present of the Statistical Committee, as being unnecessary.

14. The receipt of a letter from the Midland Branch reporting a resolution passed by that Branch on April 23rd, 1903, on the subject of "Medical Officers of Health giving opinion as to the diagnosis of infectious diseases," and that we have instructed the Hon. Secretary to acknowledge the receipt of the same with thanks.

15. That attention has been called by the President to the desirability of teaching elementary personal hygiene in the public elementary schools, and that in connection therewith they recommend—

(1) That a communication be addressed to the Board of Education, enclosing the following two resolutions:

"That in the opinion of the Society (a) domestic hygiene, personal hygiene, and physical training should be a compulsory part of the training of all teachers," and

"(b) That the teaching of elementary domestic hygiene, personal hygiene, and physical training should be compulsory subjects in all elementary schools"; and

(2) That copies of these two resolutions be sent to the Branches, with a request that they will also individually make the same (or similar) representations to the Board of Education.

ELECTIONS.

The following candidates, having been duly nominated, were balloted for, and the PRESIDENT declared they were unanimously elected:

AS FELLOWS:—

Gellatly, Robert, M.B., C.M., Dudd House, Meltham, Huddersfield, M.O.H. Meltham U.D.C.

Jackson, Herbert William, M.D., D.P.H., 62, Borough Road, West Middlesbrough, M.O.H. Ormesby U.D.C.

Kelly, T. W. Gordon, M.A., M.D., D.P.H., Desford Grange, near Leicester, M.O.H. Market Bosworth R.D.C.

Pritchett, Sidney I., L.R.C.P., M.R.C.S., Theobald House, High Street, Rochester, Kent, M.O.H. Rochester M.B. and P.S.A.

Rogerson, Thomas, M.B., Ch.B., D.P.H., Gordon, Berwickshire, M.O.H. Berwickshire.

Stevenson, T. H. Craig, M.D., D.P.H., Town Hall, Brighton, Assistant M.O.H. Brighton C.B.

Thorman, William Henry, L.R.C.P., M.R.C.S., Springfield Hall, Kirkburton, Huddersfield, M.O.H. Kirkburton and Farnley Tyas U.D.C.

Turner, Frederick, M.R.C.S., J.P., Grafton House, Buxton, M.O.H. Buxton U.D.C.

Wign, George W., M.R.C.S., Methley, Leeds, M.O.H. Methley U.D.C.

AS MEMBERS:—

Colwell, Hector Alfred, M.B., D.P.H., The Borough Hospital, Croydon.

Goodwin, Frederick Charles, M.D., D.P.H., Castlereagh, Richmond Road, Kingston-on-Thames.

AS AN ASSOCIATE:—

Bridger, J. F. E., L.R.C.P., M.R.C.S., Bridgetown, Barbadoes.

NOMINATIONS.—Several candidates were then nominated for election at the next meeting.

Dr. MEREDITH RICHARDS suggested that the papers read at the ordinary meetings of the Society should be printed prior to the meetings, and that copies should be sent to those members who make application to the Secretaries.

The HON. SECRETARY understood that, whenever practicable, this suggestion should be carried out.

Dr. SIDNEY DAVIES, Medical Officer of Health for the Metropolitan Borough of Woolwich, read a paper on "The Source of Infection in Tuberculosis."*

* See p. 130.

A discussion followed, in which the following took part: Dr. A. Newsholme, Dr. F. J. Allan, Dr. G. Millson, Dr. E. F. Willoughby, Dr. Crookshank, Mr. S. F. Murphy, Dr. G. Symons, Dr. C. Childs, Dr. W. A. Bond, and Mr. Wolf Defries.

Dr. DAVIES replied.

North-Western Branch.—An ordinary meeting of the Branch was held at the Victoria Hotel, Manchester, on October 16th, 1903. Present: Dr. W. Berry (President) in the chair, Drs. Barlow, Hitchon, Vacher, Laird, Hamilton, Greenwood, Hayward, Sergeant, Wheatley, Garstang, Wilkinson, Spencer Low, Graham, Edlin, Cook, Watkins, Martin, Niven, Pringle, and Meredith Young, with Dr. A. Bissel-Shed as a visitor.

A letter was read from Mr. James Lindsay, of the Corporation of Glasgow, on the subject of duplication of Public Health Congresses. Proposed by Dr. Vacher, seconded by Dr. Garstang, and resolved that a communication be forwarded from this Branch to the Councils of the Sanitary Institute and the Royal Institute of Public Health to the effect that, in the opinion of the Branch, the duplication of such Congresses is not desirable, and the Branch respectfully suggests that an arrangement be made between the two institutes for the holding of Congresses in alternate years.

It was moved by Dr. Garstang, seconded by Dr. Wilkinson, and resolved that Dr. J. Wheatley be elected as the representative of this Branch on the Council of the Society in place of Dr. Robertson resigned.

Dr. W. BERRY then read his Presidential Address, and a vote of thanks was unanimously accorded to him on the motion of Dr. Sergeant, seconded by Dr. Wilkinson.

The question of changing the place of meeting was then discussed. It was moved by Dr. Wheatley, seconded by Dr. Garstang, and resolved that the question of change of place of meeting be decided at this meeting. Moved by Dr. Wheatley, seconded by Dr. Greenwood, and resolved that unless three-quarters of the members present vote in favour of a change of place of meeting any resolution proposing a change should not take effect. After considerable further discussion it was moved by Dr. Hamilton, seconded by Dr. Vacher, and resolved that the two immediately previous resolutions be hereby rescinded, and the question of changing the place of meeting be adjourned *sine die*.

Southern Branch.—Meeting held at Portsmouth, October 23rd. Present: Drs. Fraser (President), Griffith, Groves, Lauder, Norman, Nunn, Stephens, Stott, and Willoughby, with Alderman Emanuel, Councillor Dr. Emmett, Drs. Bankart, and Archdall Reid (visitors).

A vote of thanks was passed to Dr. Stephens for his services as President during the past year.

Dr. FRASER then read his Presidential Address, entitled "Is the Hospital Isolation of Scarlet Fever worth while?" This was discussed at the President's request, and Drs. Willoughby, Nunn, Lauder, Griffith, Groves, Stephens, and Stott took part. After Dr. Fraser had replied, the following resolution was put to the meeting and carried:

"That in the interests of public health, and in view of the large sums expended annually upon the hospital isolation of scarlet fever, it is in the opinion of the Branch advisable that a full and searching inquiry into the whole system be held."

Yorkshire Branch.—A meeting of the Branch was held at the Town Hall, Scarborough, on October 24th. There were present Drs. Robinson (Rotherham), the President, Forsyth (Birstall), Housley (Retford), Hunter (Pudsey), McLean (Doncaster R.), Porter (Leeds), Wills (Kiveton Park R.), Arbuckle (Thorne), Greenwood (Ossett), Smith (York), Mitchell Wilson (Beverley), Dittmar (Scarborough), Wetwan (Bridlington), Hollings (Driffield R.), and J. R. Kaye (Wakefield), Hon. Secretary.

They were cordially received by the Mayor, W. Morgan, Esq., and other members of the Corporation.

After the usual business of the meeting, and the election of six new members of the Branch, Dr. ALFRED ROBINSON read his Presidential Address on "Workmen's Dwellings."

Several communications which had been sent down from the Central Council were then discussed, but they were of such importance and so interesting that further discussion was adjourned to the meeting in December.

At the close of the meeting the Mayor kindly entertained the members to light luncheon, and afterwards the party drove to the new isolation hospital, over which they were conducted by Mr. Dittmar, M.O.H., and the surveyor, Mr. Smith, who has acted as the architect for the building.

The hospital is erected on the pavilion system, and comprises five blocks of buildings—the porter's lodge with discharge block in one, the administrative, scarlet fever, and also enteric fever pavilions, with the laundry. Altogether there is accommodation for twenty-eight beds, at an estimated cost of £15,000, exclusive of the site, which is encircled by an oak split fence.

Metropolitan Branch.—An ordinary meeting and an adjourned meeting of the Branch were held at 9, Adelphi Terrace, Strand, W.C., on October 23rd and November 6th, 1903, respectively. Present: Drs. R. Dudfield (President), Bryett, Sykes, Brown, McCleary, P. C. Smith, Davies, Hillier, E. A. Dorrell, Roberts, Bond, Murphy, Allan, McLeod, Jackson, Newman, Millson, Littlejohn, Parkes, T. O. Dudfield, Oliver Field, Annis, Hamer, and the Hon. Secretary (Priestley). Dr. T. N. Kelyack was also present as a visitor at the meeting held on October 23rd, 1903.

Proposed Badge of Office to be presented to the Incorporated Society.—It was unanimously decided, on the proposition of the PRESIDENT, that the Branch should provide, at an expense not exceeding forty guineas, and present to the Incorporated Society (subject to their acceptance) a badge of office in the form of a breast or collar jewel, to be worn by Presidents of the Incorporated Society during their years of office. The selection of the badge was left to the Council of the Branch.

Annual Dinner.—It was decided to hold the annual dinner on Friday, January 29th, 1904, and to admit ladies. [The Society's badge is to be presented to Dr. Groves, the present President, at this dinner.]

L.C.C. Bye-laws re Offensive Matters, Water and Earth Closets, etc., under Sections 16 (2) and 39 (1) of the Public Health (London) Act.—These bye-laws were under discussion, and many additions and alterations were agreed to by the Branch in connection therewith.

Draft Clauses L.C.C. General Powers Bill, 1904.—These draft clauses of the sanitary provisions of the L.C.C. General Bill

1904 (Nos. 19 to 32 inclusive and 14), were discussed, and finally referred to the Council of the Branch to amend (as may be thought necessary).

Election of Auditors.—Drs. Bryett and P. C. Smith were appointed auditors for the year 1903-1904.

Provision of Sanatoria for London Consumptives.—A paper* was read by Dr. L. Parkes, M.O.H. Chelsea, and in connection therewith a letter from Dr. T. O. Dudfield, M.O.H. Kensington, addressed to the Council of the Society, and referred to the Metropolitan Branch, was considered. This letter suggested the provision of sanatoria for consumptives in London by the Metropolitan Asylums Board, and the using for such a purpose of the existing Gore Farm Hospitals (originally built for small-pox isolation, but now no longer required for such a purpose).

After much discussion, it was resolved *nemine contradicente* as follows:

"1. The Metropolitan Branch of the Incorporated Society of Medical Officers of Health, noting the intention of the Metropolitan Asylums Board to give almost immediate consideration to the question whether they should undertake the treatment of persons suffering from consumption, desire to express their opinion that by reason of practical experience in regard to provision of hospitals and the treatment of the infectious sick, the Board are eminently qualified for the discharge of this duty, the effective performance of which by any competent authority could not fail to be attended with great advantages in the interests of public health.

"2. That the above resolution be transmitted to the Board with an expression of the hope of the Branch that, should the managers decide to undertake the treatment of persons suffering from consumption, they would be pleased to take into consideration the question whether the Gore Farm Hospitals, which have ceased to be reckoned as small-pox hospitals, would be suitable for the purpose, seeing that the said hospitals could be brought into use at an early date, and that the utilization of them would save an otherwise necessarily large expenditure by the provision of hospitals specially erected for the purpose."

[N.B.—Fifteen Metropolitan Medical Officers of Health were present at the meeting, and the remaining fourteen (with two exceptions) have given their assent since the meeting (at which they were unable to attend) to the above resolutions.]

References from the Society.—The following references from the Society (in the form of questions) were dealt with as follows:

A. Prevention of Tuberculosis.

(a) Is compulsory notification of phthisis desirable?

Yes; provided the powers in regard to infectious disease are restricted to notification and disinfection.

(b) To what extent (if any) should compulsory powers of isolation (hospital or home) extend to cases of phthisis, advanced or otherwise?

This question should be adjourned *sine die*.

* See p. 146.

(c) Is it desirable to utilize existing isolation hospital accommodation, where practicable, for the treatment of phthisis?

Yes.

(d) What steps (if any) other than isolation should be included in any proposed legislation (bye-law or otherwise) to be enforced for the purpose of preventing infection from phthisis?

To make it penal to expectorate in any public place, and that the definition of "public place" be extended to omnibuses, tramcars, railway carriages, and all places where persons congregate for refreshment or amusement.

B. Food Poisoning.

The following resolution passed by the Midland Branch:

"That, with the object of preventing outbreaks of food poisoning, such as recently occurred in the borough of Derby, no food should be prepared for sale and for human consumption within the same curtilage as any slaughter-house or premises wherein any offensive trade (within the meaning of the Public Health Act, 1875) is carried on; and that further legislation is urgently needed to bring all premises wherein food is prepared for sale and for human consumption up to the same standard of sanitation as at present applies to milk-shops and dairies."

Agreed to.

C. Daily Grooming of Cows, and the Careful Washing of the Teats of Cows Prior to Milking.

(a) Is it desirable to take steps with a view to securing the introduction of fresh legislation to provide for the compulsory daily grooming of cows, and the careful washing of the teats of cows prior to milking?

Yes.

(b) What other measures can be taken for generally increasing the cleanliness of the milk-supply?

This is a question with which the Council of the Society should deal.

D. Paying of Expenses of Officials attending Congresses.

The following resolution passed by the Northern Branch:

"That it is desirable that Local Authorities should be empowered to pay the expenses of the officials when attending sanitary congresses."

Agreed to.

E. The Question of the Advisability of Appointing a Minister of Public Health.

Yes; provided such Minister of Public Health be a member of the Cabinet.

Notice of Motion re Spitting.—Dr. Sykes gave notice that he would draw attention to the advisability of petitioning the Home Secretary to make an order compelling the police to act in regard to the new bye-law recently made by the London County Council re spitting; or, failing such action by the police, to empower sanitary authorities to act in place of the police.

Midland Branch.—An extra meeting was held in the Council House, Birmingham, on Thursday, November 5th, 1903. Present: T. Robinson, President, in the chair, Drs. Ridley Bailey, Barwise, Millard, Beatty, Chatelier, Clendinnen, D'Arcy Ellis, Gepp, Reginald Green, Bostock Hill, W. J. Howarth, Doig McCrindle, Henry May, G. Reid, J. Richmond, E. S. Robinson, E. H. Snell, and A. Warner.

It was arranged to invite Dr. Alfred Hill to a dinner of the Branch on December 10th, 1903, at Birmingham, on the occasion of his retirement from active public health service, and to invite also the President of the Society.

Dr. MILLARD then read a paper on "Small-pox and Vaccination."

Drs. BARWISE, BOSTOCK HILL, SNELL, STANLEY ROBINSON, and HENRY MAY took part in the discussion, and Dr. MILLARD replied.

SYNOPSIS OF DR. MILLARD'S REMARKS.

Compulsory vaccination abandoned in Leicester, 1883. During twenty years—1883 to 1902—primary vaccinations have averaged less than 10 per cent. of the births. A "gigantic experiment." "Retribution" repeatedly prophesied.

The epidemic of 1892-93; prophecies not fulfilled, but success of the "Leicester System" ascribed to "luck." The recent epidemic in 1903; prophecies again unfulfilled. According to accepted theories they ought to have been fulfilled; therefore desirable that accepted theories should be re-examined.

In this discussion it is accepted as absolutely proven that vaccination confers, in the individual, protection against small-pox, the duration and extent of this protection being as defined by R. C. V. Therefore any argument which merely tends to prove this fact (e.g., immunity of small-pox nurses, reduced fatality in vaccinated persons, or altered age-incidence) will be irrelevant.

It is also accepted, as a necessary consequence of the above axiom, that if the entire population renewed their protection by revaccination sufficiently often small-pox could not exist.

The points submitted for discussion are as follows:

1. What part does vaccination as provided by law (i.e., infantile vaccination) play at the present day in helping to reduce—

- (a) The mortality of small-pox;
- (b) The prevalence of small-pox?

2. What is the relative value, under modern conditions of dealing with small-pox, of—

- (a) Vaccination of the population as provided by law;
- (b) All other preventive measures (notification, isolation, disinfection, vaccination, and surveillance of contacts, etc.)?

To what extent was the success in controlling small-pox epidemics in Leicester in 1892 and 1903 the result of efficiency under (a) or of efficiency under (b)?

To what extent was the failure to control epidemics at Sheffield in 1887, and at Gloucester in 1895, due to neglect of (a) or to neglect of (b)?

Does it necessarily follow that the value of (a) and (b) when combined is equal to the sum of their values when applied separately? Is it possible that (a) may be antagonistic to (b)?

3. To what extent would it be possible, under modern conditions of disease prevention, to dispense with vaccination as at present provided

by law? Are the other measures for controlling small-pox capable of any improvement?

Subsidiary questions involved in the above are:

4. To what extent are unvaccinated persons a danger to the community?

- (a) Do they "pick up" the disease as readily as is supposed?
- (b) Having caught the disease, do the unvaccinated as a class, under modern conditions, tend to spread the disease as much or more than the vaccinated?

5. (1) Is it not a fact that at the present day the chief obstacle in the way of complete success in stamping out small-pox is the occurrence of unrecognised cases which escape notification and isolation?

(2) Are not these unrecognised cases usually very slight, modified cases in which recognition is often extremely difficult?

(3) Does not this class of case occur nearly always in persons vaccinated in accordance with law? and does not this fact constitute a very serious objection to the present practice of vaccination?

6. In view of these considerations is it not conceivable that persons who are unvaccinated may be a less danger to the community than persons who, in the eye of the law, are vaccinated?

7. The conditions of small-pox prevention have totally changed during the last twenty years, with the rigid enforcement of notification and isolation. The danger of being exposed to the infection of small-pox must necessarily be very much less, and vaccination, in consequence, be of proportionately less importance.

8. Is there not a tendency in many quarters to overestimate the value and importance of vaccination?

THE Jenner Institute of Preventive Medicine will in future be known as the Lister Institute of Preventive Medicine.

AN International Congress on School Hygiene is to be held at Nuremberg from April 4th to 9th, 1904, under the presidency of Professor Griesbach, of the University of Strasburg. The Congress is under the patronage of His Royal Highness Prince Ludwig Ferdinand of Bavaria, M.D. The General Secretary is Dr. Paul Schubert.

NOTIFICATION OF DISEASES.—The Health Department of New York City is considering the advisability of greatly extending the present list of reportable diseases. The most important proposed addition to the group of diseases in which notification is compulsory is puerperal septicæmia. It is thought that this will serve as a restraint on the midwives. In the other group are those diseases in which notification is compulsory only in the case of institutions, though private physicians are requested to report them for the purpose of accumulating valuable statistical information. This list will probably include influenza, lobar pneumonia, broncho-pneumonia, infectious diseases of the gastrointestinal canal, and parasitic skin diseases. The Board disclaims any intention of exercising sanitary surveillance over these diseases in the event of their being made reportable.

CURRENT PUBLIC HEALTH LITERATURE.

Official and Parliamentary.

Eleventh Decennial Census of the Population of Scotland, 1901. Vol. III., 6s. 9d. (Deals with occupations. The total population of Scotland was 4,472,103, of which 1,982,812, or 44·56 per cent., were returned as following some occupation. The following table shows the number employed in each class of occupation as compared with 1891:)

Classes.	1891.		1901.	
	Males.	Females.	Males.	Females.
Professional	59,053	23,051	67,827	33,234
Domestic	29,183	190,057	26,755	174,475
Commercial	174,558	10,276	221,579	24,730
Agricultural and fishing ...	205,827	30,018	196,581	40,136
Industrial	735,308	290,426	878,446	319,049
Unoccupied and non-productive	242,300	1,055,625	264,893	1,198,618

A White Paper (C.d. 1822) has also been issued showing the Populations of Counties, Local Government Districts, and Burghs in Scotland, with reference to the Provisions of the Licensing (Scotland) Act, 1903. 2d.

Thirty-ninth Annual Report of the Registrar-General of Marriages, Births, and Deaths in Ireland, 1902. 2s. 2d. (There is an increase in the marriage-rate—higher than the rate for any year in the previous decade—a decreasing death-rate, and a rate of emigration which is not higher than the decennial average, and much lower than in 1900, still lower than in 1895, and not much more than half of what it was in 1887. The figures are shown in the following table:)

	Number in 1902.	Rate per 1,000.	Comparison—	
			With 1901.	With Decennial Average.
Marriages	22,849	5·18	+0·10	+0·27
Births	101,863	23	+0·3	-0·1
Deaths	77,676	17·5	-0·3	-0·8
Emigrants	40,190	9·1	+0·2	+0·0

Factory and Workshop Act, 1901: Draft Order of the Secretary of State modifying the Proportion of Cubic Feet of Space to be provided in certain Bakehouses. 1d. (The Home Secretary, in pursuance of the power conferred on him by Subsection (2) of Section 8 of the Factory and Workshop Act, 1901, proposes to direct that the proportion of cubic feet of space to each person employed, prescribed in Subsection (1) of the said section, shall be modified (1) as regards Underground Bakehouses, by substituting "five

hundred cubic feet of space to every person" for "two hundred and fifty cubic feet of space to every person"; and (2) as regards Bakehouses where Work is carried on at Night by Artificial Light other than Electric Light, by substituting, in respect of the period between nine in the evening and six in the succeeding morning, "four hundred cubic feet of space to every person" for "two hundred and fifty cubic feet of space to every person.")

Home Office Memorandum as to Precautions to be in Works in which Distillation of Tar for the Production of Naphtha, Light Oil, Creosote, and Pitch, and Recommendations for the Treatment of Persons rendered Insensible or Ill by Gas. Form 919. October, 1903.

Annales de l'Institut Pasteur (Paris), Vol. XVII.

- (No. 4.) A New Streptothrix—*St. polychromogenus*. H. Vallé.
The Possibility of Staining Koch's Bacilli in Sputum when Mixed with various Substances. J. Sabrazès.
(No. 5.) The Absorption of the Tetanus Toxin. V. Morax and A. Marie.
The Active Substances of Normal Serum. L. Remy.
(No. 6.) An Automatically Cleansing Spittoon. A. Fournier.
(No. 7.) Epidemic Dysentery. L. Vaillard and C. Dopfer.
A Study of the Nitrifying Microbes. L. Massol.

La Semaine Médicale.

- (No. 33.) Are Hospitals for Infectious Disease Centres of Infection for the Neighbourhood? F. Farnier. (From a study of the incidence of scarlet fever and diphtheria in the various wards in Paris, he concludes they are, but sees no reason why they should be if proper precautions be taken as regards site, construction, etc.)
French and German National Statistics of Mortality and Morbidity.

Bulletin de l'Académie de Médecine.

- (No. 29.) Comparative Study of Hygiene in the French Navy and Merchant Marine. (Committee's Report.)

La Presse Médicale.

- (No. 75.) Detection of Tubercle Bacilli by Inoscopy. (E. J. Masselin corroborates Jousset's assertion that inoscopy allows the detection of tubercle bacilli even very scantily present in organic fluids. He reviews his extensive experience with it, and adds that, if the results are negative, he never dismisses the case as positively non-tuberculous until inoculation of guinea-pigs has also resulted negatively. Behring refers to inoscopy as a notable progress. The method is based on the fact that bacteria become entangled in the fibrin of organic fluids. By dissolving out the fibrin with a pepsin digesting mixture, the bacilli are set free, and can be obtained by centrifuging for examination under the microscope.)
(No. 80.) Intestinal Streptococci. P. Nobecourt. (Continued from previous numbers.)

Berliner Klinischer Wochenschrift.

- (No. 28.) The Plague Bacillus and Plague Serum. E. Martini.
The Bactericidal Action of Radium Rays. R. Pfeiffer and E. Friedberger.
(No. 29.) Experimental Tuberculosis. H. Kossel.
Bacteria of Whooping-cough. G. Arnheim.

- (No. 31.) Inoculation of Man with Bovine Tuberculosis. O. Lassar.
On the Value of the Widal Test in the Diagnosis of Typhoid Fever. R. Stern.
(No. 33.) Post-typhoid Glandular Abscesses and the Presence of *B. typhosus* therein. K. A. Krause and C. Hartog.
(No. 34.) Action of Dead Tubercle Bacilli and Toxins. F. Klingmüller.

Centralblatt für Bakteriologie, Vol. XXXIII.

- (No. 7.) Length of Life of Typhoid Bacillus voided in Stools. E. Levy and H. Kayser.
The Morphology and Biological Characteristics of *Meningococcus intracellularis*. H. Albrecht and A. Ghow.
On the Same. A. Weichselbaum.
Antibacterial Diphtheria Serum. J. Bandi. (He believes that the specific bacterial agglutinins of a serum are the true bactericidal substances. Standard diphtheria antitoxin does not show any agglutinating property; therefore he advises that this serum should be added to it.)
Test of Steam Sterilization. C. Eijkman.
The Value of Disinfection with various Preparations of Formaldehyde. K. Kokubo.
Flagella-staining. G. de Rossi.
(No. 8.) Study of Virulence of Tubercle Bacilli. E. Krompecher and K. Zimmermann.
Immunity to Anthrax. O. Bail. (Nos. 5-8.)
Natural Immunity to Anthrax in Dogs and Fowls. A. Pettersson.
The Therapeutic Use of the Specific Substances produced by Cultivation of Tubercle Bacilli in Milk. G. Marpmann.
Lysoform, Bacillol, and Sublamin in Hand Disinfection. Engels.
The Differential Diagnosis of Typhoid Bacillus from *B. coli* on the Basis of Acid Formation. A. Wolff.
(No. 9.) Study of Yeasts Pathogenic for Animals. E. Cohn.
Bactericidal Properties of Bone-marrow. A. Hencke.
Immunization of Guinea-pigs against Tuberculosis. E. Levy. (Virulent bacilli of human tuberculosis became avirulent when kept for forty-eight hours in an 80 per cent. sterilized solution of glycerin at a temperature of 37° C. Injected into guinea-pigs, these bacilli caused the formation of an abscess, but this soon healed. A series of five intraperitoneal injections of these glycerinated bacilli practically vaccinates them against tuberculosis infection.)
Amount of Cholera-immune Bodies contained in Separate Albuminoid Elements of the Serum. A. Wolff.
The Relation between Antistreptococcic Sera and the Virulence of the Bacteria. P. Sommerfeld.
Determination of Typhoid Organisms in Water. C. Hagemann.
Technic of Freezing-mixtures for Preservation and Transport of Samples of Water for Bacteriological Examination. E. Bertarelli.
(No. 10.) Immunity to Anthrax. O. Bail and A. Pettersson.
The Agglutinating Power of Typhoid Sera. A. Goos.
Bactericidal Action of Disinfectants in Alkaline Solutions. Engels.
Corrosive Sublimate and Formaldehyde in Practical Disinfection. F. Abba and A. Rondelli.

VOL. XXXIV.

(No. 1.) To Differentiate Bacteria. (W. Onelianski describes a new culture medium made of phenolphthalein, sodium formate, and agar. The bacteria stain differently on this medium, and it is possible to differentiate readily the colon, typhoid, diphtheria, and pseudo-diphtheria germs.)

To Test Agglutination of Tubercle Bacilli. (A. Köppen treats the bacilli with caustic potash solution, thus saponifying them; the tubercle bacilli take the stain as readily as before.)

Bacteriology of Whooping-cough. (G. Jochmann and Moltrecht found the *Bacillus pertussis* [Eppendorf] in twenty cases of pneumonia complicating whooping-cough. As this bacterium is so similar to the influenza bacillus, he suggests that attention had better be paid to the presence of cases of influenza in the environment of children with whooping-cough.)

Hand Disinfection. Engels.

The Theory of Immunity. R. Pfeiffer and E. Friedberger.

Deutsche Med. Wochenschrift, Vol. XXIX.

(No. 28.) Active Anti-plague Immunization with Attenuated Cultures. W. Kolle and R. Otto. (Their experiments with the Haffkine method failed to show any particular benefit. They consider the infection of non-virulent living cultures of plague bacilli a true and effective means of vaccination. A single injection conferred on laboratory animals completed immunity for months with no phenomena of infection, and merely a slight increase of the plague germs at the vaccinated spot. More than 80 per cent. of the rats and 60 per cent. of the guinea-pigs are still completely immune three months since the vaccination. The immunity conferred by the Haffkine method lasts at most only six weeks. The cultures were rendered avirulent by long cultivation at 40° to 41° C., a particularly non-virulent culture being selected for the purpose. Three loops of this culture could be injected into guinea-pigs without symptoms—that is, more than 3,000 times the lethal dose of a virulent culture.)

The Influence of Heat on Coagulation of Milk. W. Silberschmidt. (Cow's milk heated too long or too hot entirely loses its property of coagulating under the action of rennet.)

(No. 30.) The Bacteriological Diagnosis of Cholera. W. Kolle and E. Gotschlich. (After eight hours of "peptone-water preculture" and eight hours of agar-plate culture, the agglutination can be studied in the hanging drop with eighty magnifying power; dilution, 1 to 1,000. This allows an exact diagnosis in sixteen hours.)

(Nos. 33 and 34.) Generalized Infection with Thrush. O. Heubner. (Child had symptoms of diphtheroid nature, but on post-mortem the invasion of the fungus could be traced from the necrotic tonsils into the lymph capillaries, and thence into the general circulation.)

(No. 35.) The Antitoxin Treatment of Tetanus. E. von Behring.

(No. 36.) The Housing Question and the State. F. Hueppe.

(No. 37.) The Successful Immunization of Cattle against Tuberculosis. F. Neufeld. (This is the official report of Koch's researches during the last two years.)

Report of Committee on Foot and Mouth Disease, 1901-1902. Loeffler.

(No. 39.) Origin of Pulmonary Tuberculosis. E. von Behring. (He maintains the identity of human and bovine tubercle bacilli, and preaches that the

main source of phthisis occurring at any time during life is from infection through the milk taken during infancy, whether the tubercle bacilli in the milk are of human or bovine origin. The presence of a coughing consumptive in a family almost inevitably results in the infection of the infants by inhaling the germs, or by their getting into the milk or on the vessels used. This is the secret of the so-called heredity and predisposition to tuberculosis in the members of a family. The infection is post-genital, not inherited. It may remain latent for years or for life, but under predisposing conditions it may develop into pulmonary tuberculosis, which is thus traced to infection in infancy. And it is to this age that we must apply not only prophylactic, but immunization measures such as he has so successfully practised in cattle.)

The Retention of *B. typhosus* in Milk and Milk Products. R. Bassenge.

Centralblatt für Allgemeine Gesundheitspflege, XXII. JAHRGANG, NEUNTES UND ZEHNTES HEFT.

Further Notices on the Prophylaxis of the Infantile Mortality of Summer Dr. H. Paffenholz, Düsseldorf.

Deutsche Vierteljahrschrift für öffentliche Gesundheitspflege, XXXV. BAND, VIERTES HEFT, BRAUNSCHWEIG, 1903.

(Erste Hälfte.) Plague from the Point of View of Sanitary Police. Hans Weinmann.

The Sanitary Dangers of Milk-supplies and the necessity of a Stricter Control of them. Dr. Aust.

What has the Hamburg Exhibition for Sanitary Milk-supply taught us concerning Milk for Children? Dr. von Ohlen. (The requisites of the milk-supplies of large towns, and the various exhibits at the exhibition for the purpose of satisfying these requisites, considered, viz., stalls for cows, coolers, milk-cans, sterilizers for milk, creameries, centrifuges, etc.)

The Care of Foundlings in Italy. Dr. Emerich Turesányi and Dr. Sigmund Engel.

(2^{te} Hälfte.) Medical Observations in German South-West Africa, with special reference to Infectious Diseases, and to Koch's Method of Stamping out Malaria. (Founded on an address delivered in the Hygienic Congress at Berlin by Dr. Vagodes, of Berlin.)

Ss. 847-1078 contain a Repertorium of German and Foreign Papers on Public Health, published during the year 1902, very completely classified.

Münchener Med. Wochenschrift, Vol. L.

(No. 24.) An Epidemic of Malignant Scarlet Fever. Günther.

(No. 25.) Tar for Reduction of Dust in Roads. Schottelius and Guglielminetti. (The experiments at Monaco and elsewhere with crude petroleum have not proved very successful, as the results were not durable. But the application of boiling coal-tar produces a coating like cheap asphalt, which has lasted eight months to date, and fully answers the desired purpose. The total expense is only £16 for a kilometre of a road 15 feet wide—that is, about £26 a mile—with coal-tar 24s. to 40s. a ton.)

The Action of Antistreptococcic Serum. Menzer. (Continued in No. 26.) (It should be made from freshly cultivated human streptococci.)

(No. 28.) Koplik's Spots in Measles. Aronheim.

- Toxin and Antitoxin. Max Gruber and Von Pirquet. (Continued in No. 29.)
 (Nos. 29 and 30.) The Intestinal Origin of Tuberculosis. E. Nebelthau.
 (No. 31.) The Result of Heat on Tubercle Bacilli in Milk. W. Rullmann.
 (Found that tubercle bacilli, heated in milk to 65° C.—100° F.—for more than thirty minutes, were still virulent enough to infect guinea-pigs in intra-peritoneal inoculation. The milk was infected with human sputa.)
 (No. 32.) Vidal's Reaction in Liver Affections with Icterus, sometimes also present in Puerperal Fever and Coli Affections. F. Köhler.
 (No. 33.) The Prophylaxis and Therapeutics of Puerperal Fever. H. Fehling.
 (Recommends strongly the use of rubber gloves for every kind of vaginal or rectal examination, together with Fürbringer's method of disinfecting. Since adopting this plan has had only one case of severe infection, and 8.47 per cent. morbidity in 802 cases of childbirth in 1902; while in 1901, before adopting gloves, there were five severe cases, and a morbidity of 11 per cent.)
 (No. 34.) Toxin and Antitoxin. P. Ehrlich.
 (No. 36.) The Diagnosis and Treatment of Diphtheria Thirteen Years' Experience. Curtius.
 Tuberculosis: Infection by Way of the Intestines. L. Sorger. (He has fed dogs for months with tuberculous sputa with negative results.)
 Infant Mortality from a Social Standpoint. Ascher.

Riforma Medica, Vol. XIX.

- (No. 31.) Studies of Vaccine. O. Casagrandi. (Sterile, filtered vaccine, unable to cause the formation of a pustule when inoculated in the skin of dogs or to induce any reaction on the cornea of rabbits, conferred immunity on them, so that subsequent injection of active virus did not cause infection as in the controls. Similar tests on man resulted differently. The filtrates and dilutions which confer immunity on the dog do not render human subjects immune. On the other hand, if the dogs were inoculated with the active virus before the cutaneous lesion from the first vaccination had entirely healed, infection resulted, as also when the dogs were inoculated simultaneously with the vaccine, and a staphylococcus derived from vaccine pustules on other dogs. He thinks that these facts indicate the participation in the vaccine pustule of some pyogenic germ which finds in it special conditions for its development.)
 (No. 84.) Experimental Tuberculosis of the Epididymis. Delli Santi.

Hygeia (Stockholm).

- (No. 5.) Cancer Research. O. Sandberg. (A study of 2,153 cases.)
 (No. 6.) A Typhoid Fever Epidemic at Ronneby, 1901. J. Dahl.
 (No. 7.) The Campaign against Tuberculosis. R. v. Post.

CHRONIC POISONING BY ILLUMINATING GAS.—Dr. J. C. Bayley, of New York, found that the prominent symptoms were anæmia, albuminuria, and occasionally enlargement of the spleen, causing a simulation of malaria. The patients improved or quite recovered on being removed to a pure atmosphere. The poisoning was caused by gas having leaked slowly from mains and service pipes, sometimes in such small quantity as to give no warning by the smell.

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EDITORIALS.

RURAL HOUSING AND SANITATION.

For over a year the Rural Housing and Sanitation Association, which has its office at 9, Southampton Street, Bloomsbury, has been working unobtrusively, but as actively as its funds allow, in forcing on the attention of the public the miserably insanitary conditions under which a large proportion of the rural population is compelled to exist. Their first annual report does not, it is true, show much of actual accomplishment; but the magnitude of the work and the difficulties to be overcome are apparently beyond the power of private enterprise and individual effort, calling, like the question of "unhealthy areas" in our large towns, for the intervention of the State. There is to the unthinking something picturesque in the "thatched cottage in the dell," and covered, perhaps, with roses, honeysuckle, or clematis, it cannot but appear attractive to eyes accustomed to the repulsive squalor of the city slum. Yet, as a matter of fact, conditions are to be found in every rural district, and are there looked on as natural and unavoidable, that, with the greater sense of municipal and public responsibility and the comparative independence and security enjoyed by the sanitary staff, could scarcely exist in our large towns, or, if discovered, would raise an outburst of indignation and lead to their removal.

There are laws and regulations enough against nuisances, dangerous dilapidations, absence of water-supply, and insanitary as well as indecent overcrowding, applicable alike to town and country; but while in the former political partisanship and class jealousies give publicity to every gross example, no such activity

can reasonably be expected in rural districts, where the administration of the law is in the hands of the offenders, and the executive officers are absolutely at their mercy or caprice. In no other department of government would such truly Gilbertian state of things be tolerated or even entertained. He who should have the hardihood to propose that inspectors of factories and of shipping should be appointed by and removable at the pleasure of the manufacturers and the shipowners in each town would be deemed a buffoon or a lunatic; but such is the character of our sanitary administration outside the great towns, where the Board is mainly composed of the farmers and small landlords. The medical officer of health, often with no special training, receives a pittance for the routine performance of certain official duties, but depends for his livelihood on the goodwill of his patients, the self-same landlords and farmers; and the inspector, perhaps an unsuccessful tradesman or unfortunate farmer, or, more rarely, an ex-policeman or a former servant of the squire's, knows that an unfavourable report, if he felt himself competent to express an opinion, on the house property of a member of the Board or of one of his friends would be promptly followed by dismissal.

The law requires, for instance, that no new house shall be erected without a *sufficient* supply of *wholesome* water within a *reasonable distance*; but the sanitary authority may decide that half a mile is not too far to send to a well, and that a ditch with no provision for the exclusion of dead dogs, etc., and with channels cut in the bank to convey into it the surface drainage from the roadway alongside of which it runs, is a *wholesome* as well as a *sufficient* supply, while quite recently the bursar of a Cambridge college denounced the clause itself as "an unfair restriction of the liberty of landlords." Crumbling mud walls, propped up in stormy weather, roofs freely admitting daylight and rain, rotten floors, doors off their hinges and held up with cords, bedrooms 11 feet by 7 feet, with A-shaped roof rising from the floor, and a single window on the level of the floor, 23 inches by 22 inches, and not opening, etc., may be met with fifty miles from London. Marriages are deferred for years through the inability of the young persons to find a dwelling. Houses are allowed to fall into ruins, and even when condemned as "unfit for human occupation" are not evacuated, there being no new houses building, and further overcrowding of the old ones being a physical impossibility.

To the question why no remedy is found for such health-destroying and demoralizing conditions, the reply is always that "cottage property cannot be made to pay." Be this as it may, such excuse

would not be taken from the owner of "coffin-ships," for if the responsibilities of ownership cannot be complied with, the ownership should cease. On all sides we see the State, as represented by the urban authorities, undertaking work and responsibilities that had hitherto devolved on individuals, and sometimes in direct competition with private enterprise. We may therefore reasonably demand that if in the actual social order the landowner or leaseholder is unable to provide decent dwellings for his tenants or servants, the State, in the character of the County Council, should intervene, either by compelling and assisting him to do so or by doing it themselves.

At present in the neighbourhood of towns and in industrial districts the jerry-builder is active enough, but in those that are purely agricultural there is a steady reduction in the number of cottages, partly through natural decay and partly, though less than formerly, through their demolition by landlords, who found it unprofitable to maintain more resident labour than was absolutely necessary for working their estates. This depopulation of the rural districts, which in many typical East Anglian villages has within the last twenty-five to thirty years reached the alarming proportions of 30 to 60 per cent., is fast assuming the character of a problem of vital importance. Farmers are complaining of the scarcity of labour, notwithstanding the continual conversion of arable land into pasture. The immigration to the towns swells the numbers of the unemployed, and the very ranks of the army are being recruited from among the anæmic denizens of the slums instead of the "bold peasantry," once "their country's pride." Reforms in land tenure, not even "nationalization," on the one hand, nor protective tariffs on the other, will avail aught to stay the tide so long as there are no houses "fit for human habitation." Indeed, the agricultural labourer is no longer a boor. The schoolmasters and mistresses of the present generation are missionaries of culture. Girls who have been accustomed as domestic servants to the refinement of middle-class family life, and young men who "have seen the world," will not submit to conditions with which their grandparents were quite content. The problem of providing houses involves, together with the future welfare of the nation, fiscal issues second to none. The only security on which local authorities can at present borrow is that of rates which are already overburdened, and it would seem fairer and more reasonable to throw the charge on the land alone rather than on the already overrated householder. If some such scheme could be evolved, the landlord who had done his duty in the past would not be called

on, while he who had not would be directly benefited by the increased value given, albeit compulsorily, to his land.

HOSPITALS FOR SCARLET FEVER.

NOTIFICATION of infectious diseases to the proper authorities and "isolation," as it is commonly called, or the provision of hospital accommodation for the treatment of the sick and their complete separation from the sound though susceptible population, though connected, are not inseparable. Notification as a means of knowing the existence and distribution of a disease is indispensable, and may indeed alone suffice for the organization of measures for preventing its spread; it is practised in public schools and similar establishments, and in Germany, while other cases are sent to the fever wards of general or children's hospitals, those of small-pox are mostly isolated in their homes by police denunciation and control. On the other hand, impelled by a sense of public danger, the governments of every civilized country have from time immemorial provided isolation in the form of quarantine in the event of a threatened invasion of such "pestilences" as plague, cholera, yellow fever, or even of small-pox. In all such cases the isolation, or, as it should rather be called, the segregation, of the infected, and still more of the merely suspected persons, those who have been exposed to the risk of infection, is enforced *pro bono publico*—i.e., in the interests of the community rather than of the actual sufferers. This, indeed, is the essence of all preventive measures.

Nowadays, however, small-pox being provided for apart, and typhus and relapsing fever having almost disappeared, hospital accommodation is required for scarlatina, diphtheria, and enteric fever only. Though no disease calls for more prompt and skilled treatment than diphtheria, and the proper nursing of a case of enteric fever, especially in an adult, is out of the power of the working man's wife, those of scarlatina constitute such a majority of the admissions to isolation hospitals as can scarcely be explained by the preponderance of its incidence alone.

But it must not be forgotten that a fallacy lurks in the use of the expression "isolation hospital," for while a private patient confined to his room with no companion but his nurse may be rightly said to be *isolated*, the inmates of a hospital, though *segregated* from the outer world, are *aggregated* within its curtilage. In fact, the 20 to 30 per cent. that in every community are retained

at home, having there "proper lodging and accommodation" in the present interpretation of the words, comprise all that can strictly be described as "isolated, the "segregation" of the others being resorted to as preferable to leaving them in crowded rooms. There is no doubt as to the favour with which these hospitals are regarded by the public of the middle, no less than the working classes, nor as to the general belief that the patients receive in them better treatment and attendance than they could in most cases obtain at home; an attitude in striking contrast with the suspicion and hostility at one time displayed. But by a strange irony many of the officials responsible for the conduct of these establishments have become incredulous as to their advantages, even if they do not look on them as aggravating the evils they were meant to avert.

In the present issue* Dr. Mearns Fraser raises the important question, Is the isolation of scarlet fever worth while?

About two years ago Dr. Millard† put forward a large mass of statistics for the purpose of showing that the attack-rate and fatality as a rule rose with the percentage of cases isolated, the figures being taken from the more important towns of the North Midlands. These he compared singly or in groups of nearly equal aggregate populations. To a practised statistician these tables, though having a semblance of fairness, bristled with fallacies. No two towns are ever identical in all their conditions and circumstances; but groups, though comprising populations numerically equal, can never be fairly compared, especially if one consist of a few larger and the other of several smaller towns. The coefficients of isolation, again, represented means rather than averages, and a mean of 37—the percentages of the members of the group varying between the extremes of 22 and 77 teaches nothing as to the results of high or low proportions of isolation. The disease being one the incidence, and in a still higher degree the fatality, of which is almost confined to childhood, the mortality should be calculated on what is practically the entire susceptible population—viz., children under ten years of age—not on the total of all ages. Yet of the total child population Dr. Millard gives no hint save that he tells in one instance of a falling birth-rate. Such children form 25 per cent. of the total populations of London and Berlin, but 12·5 per cent. only of that of Paris; so that the recorded death-rates from scarlatina of 0·28 and 0·34 per 1,000 represent rates among the *child* population of 1·12 and 2·12 respectively, or as 1 : 2·43—not, as might appear, as, 1 : 1·21; and for aught we know such diversities in age constitution may exist elsewhere. Dr. Millard's diagrams brought out very clearly the periodical

* Page 208.

† PUBLIC HEALTH, vol. xiii., p. 462.

recurrence of years of maximum and minimum prevalence and mortality, but the grouping of towns in which these did not synchronize seriously affected the result. A comparison, however, of single towns led to conclusions as often opposed to as consistent with his theory—*e.g.*, Oldham and Bolton, with like populations and proportions of isolation, had attack-rates of 3.1 and 5.5, while Wigan, isolating 47, and Warrington 77 per cent. of the cases, showed the same attack-rate. There must be other factors at present undiscovered, some of which may remain unknown, perhaps unknowable, or if recognised, their influence may be found such as not to admit of quantitative determination.

One thing, however, seems certain—that failure of the hospital system where such has taken place, has been largely due to defective administration. We must confess to surprise that Dr. Millard has not made this the basis of his demand for an inquiry. To our mind, that is the true conclusion to which all the papers on the subject point. But what does it mean? It means the indictment of the local authorities and their advisers for faulty construction and mismanagement. We have no desire to stifle inquiry, but we would commend to our readers the remarks made in the discussion which followed Dr. Fraser's address. We would also draw special attention to an important statement made by Dr. Thresh in a special report on the provision of hospital accommodation. After quoting Dr. Millard's statements, he writes:

"Doubtless you are greatly surprised that I should quote such statements to you, and at the same time have been advising you to provide more hospital accommodation; but I do not quite carry my convictions to the logical conclusions deducible from Dr. Millard's figures. I base my advice on experience and common-sense. There are constantly occurring cases of scarlet fever in overcrowded houses, in places where young people are employed, servants in families, and in houses where milk is sold, etc. In all these cases it is to the interest of the public as well as of the patients that the latter should be promptly removed and isolated, and it is for the purpose of making provision for all such cases that I urged the necessity for a well-equipped isolation hospital."

Hospitals play a very important part in the methods at our command for dealing with infectious disease, and the sooner the administration of those which are defective is put on a proper and efficient basis the better it will be.

WORKMEN'S DWELLINGS.*

By ALFRED ROBINSON, M.D.,

Medical Officer of Health, Rotherham; President of the Yorkshire Branch.

I BEG to offer you a few remarks on a problem which is constantly presenting itself in one form or another for solution. Like the poor, the problem of the housing of the poor is always with us and is one of the greatest difficulties that we, in our capacity of medical officers of health, have to face.

The obstacles to be surmounted are, indeed, so great, and the possibilities of failure so proportionately large, that the medical officer who evades the problem can scarcely be held blameworthy. In the present unsatisfactory state of matters, where the medical officer is dependent for his continuance in office on the yearly vote of a body of men whose interests he may in one way or another infringe, even when his action in the public welfare is successful it behoves him to walk warily. It says much for the courage and disinterested zeal of many of our medical officers that they have made fearless and honest attempts to grapple with the difficulty. In some cases their efforts have met with a considerable measure of success; in others the evil has only been purged from one quarter to reappear in an aggravated form in another.

The perfect scheme for the perfect housing of the poor has yet to be devised, but there has never been a time when so much thought and attention has been devoted to it, and when it has seemed so hopeful of realization.

Meantime, we are hampered by many obstacles, not the least of which are the imperfect state of the Parliamentary Act which gives us the power to proceed, and the difficulty of inducing authorities already heavily burdened with debt to undertake any outlay which may prove financially hazardous.

I do not propose to discuss the many phases of this large question, but shall merely confine the few remarks I have to offer to the subject of the rehousing of the poor after the demolition of insanitary areas. Even this I shall only be able to touch upon in the briefest way.

An insanitary area in one of our large towns has been condemned, and the inhabitants have received notice to quit. How are they to be provided with housing accommodation?

* Presidential Address, Yorkshire Branch of the Society of Medical Officers of Health at Scarborough, October 24th, 1903.

If we make a rough analysis of the population of such an area, we may divide it into the following classes :

1. Tramps, vagrants, and hawkers—birds of passage who are here to-day and gone to-morrow.

These are undesirables whom we have no desire to attract by the provision of comfortable apartments. At the same time, so long as this class exists, it is a matter of importance that it should be accommodated where supervision can be exercised over it, both in matters of simple hygiene and especially as regards infectious disease. We have all of us recently had striking illustrations of the effective way in which vagrants can disseminate small-pox over large areas of country, and we look for the day when health authorities will be empowered to deal with this danger to the community in the efficient manner which we have long desired and asked for.

Until that time comes much could be done in the way of supervision at least, if we could deal with these menacers of the public safety in some premises which are directly under the control of the local authorities ; and this is one of the arguments used in favour of the erection of municipal common lodging-houses.

It would not, however, be justifiable to advise the erection of such buildings merely for the accommodation of vagrants, hawkers, *et hoc genus omne*, but there is another class of slum inhabitants to be considered—viz. :

2. Persons temporarily resident in the town, and engaged in work not of a permanent character, such as navvies, pit-sinkers, labourers, etc. Where these have to be housed the problem is rendered much simpler if there exists a municipal common lodging-house ready to receive them.

Failing this, provision may be made in any tenements to be erected for rehousing purposes of single-roomed apartments at a low rate of rental.

It is more than likely, however, that, instead of availing themselves of such apartments, these persons will prefer to billet themselves on residents in some other poverty-stricken neighbourhood, where they will help to reproduce overcrowding and insanitary conditions.

This is the class of men who probably benefit most by the existence of a model lodging-house under municipal control, and it is a matter for consideration whether such a building should not have a place in every large improvement scheme of the kind.

3. The third class consists of households where the wage-earner is making not more than 15s. or 20s. per week, and who certainly

cannot afford to pay more than 2s. or 3s. per week in rent—that is to say, one-seventh part of his income.

This is the class which it is most difficult to provide for in any rehousing scheme. What is required here is to plan a house which will be healthy and sanitary, sufficiently roomy to accommodate a family, say, of four to six people, with a rental of not more than 3s. per week, and which will yet give a sufficient return to pay the interest on the outlay on the building and land, and to repay the sum borrowed in an extended period of years.

To evolve a dwelling which will fulfil these requirements has proved a matter of great difficulty, and in some cases, where the price to be paid for land is high, it has been found almost an impossibility, and has formed a stumbling-block in the way of the effective development of many a rehousing scheme.

In some places no attempt has been made to erect such a class of dwelling, and in its place houses have been built to let at a much higher rental—5s. to 7s. 6d. per week.

Such houses can be made to yield a better financial return, and those responsible for their erection put forward the theory that, by providing houses for the better class of dwellers in poor districts, their original dwellings gradually become vacated, and are subsequently tenanted by those in a lower stratum of society, so that a general movement upwards is produced, and the tendency to overcrowding in the lowest quarters is diminished.

There are many arguments for and against this "indirect" rehousing scheme, as it might be called, but there can be no doubt that where land can be acquired cheaply, and buildings erected which will fulfil the conditions I have enumerated, the direct provision of houses at a suitable rental for the families displaced is to be preferred. Indeed, it is very doubtful whether this upward movement into better-class houses takes place to any appreciable extent. The movement must necessarily be a slow one, and as overcrowded towns have usually an increasing population, it is probable that many of the new houses become tenanted by immigrants from other parts.

Thus, the buildings fail to produce the alleviation of overcrowding in poorer quarters for which they were intended, and the Corporation lays itself open to attack from those who believe that it is not the function of such a body to enter into competition with the private builder.

A combination of the two methods has been put into practice in some places, where tenements have been erected containing the more expensive as well as the cheaper apartments, so that the

average rental obtained on the whole yields a profit. This appears to work satisfactorily, and has been adopted in Bradford and other places, where the new buildings are erected on the site of those pulled down, and where land is usually of considerable value.

It is still possible to obtain land in the outskirts of most of our large towns at a sufficiently cheap rate to allow of the erection of houses with accommodation enough for an average household of the class we are dealing with, and at a reasonable rental; and where cheap and easy means of transit exist to and from the centres of industry in the town, the additional advantages of pure air, bright sunshine, and the possibility of having a small plot of garden attached to each house, will usually decide us in favour of utilizing such sites in preference to those of the demolished insanitary areas, which are always valuable for other purposes.

If such land be obtainable, we can here erect a type of dwelling which may more nearly earn the name of a home than can the apartments in the dreary and many-storied blocks which we have to erect in more central sites. Small two-storied cottages, each with a little garden attached, form homes for the poor which are paradises in comparison with the slums from which they have been expelled.

It is, however, altogether unwise and unnecessary to go to an extreme in the direction of comfort, and to carry out the plans so often drawn up as representing the minimum of accommodation that should be supplied. Such plans we find to include sitting-rooms, bathrooms with hot and cold water, and other accessory apartments, which I consider are not only unnecessary, but which increase the cost of the building to such an extent as to render it unsuitable for its purpose. We find that these families of the poor use the kitchen for all ordinary living and domestic purposes other than sleeping; and where a sitting-room is provided, we usually find it unused as such, and only occupied by the perambulator, some useless furniture provided on the pernicious hire system, and the Sunday clothes of the lady of the house gracefully distributed over the table and chairs. It is a receptacle for rubbish, and an endless trouble to keep clean, if, indeed, any efforts are made in this direction. Much better it is to have the kitchen large, roomy, and comfortable, with plenty of light and a good fireplace; and in place of the seldom used bathroom to have a movable bath placed in the scullery, where it is available when required. The house could then be reduced to these apartments, which I think are sufficient: a roomy kitchen, a scullery containing a movable bath, and a cupboard or press downstairs; while upstairs there would be

two or three bedrooms. Such a house would meet the requirements of most families of this class, and could, I think, be erected at a cost which would be repaid at a rental of about 2s. 6d. per week.

I have dwelt upon this matter, for I feel that this is the class of dwelling which is most wanted, and which the poor in our large towns find it so difficult to obtain.

Everyone who has studied the question as it affects our large manufacturing towns knows that poor families find it almost impossible to obtain houses at 2s. to 3s. 6d. per week, unless two or more families herd together in the same dwelling, and we find those high prices obtained even in the lowest and most dilapidated slum property.

Houses at a higher rental are always obtainable, and therefore I consider that persons able to pay for them should be left to take care of themselves, and that it is unnecessary for the authorities to undertake the erection of dwellings of this better class. Where a demand exists for such houses, private enterprise is always ready to provide a supply; but where private enterprise fails to produce the cheaper type of building, it becomes the province of the public body to do so, as the facilities given to it for borrowing and repaying money, and the smallness of the return it requires for its outlay, enable it to perform what the private builder cannot profitably attempt. The greater the advantage which a public body has in this way over the private individual, the better will it be able to do the work which to the latter is unprofitable, and the less likely is it to encroach on his sphere of enterprise. We can thus see the importance of the concession which has recently been granted in the Housing of the Working Classes Act, 1903.

Hitherto money borrowed for the purpose of purchasing freehold land for the erection of workmen's dwellings has had to be repaid in sixty years, while the money required for the erection of buildings under the Housing Acts has had to be repaid in forty years. These comparatively short periods have long been felt to be burdensome and to be serious difficulties in the way of profitably laying out the money. Now eighty years will be allowed for the repayment of money borrowed for the purchase of freehold land, and sixty years for the repayment of money borrowed for the erection of buildings under the Housing Acts where the circumstances are such that this may properly be done. The new Act also authorizes the reborrowing of outstanding balances on similar terms.

The importance of this concession is not at once apparent until we reduce it to a matter of pounds, shillings, and pence.

We then find that, taking the rate of interest at 3 per cent.—

£100 to be paid in forty years requires £4 6s. 6d. per annum,
 „ „ „ sixty „ „ £3 12s. 3d. „
 „ „ „ eighty „ „ £3 6s. 1d. „

or 1s. 7½d., 1s. 4½d., and 1s. 3½d. per week respectively.

Thus, taking the case of a house of the value of £200, the saving under the new method would amount to about 7d. per week on the rental, a matter of considerable moment where every penny has to be taken into account.

It is unnecessary, I think, for me to go further into the subject. The conditions affecting such schemes of improvement are so diverse in different localities that each must be separately worked out, and plans which would be successful in one town are impossible in another.

In every case the problem bristles with difficulties, and even when an apparent solution has been attained, we are apt to find that the best-laid schemes of sanitary authorities, as well as of mice and ordinary human beings, are subject to much deviation from their intended courses.

REMOVAL TO HOSPITAL IN DIPHTHERIA. Statistics as to attack-rate of diphtheria among exposed persons show that when only single cases occurred in each house the attack-rate was 26·8 per cent. among exposed persons under twenty in hospital-treated as compared with 34·9 per cent. in home-treated cases, and that when multiple cases occurred the proportionate percentage was as shown in the following table:

ATTACK-RATE AMONG PERSONS UNDER TWENTY YEARS OF AGE IN INFECTED HOUSES.

	Home-treated Cases.		Hospital-treated Cases.		
			(1) First Case removed before Onset of Second.	(2) First Case not removed before Onset of Second.	(3) Two Cases simultaneous Onset.*
A. Only one case in the house	34·9			26·8	
B. More than one case in the house	72·7		49·4	59·4	87·0

Annual Report, Brighton.

* Only 27 in this group.

HOUSING OF THE POOR.*

By WILLIAM BERRY, J.P., F.R.C.S.I., D.P.H.,
 Medical Officer of Health, County Borough of Wigan, President of the North-Western Branch.

THE pleasure attending the attainment of a position of this description is marred somewhat by the imposition of a Presidential Address. Many difficulties confront one, but the main difficulty is to find a subject with which one is familiar and which will be of interest to the members. I was at a loss to fix on a suitable theme, and at last determined to select the subject of "Housing of the Poor" for three reasons:

1. Although pretty threadbare in the form "Housing of the Working Classes," it is a subject that interests all medical officers of health, but more especially those of the smaller towns and urban districts.

2. The subject was of sufficient interest to be named in the King's Speech, and legislation on the subject was promised.

3. The medical officer of health must of necessity hold a responsible position in advising his authority to take action under the various Acts.

Following on the King's Speech at the opening of Parliament last session, we have had a Bill which has received Royal Assent, entitled "Housing of the Working Classes Act, 1903," and the Local Government Board have recently addressed a circular to town councils and urban district councils drawing their attention to the provisions of this new Act. The provisions respecting borrowing powers and repayment of loans are considerably amended by Section 1 of the new Act.

The effect of subsection (1) of this section is to extend the maximum period for the repayment of loans raised for the purposes of the principal Act or Acts, amending it to eighty years, leaving the actual period for repayment, subject to this limitation, to be determined as heretofore with the sanction of the Board.

The next subsection will prevent any loans raised for the purposes of the Housing Acts from being taken into account for the purposes of the limitations on borrowing above referred to. The Board state that they propose in future, as a general rule, to allow the full term of eighty years for the repayment of money borrowed for the purchase of freehold land, and sixty years for the repayment of money borrowed for the erection of buildings under the Housing Acts

* Presidential Address delivered at the North-Western Branch of the Incorporated Society of Medical Officers of Health, Manchester, October 16th, 1903.

where the circumstances are such that this may properly be done. Where money has been borrowed in recent years for these purposes they will be ready to consider applications for sanction to the re-borrowing of the outstanding balances for eighty or sixty years (as the case may be) from the date of the original borrowing, if the money has been borrowed in terms which will admit of this. The new Act also provides for appeal to the Board by ratepayers in the event of the local authority doing nothing. This provision is an old one, but has been slightly improved. Certain points in procedure, modification of schemes, closing orders, cost of demolition, and letting houses for the working classes, are also incorporated in the new Act. As Sir S. B. Provis says, "there are now very considerable powers placed in the hands of local authorities, and the Board trusts the effect will be to stimulate councils to exercise their powers in this matter."*

Many towns have done very little in respect to the destruction of insanitary property. I am excluding, of course, cities like Manchester and Liverpool, and large towns like Salford, and I think it may fairly be said that the powers of the Housing of the Working Classes Act, 1890, have not been fully exercised, especially in small towns and rural districts. You will remember that those powers of the Act of 1890 are contained in seven parts and seven schedules, but I may here casually refer to *three*, which are the principal parts:

- Part 1. Unhealthy areas.
- Part 2. Unhealthy dwelling-houses.
- Part 3. Working-class lodging-houses.

Allan, in the introduction (p. 30) to his work, "Housing of the Working Classes Act, 1890," says:

"The powers given by the Act may be summarized generally as enabling local authorities to deal with—

"1. Individual houses, by insisting on having them made fit for habitation, or if that is not or cannot be done, by closing or demolishing them.

"2. Obstructive buildings, which cause other houses to be unhealthy, by enabling the local authority to demolish them.

"3. Small areas of unhealthy houses, by having them pulled down and reconstructed.

"4. Large areas, or 'slums,' which can be acquired and pulled down, and an improvement scheme carried out.

"5. The erection of dwelling or lodging houses for the working classes in districts where the same are required.

"Of these powers, the first three fall under Part 2, the fourth is

* Vide *British Medical Journal*, p. 864, October 3rd, 1903.

dealt with under Part 1, while the provisions of Part 3 relate to the fifth.

"Part 1 is not applicable to rural districts.

"Part 2 is applicable to all sanitary districts, and may be enforced by the sanitary authority.

"Part 3 may be adopted by rural district councils, subject to the sanction of the County Council."

Part 1 for the most part is expensive, and deals with unhealthy areas, so that Part 2 is the part of the Act which gives power for dealing with unhealthy dwellings or buildings unfit for human habitation. Closing orders and demolition orders can be obtained, with power of owner to appeal to the Court of Quarter Sessions. Under Part 3 of the Act working-men's houses or lodging-houses can be erected by the local authority. In my own town I have no difficulty in proceeding under Part 2 of the Act, and we have had very little litigation. We go in for demolition, and not for rendering these houses sanitary. We pay a nominal compensation on demolition, and thus save legal and expert expenses; but what is of the utmost concern to me just now is the displacing of the tenants without their being able to find housing accommodation at a rent which they are able to pay, so that we find now two and more families occupying one house. The cure, therefore, is worse than the disease, and I want the Corporation to put up houses which can be let from 2s. 6d. to 3s. 6d. per week for the class of people that inhabit the unhealthy, dilapidated houses. A rent of 1s. or 1s. 3d. per room is as much as these poor people can pay. We are now providing for displaced tenants by houses to be let at 4s. per week, but this is too high for these people who are being displaced, unless we allow them to take in lodgers. Liverpool, no doubt, is doing a good work in this respect by putting up a number of houses and at the same time giving preference to the displaced tenants. The cost of land has been held by the socialist to be the main cause of the high rent, but really this cannot be so in small towns and rural districts. The cost of wages and building material is much more likely to be the cause, for the private property owner naturally expects a reasonable return for the money he lays out, and this class of tenant is not one of the most desirable of occupiers. I have come to the conclusion that the time has arrived for municipal authorities to take this matter in hand earnestly and thoroughly, that they should and must deal with—

1. Their insanitary property.

2. They must provide houses at a reasonable rent for those displaced, even at the expense of the rates, and this is the reason

why I have given my paper the title of "Housing of the Poor," and not of the "Housing of the Working Classes." The working classes are provided for, and will be, by private enterprise. The poor will have to be provided for by the local authorities or the Poor Law Guardians.

8. So as to prevent any competition with the private property owner, none but those displaced from the insanitary dwellings should be allowed to occupy the new buildings.

With regard to the first, all of us are probably agreed, but with the second some differences of opinion might be held, but there is no doubt that some means ought to be found for these poor people to obtain a dwelling at a rental approaching what they have previously paid. I believe in Liverpool they have solved the question, and are building houses for those dispossessed. The chairman of the Housing Committee is a strong man in regard to this subject; being an estate agent, he knew the requirements of the tenants, and was able to lead his committee. Up to 1885 only half, or 50 per cent., of the dispossessed had been accommodated, and there was a deficiency of 8,056 although the houses built included 125 tenements at St. Martin's Cottages, 270 Victoria Dwellings, and 101 Juvenal Dwellings. The deficiency is now being made up, and the Housing Committee "decided that in future the new houses should only be occupied by dispossessed tenants, each of whom should be given an opportunity of taking a new house." There were in course of construction 176 one-roomed houses at 2s. per week; 642 two-roomed houses at 3s. per week; 738 three-roomed houses at 4s. per week; and 140 four-roomed houses at 5s. per week—a total of 4,234 rooms to accommodate over 8,000 persons. Taking the total cost of demolition and housing, Mr. Turton stated that the loss last year amounted to 1½d. in the pound, including sinking funds; one-third of a penny is the loss on housing operations alone. But at the end of a period of years the ratepayers would have possession of valuable rent-producing property, and there was an enormous gain in life, health, and happiness.

Mr. Huddart (chairman of Health Committee of Salford) stated at the Royal Institute of Public Health Congress in Liverpool that in Salford they had pulled down 4,000 out of 6,000 back-to-back houses; that in Salford 50 per cent. of the population lived in houses 10s. a week downwards—how much downwards I do not know—but he further stated that "the working-man did not want tenement houses, and in Salford they had built four-roomed self-contained cottages on land costing 15s. per yard, and they could let them at 5s. 9d. per week." Well, I quite agree with this if the

occupier can afford to pay the rent, and private enterprise would provide this without the Corporation entering into competition. It is a serious matter when a working-man of the labouring class has to pay 25 per cent. of his wages in the shape of rent.

Some of Mr. Huddart's fellow councillors did not agree with the Health Committee, for one of the councillors at their August council meeting stated "that they were not opposed to the demolition of insanitary property, but in favour of it. What they asked was that houses should be found for the poor, destitute people, and they should not be forced either into the workhouse or the streets."

There is no doubt at all, and it is my own experience, that people turned out of houses with a rental of from 2s. 6d. to 4s. per week, and no houses provided for them excepting a rental of from 5s. to 6s. 6d. per week, that two and more families go to occupy one house, and thus back-to-back houses of the worst description are formed. In Wigan a large area was taken; the Local Government Board insisted on the Corporation rebuilding on the site one of the best class of artisan houses, which could only be let at 5s. 6d. or 6s. per week, and I don't believe that there was a single displaced tenant who took one of these houses. They could not afford it; they had previously paid from 3s. to 4s. per week, and the increase was too much for them. Now, with regard to the third proposition, I think the Liverpool plan meets the requirements, and this can be carried out by all authorities by adopting Part 3 of the Act. I do think in rural districts where land is cheap that under Part 3 of the Act of 1890 much could be done without any large addition to the rates, the requirements and earnings of the occupiers being much easier ascertainable than in the large towns.

In conclusion, I may mention that I have not touched upon the taking out of the town the slum-dweller, for although this may in the case of large towns and cities be one remedy, in smaller towns it is not so easy, and the working-man will get as near as possible to his work.

A suggestion has been made by H.M. Treasury that in future all loans granted for the erection of workmen's dwellings under Part 3 of the Housing of the Working Classes Act, 1890, and repayable in sixty years upon the *annuity* system, shall only be sanctioned on condition that the borrowing authority agrees by resolution to set aside in every year from the first a percentage of the estimated rents which will create a fund sufficient to meet the cost of repairs and renewals during the whole period of the loan; in the event of the loan being repaid on the *instalment* system, it will not be necessary to attach conditions with regard to a repairs or renewals fund.

IS THE HOSPITAL ISOLATION OF SCARLET FEVER WORTH WHILE?*

By A. MEARNS FRASER, M.D., D.P.H.,
Medical Officer of Health, Portsmouth.

IF you will permit me, I should like to-day to renew a question, discussed some little time back in another branch of our Society—namely, the value of the isolation hospital treatment of scarlet fever. Articles have appeared by Dr. E. D. Marriott† with intent to show that isolation hospitals, instead of being the blessing that was anticipated at their origin, had not only, what I think is generally conceded, failed to accomplish the end confidently expected of them, but had actually been instrumental of harm. At a somewhat later period a paper was read by Dr. K. Millard,‡ the medical officer of health of Leicester, in which he set himself the task of showing that, especially in respect to scarlet fever, hospital isolation had been a failure. To my mind neither of these papers has been satisfactorily answered, and it is with a view to obtaining further discussion on the matter that I raise the question to-day under the head of “Is the Hospital Isolation of Scarlet Fever worth while?” By the expression “worth while” I mean, are the results of hospital isolation of scarlet fever such as to justify the large sums annually expended on it?

If we consider for one moment, it will be granted that there is no disease that sanitary authorities have lavished so much money upon as scarlet fever. The prevention of small-pox, including vaccination, may be more expensive, but the larger part of the cost, that of vaccination, falls principally upon the poor law expenditure, and not the sanitary authority. I believe you will agree with me that in most medical officers of healths' department the largest item of expenditure is the isolation hospital, and the largest part of this expenditure—50 per cent. at least—is due to scarlet fever. In this town (Portsmouth) the scarlet fever patients represent over 60 per cent. of the total cases admitted. Surely, then, if one disease is to have so much spent on it, we should have no doubt in our own minds, first, that it does indeed play an important part in the health of the community, and, secondly, that

* Presidential Address to the Southern Branch of the Incorporated Society of Medical Officers of Health, October 28rd, 1903.

† “Scarlet Fever: The Case Against Hospital Isolation” and “The Failure of the Isolation Hospital,” by E. Dean Marriott.

‡ “The Influence of Hospital Isolation in Scarlet Fever,” by C. Killick Millard (read before the Incorporated Society of Medical Officers of Health, Feb. 1901).

the means we recommend, the very expensive practice of hospital isolation, is really accomplishing, or that there are reasonable grounds for supposing that it will accomplish, the end we have in view—namely, the prevention or the limitation of the disease to such a degree as cannot be attained by any other and cheaper means.

Let us first consider the question of the importance of the disease. After all, the aim of the public health service is to preserve and prolong life, and the very limited means at the disposal of a health department should be so expended as to give the best return of life preserved. Therefore it follows that these preventable diseases which cause the greatest mortality should receive the greatest attention. I regret that I am unable at this period to give you figures for the whole country, but for the purpose of estimating the mortality from scarlet fever the statistics in Portsmouth may be taken as fairly representative of vital statistics over the country generally.

During the past twenty years the total number of deaths from all causes in Portsmouth has been 59,316; of these only 319 have died from scarlet fever, or, in other words, only 1 out of every 200 deaths registered has been due to scarlet fever; it has, in fact, during this time been one of the slightest causes of mortality, yet probably in Portsmouth we have spent during the last ten years alone considerably more than £10,000 on it in hospital isolation alone. This sum, I maintain, is out of all proportion to the importance of the disease.

It may be objected, however, that if it had not been for the isolation hospital the death-rate would have been very much higher. I take it that by such persons the effect of the isolation hospital will be held to be that, in the first place, it prevented a number of persons from taking the disease, and so prevented death, and that, in the second place, owing to the better treatment received at hospital than at home, a number recovered that would otherwise have died.

But is this so? I think not. To take the second objection first. During the past twenty years, out of the 5,859 cases of scarlet fever notified, 3,259 have been treated in hospital; of these 97·46 recovered, whilst 2,800 have been treated at home, and of these 96·58 recovered. The advantages, therefore, from hospital treatment as regards recovery are practically nil. And it is probable that even this slight advantage is apparent rather than real, for whereas in the first place only those cases which had been diagnosed as scarlet fever were sent to hospital, there must have been a certain number

that have died at home of undiagnosed scarlet fever; and, further, a number must have died at home who were too bad to be removed—i.e., cases which must have died whether moved to hospital or not. The deaths under these two heads would probably more than account for any advantageous result that might be attributed to an objection that only the poorest and worst cases are sent to hospital. Moreover, I do not think anyone who has had much experience of the hospital isolation of scarlet-fever patients will deny that the complications that occur in the isolation hospital aggregation of scarlet-fever patients are far and away more numerous than are seen in private practice. All who have had much experience of isolation hospitals have learnt to know and to dread post-scarlatinal diphtheria, a disease I believe almost entirely limited to isolation hospitals, or, at any rate, exceedingly rare in private practice. How common it is for measles to run through a ward of scarlet-fever patients, and this disease, like post-scarlatinal diphtheria, the greatest care seems unable to prevent; chicken-pox and whooping-cough, too, are not unusual accidents. Otitis, adenitis (of convalescents, not during the acute stage), and mastitis, are all far and away more common in hospital than in private practice. Nor can the suggestion that these complications are due to neglect or mismanagement be for one moment upheld. One has only to turn to the Metropolitan Asylums Board's hospitals, where nothing that skill or money can effect is neglected, to get some idea of the complications and accidents that supervene even in the best institutions. In the Annual Report for 1902 the following are given as among the complications that occurred in the 14,889 cases there isolated:

14.6	per cent.	suffered from	otitis.
7.58	"	"	adenitis (during convalescence).
2.84	"	"	diphtheria.
2.05	"	"	chicken-pox.
1.75	"	"	measles.
0.63	"	"	mastitis.
0.89	"	"	whooping-cough.

Nor are the above returns surprising when we find that 4.7 per cent. of the scarlet-fever cases received were found not to be suffering from that disease; the 708 cases thus sent in wrongly diagnosed comprised 91 cases of measles, 48 of rubella, 154 of tonsillitis, 159 of erythema, and 70 of no obvious disease. In addition, 447, or 1.93 per cent., of the cases had two diseases co-existent at the time of admission.

With such facts as these, occurring in admittedly the best-managed isolation hospitals in the kingdom, the cynical definition of an isolation hospital as a "place where a patient goes in with one infectious disease and catches all the rest" is not sufficiently void of truth to be without sting.

Knowing what we know of the results of hospital isolation of scarlet-fever patients, I do not believe that many who have had much to do with isolation hospitals would uphold them on the score of the benefits to the patients themselves. The only logical reason for their existence must depend on the supposition that they do good by preventing the spread of the disease.

This is the sole standard by which they must be judged, and consequently I shall deal at more length with this part of the subject.

I feel that some apology is due from me in not having prepared statistics from other towns up to date, but as we have already statistics up to the year 1899, for which we are indebted to Dr. Killick Millard,* and as the most rigid criticism of these only elicited the single discrepancy that in dealing with one town, Preston, they did not indicate that only the first case of scarlet fever was notified in a family, I think no objection can be raised to my referring to these when comparisons are needed from other towns.

But as regards Portsmouth, I am able to place before you the figures for the last thirteen years—i.e., 1890-1902. (I use the last thirteen years because, although notification in Portsmouth commenced in 1884, isolation was not generally practised till 1890; for the six years before that date the percentage of cases isolated was only 15.1.) During these thirteen years the number of cases of scarlet fever notified in Portsmouth was 7,781, and the number isolated was 4,355, giving a mean of 56 per cent. isolated. The percentage varied from 67 per cent. isolated in 1896 to 43 per cent. in 1893.

Now, if isolation was of any advantage, I should expect to find some indication of benefit in the years that the isolation was particularly practised; but what do we find? I have prepared a table showing the attack-rate per 1,000 of the population of Portsmouth, together with the percentage of cases isolated for the *whole period* of nineteen years (from 1884-1902) during which hospital isolation has been attempted; this period may be conveniently divided into the two periods, 1884-1889, during which the hospital isolation was very slight, amounting only to 15.1 per cent., and the second period, 1890-1902, when the percentage isolated amounted to 56.

* *Op. cit.*

Table showing the Percentage of Cases of Scarlet Fever Isolated in Hospital, and the Attack-Rate per 1,000 Population for the Years 1884-1902.

Year.				Percentage of Cases Isolated.	Attack-Rate per 1,000 Population.
Principal Period of Isolation.	1884	...	...	4.9	1.94
	1885	...	...	5.0	2.23
	1886	...	...	8.5	2.38
	1887	...	...	8.6	4.40
	1888	...	...	25.8	3.10
	1889	...	...	38.1	4.74
	1890	...	...	67.1	3.65
	1891	...	...	55.2	2.04
	1892	...	...	52.0	6.30
	1893	...	...	42.8	7.12
	1894	...	...	52.0	2.72
	1895	...	...	56.9	1.82
	1896	...	...	67.2	3.02
	1897	...	...	59.1	3.96
	1898	...	...	61.4	3.95
	1899	...	...	57.6	3.16
	1900	...	...	56.9	1.89
	1901	...	...	59.7	2.40
	1902	...	...	56.2	3.61

Dealing with the period of thirteen years 1890-1902, during which hospital isolation has been principally practised, we find the most inconsistent results. For instance, in the two years 1890 and 1896, in which there was most isolation, 67 per cent. of the cases being moved, the attack-rate per 1,000 population was 3.6 and 3.0; but in the two years 1895 and 1900, in which there was the lowest attack-rate—namely, 1.8 per 1,000—the percentage removed was only 57. The year 1898, when 61 per cent. of the cases were moved, gave an attack-rate of 3.95, whereas 1894, when only 52 per cent. were isolated, gave an attack-rate of only 2.7.

The only two years that can give any comfort to a believer in hospital isolation are 1892 and 1898. These were epidemic years, and in view of the other figures cannot carry much weight.

Curiously enough, too, if we take the period of three years, 1884-1886, in which the isolation was lower than in any other three consecutive years—namely, 6.1 per cent.—we find that the attack-rate also was lower than it has ever been in any like period since the practice of hospital isolation has been introduced. So in this town, at all events, after nineteen years' experience, there is

not the least evidence that hospital isolation has exercised any restraining influence whatever over scarlet fever.

Now, if I had to depend on the results of Portsmouth alone, I should be very chary of expressing a definite opinion one way or the other, for I should expect to be met with the argument that not a high enough percentage of cases had been isolated to be of any value. Fortunately, however, owing to Dr. Millard's investigations, we have the experience of all the other large towns in England to assist us in forming a correct opinion.

Isolation has been practised in some towns for nearly twenty years, and surely, if it is of any benefit, sufficient time has elapsed for some proof of its benefits to exist. I am, however, unaware of any large town that can be pointed to as showing an example of scarlet fever controlled by the use of isolation hospitals. On the contrary, in most towns it will be found that, instead of being controlled, the disease is on the increase. Strange it is, too, that a town practising isolation to such a large extent as Nottingham, which in the last ten years, 1890-1899, isolated 74 per cent. of the cases, had practically the same number of cases in proportion to the population as had Burnley, which never isolated at all; and Huddersfield, in the same period, isolating even 90 per cent. of its cases, had an attack-rate of 4.8 per 1,000, which is actually slightly more than Gateshead, which isolated only 15 per cent. Where on earth are we to draw any conclusion in favour of isolation from such facts as these? It may be objected that we do not know what the prevalence of scarlet fever would have been in these towns if there had been no isolation. That may be so. Proof on either side cannot be obtained. Every scrap of evidence, however, that I can come across decisively negatives the supposition. If isolation tends to prevent the spread of disease, surely by taking a number of towns isolating to the extent of 70 per cent. of their cases, we ought to find in them that at least they experienced a less attack-rate than a group of towns isolating below, say, 30 per cent. Yet what are the facts?

Birmingham, Brighton, Huddersfield, Nottingham, and Northampton, all isolated above 74 per cent. of their cases, the mean for these five towns being 81 per cent. isolated, and the attack-rate was 4.5 per 1,000. On the other hand, Cardiff, Newcastle, Plymouth, and Sunderland isolated only 25 per cent. of their cases, but their attack-rate is actually less than the good "isolators," averaging only 4.1 per 1,000 population. In only one large town in the kingdom has isolation been carried to such a height as in Birmingham, yet after years of rigidly enforced isolation the

attack-rate reached last year the enormous proportion of over 9 per 1,000 population!

Again, if hospital isolation is as beneficial as many would have us think, it is only reasonable to believe that if a large town suddenly has its means of isolating taken away from it, dire results must ensue; and if, in addition, nearly 100 cases of scarlet fever should be dumped down in this town denuded of its power of isolation, the result should be almost too awful to contemplate. Curiously enough, such an instance has actually occurred, no longer ago than the beginning of this year. By the kindness of Dr. Millard, I am able to put the following facts before you. The isolation hospital of Leicester was closed on January 21st in order to accommodate cases of small-pox. Ninety-eight patients in all stages of scarlet fever were sent to their homes. Instead of a general outbreak of scarlet fever all over the town, the notifications actually dropped at once from 25 per week, which had been the average for the three months preceding the closure, to 10 a week, and they remained at this figure for six months following the closure!

So far also from the 98 cases spreading the disease, only 2 return cases occurred. I do not, of course, wish to suggest that the closure of the hospital had anything to do with the sudden decline in the prevalence of scarlet fever, but I do say that, for the closure of the hospital to be immediately followed by a drop of 50 per cent. in the attack-rate, is very suggestive that isolation hospitals play a small part in preventing the disease. The fact that there were only 2 return cases calls to mind the result of the closure of the Leicester Hospital before in 1891, when 111 cases of scarlet fever were sent back to their homes without a single return case.

I have studied and dissected the statistics of other towns carefully, and I can find there no proof whatever that the isolation of scarlet fever is doing anything to prevent the disease. So far, indeed, from there being any proof of their value, all the indications are that isolation is a costly failure.

I have seen it stated that one town must not be compared with another; that one group of towns must not be compared with another group; that statistical evidence cannot be taken as a proof, and various other objections to explain away the fact that the large isolating towns do not show any marked improvement over the non-isolating or feebly isolating towns. I notice that the arguments in favour of isolation apparently ignore statistics and depend on the supposition that the theory of isolation is so sound that it must in practice be advantageous, and that, if isolation has

not proved the specific that was expected, the reason must be that the system has not been carried out properly; that the fault must be with the methods, which should be improved, but that the system is so theoretically correct that it is bound to be eventually successful. Well, we have now had nearly twenty years' experience of the system, and I ask—surely a very small demand to make—for one single instance amongst the large towns of the practice of hospital isolation being successful in giving that town a marked freedom from the disease over other non-isolating, or “feebly” isolating, towns.

I confidently expect no such instance is forthcoming. But to attack the system from another point of view. Statistics, we are told, are not applicable. Well, let us look at the theory and practice of the hospital isolation of scarlet fever.

Are there any reasonable grounds from which it might be deduced that the hospital isolation of scarlet fever would prove a failure? I think there are ample. The system must depend on three fundamental principles: first, that all or most cases of scarlet fever, as soon as the disease is notified, shall be moved to hospital before they have had time to spread the disease; secondly, that everything in connection with the patients likely to carry infection shall be thoroughly disinfected; and, thirdly, that the patients shall be kept in hospital until free from infection.

Taking the three points I have mentioned in order, we find to start with that not one of the big towns is able to isolate all its cases, for the simple reason that if the patient can be isolated at home no legal power exists to compel his removal. And, as a matter of fact, out of the thirty-three large towns only five have isolated more than 70 per cent., and only seventeen have isolated more than 50 per cent. of their patients. You may reply, “Yes, and that is the reason why hospital isolation has not been successful.” But if this is admitted, then you must also admit that hospital isolation always will be a failure; it is inconceivable that, without being granted compulsory powers of removal, all large towns will ever isolate even so much as 80 per cent. of their patients. But, apart altogether from the willingness or unwillingness of patients to go to hospital, there are other equally valid reasons against being able to rapidly isolate all scarlet-fever cases in hospital.

We commonly find that a case of scarlet fever is so mild that no medical man is called in, and it escapes notice for some days or even weeks, not being recognised until perhaps some severer cases occurring, and a cause being sought, attention is directed to the peeling of this first case, which in the meantime has probably

done all the mischief it is capable of. To these must be added those cases that are concealed, either because the wage-earners of the household are afraid of being prevented from pursuing their usual work, or else the parents are afraid of being forced to send the child to hospital. Here, then, is the first big flaw in the system: authorities will never be able to isolate all the cases that occur.

To turn to the second point, disinfection. The disinfection of everything the patient has been in contact with is often incomplete, or it comes too late, after the disease has already spread to other members of the family. I think most medical officers of health have come across cases where, if the child has happened to be wearing some nice new clothes when it was taken ill, these are put on one side and not produced for disinfection, in case they should get spoilt. These clothes in time often prove the cause of a second case. That the disinfecting takes place too late is, however, commoner still. We find constantly that the day after the patient is moved to hospital and disinfection is carried out a second case occurs, followed not unfrequently by a third, and even a fourth. Two, therefore, out of the three conditions on which the system depends fall to the ground.

And now we come to the third and most important condition for success—that the patient shall be kept isolated until he is free from infection. If, in spite of the failure of the other two provisos, we could secure success in this, there might—I say might—possibly be some excuse for the expenditure. But what do we see?

Does *anyone know* when a patient becomes free from infection? I think I could undertake to say when a patient treated at home was free from infection, but I should be very sorry, after my own experience and the experiences I have seen recorded by others, to say when a patient treated in a fairly full so-called "isolation ward" was free.

And judging by the experience of hospitals throughout the country, I think very few hospital superintendents would care to give a guarantee that any particular patient, discharged apparently free from infection, would not be the origin of a return case.

It is these return cases that to my mind afford the most damning evidence of the failure of the hospital isolation of scarlet fever. It is a matter of common knowledge that no amount of ingenuity has up to now been able to prevent the occurrence of return cases. Think for one minute, gentlemen, what this implies. The very fact that the most experienced fever hospital superintendents in the kingdom are unable—and this cannot be denied—

are, I say, unable to guarantee that any patient on his discharge from hospital shall not be the means of infecting other persons is surely of itself sufficient to demonstrate the uselessness of the isolation hospital in checking scarlet fever.

But do the numbers of return cases given by medical officers of health and hospital superintendents, large as they are, really represent the true state of affairs? I submit they do not. In my opinion there is ground for believing they do not represent one-half of the actual return cases that occur, and for the following reasons: Nobody denies that patients are sent out whilst still infectious, the proof for which exists in the fact that as soon as the patient goes back to his house a return case often occurs. If a return case does not occur, we conclude the patient was free from infection. Here, however, is a very grave fallacy. Return cases are limited, by commonly accepted definition, to those occurring *in the patient's own house*. But is it not reasonable to suppose that if there were any persons susceptible to scarlet fever they would contract it when the disease was first brought to the house? Therefore, if on the patient's return to a house from hospital no other case occurs, you must not assume that therefore the patient is free from infection; it may simply be that there is no susceptible material in that house. On the contrary, the patient may be in a highly infectious state, and reasoning by analogy, in a number of cases he undoubtedly is so; and as he goes about gaily to day-school and Sunday-school and children's parties and such-like places, can anyone doubt but that he is often responsible for numbers of cases the cause of which is never suspected?

Moreover, as the patient is brought in contact with a far larger number of susceptible persons in schools than in his own home, it is only natural to conclude that the larger number of return cases, although not recognised as such, do, indeed, occur in schools and other places outside the homes of the patients.

An attempt has been made in some towns to obtain evidence as to the value of hospital isolation by comparing the number of cases of scarlet fever that occur per house in those in which the first case is removed to hospital with those in which the patient is treated at home. But, for the reasons I have stated, these figures must afford unreliable evidence of the value of hospital isolation until account is also taken of the actual number of return cases that occur. The only way of obtaining any evidence worth considering as to the value of hospital isolation in preventing secondary cases is to take two somewhat similar towns—one which isolates and one which does not—and compare the cases per house in each town. But in

these statistics also return cases outside the patient's own home must not be ignored.

The whole gist of the matter is that we do not know when an isolation hospital patient is free from infection. A perusal of medical officers of healths' annual reports shows instance after instance of return cases, and a failure to explain how they can be prevented. The length of time the patient was kept in hospital was at one time thought to be too short, but Professor Simpson records a case that was kept in hospital eight months, and even then on discharge gave rise to return cases.* Can anything be more bewildering to a medical officer of health to read first of return cases being caused after detention in hospital for periods varying from six to thirty weeks, and then, on the other hand, to read of 144 scarlet-fever patients sent out from the Leicester Hospital in all stages of the disease without a single return case. Much more might be written on the subject of return cases, but I am sure, with your experience as medical officers of health, you need no further evidence from me on the point, and I believe you will agree with me that the third of the great principles on which I have stated the success of isolation hospitals depends—namely, the keeping of patients till they are free from infection—also proves in practice a complete failure.

To conclude, then, gentlemen, I have endeavoured in the first place to show that, so far as any benefit to the scarlet-fever patient himself is concerned, he is no better, and in some respects a good deal worse off in an isolation hospital than if treated at home.

Secondly, I maintain that no evidence can be produced that the practice of the hospital isolation of scarlet fever in any large town gives that town a marked freedom from the disease compared with any other non-isolating or slightly isolating town.

Thirdly, I have put before you reasons which appear to me quite sufficient to account for the failure, and to warrant the assertion that the system must inevitably *always* prove a failure.

Interested as I am with the subject, I feel that I have not the right to trespass further on your time. I have endeavoured to keep this paper as free from statistics as possible, but when unavoidable the figures used are, I believe, reliable and easily verified. I am quite conscious that I have not done justice to the subject; if, however, I have succeeded in raising doubts in your minds as to the generally accepted value of the scarlet-fever isolation hospital, I shall feel that my labours have not been in vain. I submit to

* "Return Cases of Scarlet Fever and Diphtheria." Metropolitan Asylums Board Report, 1901.

you, gentlemen, that, having regard to the results obtained from the large sums of money annually expended by large towns on the hospital isolation of scarlet fever, the latter is not worth while. I have dealt so briefly with the subject that I cannot flatter myself I have been able to convert you to my views; I do trust, however, that I have said enough to convince you that, at any rate, the system should be thoroughly inquired into.

Many of us, I am aware, are in a somewhat difficult position through having been instrumental in the erection of large isolation hospitals; in spite of this, gentlemen, I appeal to you, that if there is in your minds the smallest doubt—that if you are not absolutely and irrevocably convinced that the system is not only successful, but well worth the money expended on it—you will support me in demanding an inquiry.

I am persuaded that throughout the country generally a certain feeling of unrest exists as to the value of scarlet-fever hospital isolation. Nothing is to me more certain than that, if we medical officers of health now burke the inquiry, the public in a very few years will force our hands in the matter. Let us, at any rate, lead in the matter—an inquiry can do no harm; but if we shut our eyes to the blemishes in the system our position will indeed be ignominious when others get up to prove us in the wrong.

I state my opinion boldly, without fear of being unable to maintain it, that the hospital isolation of scarlet fever in large towns is *not* worth while. I shall not ask you to-day to commit yourselves to the same extent, but I do ask for your support to this extent, which, for the purposes of discussion, I will propose in the following resolution:

"That, in the interests of public health, and in view of the large sums expended annually upon the hospital isolation of scarlet fever, it is, in the opinion of the branch, advisable that a full and searching inquiry into the whole system be held."

A somewhat similar resolution was moved about two years ago by Dr. K. Millard before the Incorporated Society of Medical Officers of Health in London; on that occasion it was defeated. On this occasion, gentlemen, I trust that, by supporting the resolution, you will place on record your opinion that the objections raised to the system can no longer be ignored. If you share my views you will, of course, support me; but even if you do not go so far as I do, I ask you to at least declare the subject, in your opinion, a fit one for inquiry.

If the system is beneficial, inquiry can do no harm; but if not, any attempt to stifle inquiry must end in disaster.

DISCUSSION.

Dr. WILLOUGHBY, speaking for Eastbourne, which had isolated in different years from 90 to 100 per cent. of cases, said it had been a success, both from its advantage to the reputation of the town and by preventing the spread of the disease. Each of the cases nursed at home in 1902 had caused further cases, while none had arisen from hospital patients. The question whether the money could be better expended in other ways was difficult to estimate.

Dr. NUNN agreed with Dr. Willoughby. His experience at Bournemouth, which isolated 90 per cent. of cases, was similar.

Dr. LAUDER stated that when he had return cases he accused himself. He had revised the details of hospital administration, and although he had discharged 100 cases in the peeling stage (selecting carefully those without complications), he had only had one return case from them.

Dr. GRIFFITH thought the failure in the large towns was due to faulty administration of the hospitals, including a trust in disinfection by dry heat, overcrowding, and sending out patients with discharge from the ears or nose, who gave rise to return cases; and to want of means for properly searching out infectious cases in the towns. It would be necessary to have assistant medical officers to hunt up unrecognised cases and contacts, as was done successfully with small-pox and diphtheria.

Dr. GROVES remarked that in the health resorts isolation appeared to be a success, because it was taken up thoroughly and in a commercial spirit. He gave instances in his own district where epidemics would in all probability have been stopped by early removal to hospital.

Dr. STEPHENS, speaking on the resolution of Dr. Fraser, thought that as the subject had been brought forward, and doubts had arisen in the minds of the public, it was a necessity that the Society should make an inquiry and formulate their opinions.

Dr. STOTT gave examples to show that in his rural districts isolation had proved a success; he had never heard of any return cases. The advantage he had was that all the circumstances of the people were well known and could be dealt with, while if a case was left at home all the neighbours came to visit.

The following resolution was then submitted to the meeting and carried:

"That, in the interests of public health, and in view of the large sums expended annually upon the hospital isolation of scarlet fever, it is, in the opinion of the Southern Branch, advisable that a full and searching inquiry into the whole system be held."

THE Sanitary Committee of the Glamorgan and Glamorgan County Council has instructed its medical officer, Dr. William Williams, to prepare hand-bills in both English and Welsh describing the symptoms of ankylostomiasis and how the disease may best be guarded against. A circular is also to be issued to medical men informing them that the investigation of material from suspected cases will be undertaken at the county laboratory.

LAW REPORTS.

IN THE HIGH COURT OF JUSTICE.
COURT OF APPEAL.

October 31st, November 6th and 7th, 1903.

BEFORE VAUGHAN WILLIAMS, ROMER AND STIRLING, L.JJ.

WILKINSON v. LLANDAFF AND DINAS POWIS RURAL DISTRICT COUNCIL.
Public Health Act, 1875, Sections 4 and 19—Sewer—Neglect to Cleanse—Damages.

A channel by the side of a road made to carry off surface-water, but also taking rain-water from the roofs and curtilages of houses, was held to be a sewer, and a local authority were held liable to pay damages for neglecting to cleanse it, by reason of which neglect the plaintiff's child was made ill.

This was an appeal from a judgment of PHILLIMORE, J., in an action tried at Cardiff Assizes, by which an injunction was granted against the defendant authority to restrain them from permitting any foul or noxious matter to remain in a certain channel so as to cause a nuisance, and also awarding £30 to the plaintiff as damages by reason of the expense which he had incurred in consequence of the illness of his child. The plaintiff occupied a house in Millbrook Road, in the district of the defendants. This road was vested in the defendants. At the side of the road was a channel or gutter for carrying off the surface-water of the road. The water from the channel ran through gratings into an underground drain. Into this channel also drained the rain-water from the roofs of several of the houses in the road, and also from the curtilages of these houses. Such water ran through pipes into the channel. From a cesspool connected with certain houses in the road liquid sewage escaped into this channel and did not, apparently, run off, but remained in pools and gave off noxious gas, whereby the plaintiff's child became ill. PHILLIMORE, J., held that the channel was a sewer within the meaning of Section 4 of the Public Health Act, 1875, and that therefore, by virtue of Section 19 of that Act, it was the duty of the defendant authority to cleanse it.

D. T. Evans, K.C., and J. Sankey appeared for the defendants on the appeal, B. Francis-Williams, K.C., and J. Davies Williams for the plaintiff.

VAUGHAN WILLIAMS, L.J., said he agreed with PHILLIMORE, J., both as regards facts and law. The channel was not a drain within the meaning of "drain" as defined in the Public Health Act, 1875, Section 4. Then was it a drain within the meaning of a "sewer," which is defined to include "sewers and drains of every description, except drains to which the word 'drain' interpreted as aforesaid applies." The fact that it was ill-defined made no difference. It was made for the purpose of drainage.

ROMER and STIRLING, L.JJ., concurred, and pointed out that, although this channel was a sewer, this finding did not, as was argued, authorize any of the inhabitants to use it for sewage or faecal matter. Section 21 of the Public Health Act, 1875, did not authorize every owner or occupier to connect every drain with every sewer. All

that is given by that section is a right to have the drain connected with the sewers of the local authority, but the local authority by their regulations may prescribe the particular sewer with which the communication is to be made.

KING'S BENCH DIVISION.

July 6th, 1903.

BEFORE LORD ALVERSTONE, L.C.J., WILLS AND CHANNELL, JJ.,
HIGH C. BILLINGS.

Metropolis Management Act, 1855, Sections 74, 76, 250—Sewer or Drain—Combined Operation—Delegation of Board's Power of Approval to Surveyor.

A pipe draining several houses and laid according to a plan submitted to the local authority, with a request to sanction a combined operation, which plan was marked, "approved by the surveyor," is nevertheless a sewer if it is shown that the only approval of the authority was by their surveyor, who acted under a general resolution delegating to him the authority's power to order a combined operation, on the ground that the authority had no power thus to delegate their duties, and that therefore there was no order of the authority approving the combined operation.

This was a case stated by a Metropolitan magistrate on the hearing of a complaint made by a sanitary inspector for Hackney Borough Council against the owner of a house in respect of a nuisance caused by a defective drain. The defence was that, as the pipe in question drained six houses, it was a sewer, and should be repaired by the council. In reply, it was urged that, although the pipe drained six houses, it was nevertheless a drain, as it was laid as a combined operation with the sanction of the Board of Works, the predecessors of the Borough Council. It appeared that on April 9th, 1868, an application in writing by the then owner of the houses, together with a plan, was sent to, and received by, the Hackney District Board of Works, being the proper authority under the Metropolis Management Act, 1855, Section 76, for permission to drain the six houses by means of a combined drain.

The said application was filed in its order in the book containing the applications for permission to drain buildings submitted to the Hackney District Board of Works, and was signed as "approved" by James Lovegrove, the then surveyor to the Hackney District Board of Works, now deceased, and the work was executed in conformity with the plan accompanying the application. There was no record or any other evidence of any approval by the said Board, or by any of its committees, of the said application and plan, or of the said application and plan having been in any way reported to or brought before any such Board or committee, except that the total number of the applications received, including the said application, was reported by the said surveyor to the said Board.

By resolution dated March 24th, 1859, which was in force and unrescinded at the date of the application, and until September, 1869, the surveyor to the Hackney District Board of Works was authorized "to grant applications for house drainage, when they are regular, involving no special point for the consideration of the Board, the number of such applications to be reported quarterly."

It was contended that this resolution was *ultra vires*, and that the approval by the surveyor was not an approval by the Board of Works, and therefore the system was not a combined operation. The magistrate took this view and dismissed the summons.

Bevan appeared for the appellant, *Courthope Munroe* for the respondent. The High Court affirmed the magistrate's decision and dismissed the appeal.

LORD ALVERSTONE, L.C.J., in the course of his judgment, said: The difficulty I felt in this case was, knowing the plan was before the local authority, and was entered in the regular way, and sanctioned by their surveyor, whether we should be justified in coming to the conclusion that there had been such a recognition or ratification of the act of the surveyor as made it really the order or direction or approval of the Board, so as to satisfy the words of the statute. But I have come to the conclusion that we cannot do so. There is no doubt that the Board here did intend to delegate some of their powers, and I think it is quite plain that they cannot delegate generally their jurisdiction without judgment upon the order that ought to have been made for combined drains. They not only did that, but they said that they authorized the surveyor to grant applications for house drainage where they were regular, involving no special point for consideration of the Board, the number of such applications to be reported quarterly. It might have been the argument that they did not mean to delegate to him the cases of all the drains; but looking at the book, and noticing that all the applications are treated in the same way—the large number of applications for single drains, and the considerable number of applications for combined drains—I think it is pretty plain that they did not treat the fact of it being a combined drain as a special point. Therefore it seems to me that there is really no evidence here of any order or direction by the local authority, no evidence of any approval of the construction of a combined drain, but, on the contrary, there is distinct evidence that the Board did delegate the authority to the surveyor, and allow him to decide the matter independently of the Board. That being so, I come to the conclusion that the magistrate came to—namely, that the local authority had delegated the consideration of permission to drain groups of houses to the surveyor, and that, beyond the approval of the surveyor, no order was given. I think that is a right conclusion, and that, therefore, the magistrate was justified in giving judgment that this line of pipes must be treated as being a sewer, and that there is no sufficient evidence that it is a combined drain, so as to throw whatever burden there is upon it upon the respondent. I think, therefore, this appeal should be dismissed.

WILLS, J., in concurring, said: It seems to me the case would have been very different had it not been for that resolution which delegated the authority of the Board to the surveyor. We know perfectly well in matters of this kind the order or approval of the local authority is very seldom exercised with any reference to the circumstances of the particular case. Generally it is a mere matter of form; the local authority acts on the report of the surveyor that all things are right. Very often a resolution is passed which approves *en bloc* all the things which have been reported to them without anybody having asked a single question, or knowing anything whatever about the particular matter to which the order applies. Therefore, if it is shown that the documents are in order, and that in the ordinary course of things they would be laid before the Board either to approve or for disapproval, and

it is found there has been no disapproval expressed, I think it would be a foregone conclusion that there was no disapproval, and that the matter had come in regular course before the Board, and that such sort of confirmation as I have indicated had been pronounced by the local authority, although there may have been no resolution upon the minutes, because it seems to me that would be the regular course of business; but when you have got the whole thing preceded by a resolution of the local authority that their authority in this matter shall be delegated to the surveyor, and that all he is to do is to report quarterly the number of cases in which he has exercised his discretion, it seems to me to negative the notion which one otherwise would be very apt to entertain that the matter had come in regular course before the Board, and seems to indicate that nothing would come before the Board. I think that is the proper inference.

CHANNELL, J., also concurred.

CHANCERY DIVISION.

July 15th, 1903.

BEFORE JOYCE, J.

ATTORNEY-GENERAL (AT THE RELATION OF THE CHAILEY RURAL DISTRICT COUNCIL) v. KEYMER BRICK AND TILE COMPANY, LIMITED.

Nuisance—Offensive Trade—Abatement—Injunction.

Where manufacturers bring refuse on to their land which causes a nuisance at certain times of the year, the court will grant a perpetual injunction to restrain them from bringing such refuse so as to cause a nuisance, and will leave it to them to bring the refuse on to their land on their own responsibility in such manner and at such times as will not cause a nuisance.

This was an action brought by the Chailey Rural District Council in the name of the Attorney-General for an injunction to restrain the defendants from depositing or accumulating filth, dust, rubbish, night-soil, refuse, or other noxious or offensive matter in such a manner as to allow any portion of the same or effluvium therefrom to escape from the carts or other means whereby the same were conveyed, and from permitting the same to remain or continue on any land in the defendants' occupation within the district of the relators, so as to occasion any nuisance, annoyance, or injury to the health of the public. Since 1889 the defendants had been manufacturers of bricks, tiles, and other pottery, and carried on business and were in occupation of lands in the parish of Ditchling, in the county of Sussex. Their brickfields were on land about twenty-five acres in extent, in the centre of which was a large pit or excavation.

In this pit it was alleged that the defendants had for some time past deposited and accumulated large quantities of filth, rubbish, and refuse in a state of decomposition, which occasioned a nuisance and was injurious to health. It appeared from the evidence that the defendants obtained a regular supply of what is known as London "rough ashes," which consisted of house refuse, and contained a considerable quantity of cinders, ashes, and some small coal; but it also contained besides ashes various sorts of decaying vegetable matter, old bones, dead cats and dogs, old mattresses and other articles of bedding, old boots and

clothing, and the whole was said at times to give off a nauseating and offensive smell, particularly while the trucks were being unloaded.

The ashes were used to mix with the clay for bricks, and the breeze was used for starting the fires. The nuisance complained of seems to have occurred mainly during the summer of 1902, and evidence was given as to the stench from the heap of refuse, and that it had caused a plague of flies.

Some of these flies had been examined at the bacteriological department at the Middlesex Hospital, and a doctor, to whom they had been submitted, gave evidence as to the bacteria which he had found on them, and stated that, in his opinion, there was a possible danger to health from the conveyance by the flies of dangerous bacteria from the refuse either direct to human beings or indirectly to food which might be contaminated by the flies. The defendants' evidence was to the effect that fly-borne bacteria was not in fact injurious to health, and that the danger and annoyance from such a heap could be reduced by precautionary measures to an unobjectionable degree in certain states of the weather and atmosphere.

Macmorran, K.C., Younger, K.C., and F. R. Radcliffe appeared for the plaintiffs, Hughes, K.C., Marshall Hall, K.C., T. T. Methold, and A. W. Wells, for the defendants.

JOYCE, J., in giving judgment, said: The only question I have to decide is purely one of fact—namely, whether or not what the defendants have done has created or occasioned a public nuisance within the neighbourhood of their brickfields. Now, in law, a public nuisance need not be injurious to health. It is not necessary to show that people have been made ill by what has been done. It is sufficient to show that there has been what is called injury to their comfort, a material interference with the comfort and convenience of life of the persons residing in or coming within the sphere of the influence of that which has been done by the defendants on their works. I have nothing to do with the question of whether the defendants can or cannot profitably carry on their business without doing that which is complained of, nor have I anything to do with the difficulties which the authorities in London have of disposing of their house refuse. The conclusion I have arrived at is that no reasonable person who heard this evidence can doubt that a serious and disgusting public nuisance has been occasioned by the defendants in the neighbourhood of their brickworks, and from that conclusion, in my opinion, the usual consequences must follow. The only limitation I can put upon the injunction is that they must not bring the refuse on to their land so as to create a nuisance. If at any time or under any circumstances they can do it so as not to create a nuisance, no order I make will prevent them from doing it; but it must not be taken that I have decided that that can be done: I decide nothing of the kind. If they think that at certain times and under certain circumstances they can do what they wish to do without creating a nuisance, they will do that on their own responsibility, and they will have to take the risk of what they do.

The form of the injunction will be: "A perpetual injunction to restrain the defendants, their agents, and servants from unloading, depositing, or bringing, or causing to be unloaded, deposited, or brought, in or upon or to their brickfields and lands in the pleadings mentioned, or any part thereof, any rough ashes, rubbish, or house or other refuse whatsoever, so as by noxious or offensive odours or vapours arising therefrom or otherwise to be or occasion a nuisance to the annoyance

of persons in the neighbourhood of the defendants' brickfields and lands, or so as to be or become injurious to the public health." I add the last words because, notwithstanding what they say, I think there is a risk to the public health. I do not say it has been proved yet, but if they do not do anything injurious to public health, this order will not stop them.

IMPORTING SKIMMED MILK.—At the Mansion House, on November 30th, Maurice Simon, of Duncan Street, E.C., was summoned before the Lord Mayor, at the instance of the Customs, for, on or about October 20th, importing into the United Kingdom, per the steamship *Batavier II.*, from Rotterdam, at Custom House and Wool Quay, within the Port of London, condensed separated milk in tins packed in 226 packages, which milk appeared, by analysis of the sample tin taken out of one of the packages, to be and consist of condensed separated milk, such tin not bearing a label whereon the words "Machine-Skimmed Milk" were printed in large and legible (or any) type, contrary to Section 1 (1) (c) of the Sale of Food and Drugs Act, 1899.—*Mr. Theodore H. Ward*, solicitor, appeared on behalf of the Customs in support of the summons; *Mr. Arthur B. Crundall*, solicitor, appeared for the defendant.—*Mr. Ward* said that the Customs were proceeding in this case against the consignee, as he was technically the importer.—*Mr. Crundall*, for the defendant, said that these goods were sent to the defendant without his ever having ordered them, and he had no opportunity of giving instructions or directions with regard to the label. Although technically guilty, the defendant was perfectly innocent of any moral offence.—The Lord Mayor said he did not care who was responsible, whether it was the defendant or the people on the other side. No doubt the people on the other side who had despatched the goods wrongly labelled were liable to the defendant. These cases ought to be stopped. The public were defrauded. He should impose on the defendant a fine of £10 and £2 2s. costs.

STRUCTURAL ALTERATIONS TO UNDERGROUND BAKEHOUSE. At Marylebone Police Court, on November 30th, *Dr. John Cross*, of 3, Gloucester Road, Regent's Park, was summoned under the Factory and Workshops Act, 1901, by the tenant of an underground bakehouse at 12, Canterbury Road, Kilburn, to show cause why he, as the owner or lessor of the premises, should not pay the whole, or part, of the expenses to be incurred by the tenant in carrying out certain structural alterations in order to obtain the certificate of the local district council on January 1 next. *Sington*, barrister, supported the summons; *W. J. Lake*, solicitor, appeared for the defendant.—It was shown that the alterations considered necessary by the Willesden District Council before they could grant a certificate would amount to £183. Of this sum it was admitted that the tenant was liable for £26, and the court was asked to decide as to how the remainder should be apportioned between the parties.—*Mr. Plowden* said that he was of opinion that what was required was one of two things before he could be called upon to make any such apportionment as that suggested. Either the alterations found necessary must in fact be carried out and the bill for them be brought before the court, or, if the alterations were not carried out beforehand, the sum which they would cost must be agreed upon between the parties.—*Mr. Sington* asked the magistrate to state a case.—*Mr. Plowden*

assented, and inquired what could be more unsatisfactory than to ask a magistrate to determine the amount which the alterations would cost. He hoped for the sake of the parties that he would not be called upon to decide such a question, for, if he was, he should make a muddle of it.—Eventually the summons was adjourned to give the parties an opportunity of considering the matter.

ERYTHEMA SCARLATINIFORME DESQUAMATIVUM RECIDIVANS.—*Kramsztyk (Dermatologische Zeitschrift, Band ix., Heft 3)* reports three cases of this interesting affection, in the first two of which nine attacks occurred, and in the other two two and three attacks respectively. In first attacks the diagnosis between this disease and scarlatina may be difficult. The absence of the pharyngeal redness and the strawberry tongue, characteristic of the latter, are of great value in the differential diagnosis, although these are occasionally seen in the former affection. Even such complications as inflammation of the ears and nephritis may occur, so that the only certain diagnostic feature is the recurrence of the eruption. The author believes that the disease is not a local affection of the skin, but a general infection to be classed with the other infectious exanthemata; it is not an erythema scarlatiniforme, but a "pseudo-scarlatina recurrens."

THE KJELDHAL METHOD.—Comparative tests by several co-operating laboratories are reported (*Landw. Vers. Stat.*, Nos. 3-4, 1902) which show that the Gunning-Atterberg modification of the Kjeldahl method is as reliable as the method previously used by the German association. The method is as follows: Heat 1 to 2 grammes of substance with 20 c.c. of nitrogen-free concentrated sulphuric acid, with the addition of about 1 gramme of mercury, until the substance is dissolved (this requires about fifteen minutes), then add 15 to 18 grammes of potassium sulphate and heat again, continuing the digestion for fifteen minutes after a colourless solution has been obtained. Allow to stand ten minutes, then dilute with water. With substances which do not foam the potassium sulphate may be added at the beginning of the operation.

C. A. Mooers (Univ. Tennessee Record, No. 4, 1902) calls attention to the omission in this modification of any directions as to the time to be allowed for the solution of the nitrates before adding the thio-sulphate. He also finds that there is a marked absorption of ammonia in the condenser of the Kjeldahl apparatus, probably by the mercury carried over into the coils along with paraffin. Analytical data reported indicate that the error from this cause may be considerable, especially if block-tin condensing coils are used. Glass condensing coils or straight tubes are considered cheaper and in other respects preferable to block-tin.

H. D. Law (Journ. Soc. Chem. Ind., No. 12, 1902), having made determinations of nitrogen with and without the use of permanganate to determine the correctness of Nihoul's conclusion that the amount of nitrogen obtained depends largely on the duration of the time of heating after the solution has become clear, finds that "the amount of nitrogen obtained does not increase after a clear solution has been obtained, but until this stage is reached results are always too low." With the use of an oxygen carrier the time of heating is much reduced and the results obtained are less variable.

SECURITY OF TENURE FOR MEDICAL OFFICERS OF HEALTH.

A CONFERENCE between representatives of the Medico-Political Committee of the British Medical Association and of the Council of the Incorporated Society of Medical Officers of Health was held on July 7th, 1903.

The Conference was arranged at the instance of the Chairman of the Medico-Political Committee of the British Medical Association in order to consider what steps could most effectively be taken by the British Medical Association, in co-operation with the Incorporated Society of Medical Officers of Health, to obtain security of tenure for medical officers of health.

The questions discussed were: (a) The steps to be taken to promote the passing into law of the Bill promoted by the two Societies, and introduced into Parliament, up to the present unsuccessfully, by Sir Francis Powell and others. (b) Specially whether anything further could be done to press the subject on the attention of the Government with a view to obtaining for Sir Francis Powell's Bill Government support.

As to (a), it was agreed that efforts should be made to induce the Members of Parliament who supported the Bill to introduce it at the commencement of the next Session, and to make special efforts to obtain for it an early place in the ballot.

As to (b), the organizing secretary of the British Medical Association reported that the Council of the Association had requested the President of the Local Government Board to receive a deputation on this subject as well as on that of vaccination, but so far without success. The representatives present of the Society of Medical Officers of Health expressed their strong sense of the importance of renewed efforts being made, if practicable, to secure an interview with the President of the Local Government Board. Heads were agreed upon of a memorandum of the matters to be laid before the President of the Local Government Board, and Mr. Whitaker undertook to draft such a memorandum, and to submit the draft to the secretary of the Incorporated Society of Medical Officers of Health.

Memorandum of Considerations to be submitted to the Right Honourable Walter Long, President of the Local Government Board, in favour of Legislation giving Security of Tenure to Medical Officers of Health.

The attention of the British Medical Association has frequently been drawn to the injustice to medical officers of health, and consequent injury to the sanitary administration of the country, occasioned by the shortness of the term for which appointments of medical officers of health in England and Wales are at present usually made; and it is conceived to be the duty of the Association to bring under the notice of the Government the following considerations in favour of prompt and effective legislation for the removal of the evils described:

1. That, owing to the special nature of the work of medical officers of health, it is important that they should not only be possessed of the requisite knowledge and skill, but also that they should be prepared conscientiously to discharge their duty, both advisory and administrative, in the protection of the public health, and in carrying out the instructions of the Local Government Board to

that end, without undue regard to private interests which may be affected thereby.

2. That, while such appointments are under the absolute control of local sanitary authorities, and are made for very short terms, such as a year, it may, and there is evidence for saying frequently does, happen that the medical officer is refused reappointment through having, in the conscientious discharge of his duty, roused the antagonism of private persons, or of classes of the community interested in the maintenance of abuses which he has sought to have remedied.
3. That the effect of such dismissal from office of a medical officer of health is prejudicial to the public interest in two respects: (a) Through the removal from the public service of an officer who by hypothesis has proved himself efficient; and (b) through the consequent discouragement of others from the faithful performance of the duties entrusted to them. The ultimate effect has been summed up in the statement that only the medical officer who does nothing is practically secure.
4. That Metropolitan and Scottish medical officers of health have already the security of tenure which is desired for others, and that no reason is apparent for the distinction thus made.
5. That no other public officer can be so readily got rid of by local authorities as the medical officer of health, although his duties, for the reasons above stated, would appear to demand exceptional security of tenure. The positions of the poor-law medical officers and of town clerks are specially cited for comparison.

The British Medical Association would therefore most respectfully submit that in the public interest, to promote the faithful performance of their duty by an important and responsible body of public servants, it is desirable that medical officers of health should be made, by Act of Parliament, subject to dismissal only on grounds of inefficiency or misconduct proved to the satisfaction of the Local Government Board.

A meeting of the Public Health Committee of the British Medical Association was held on October 20th, when there were present Dr. J. Groves, (Chairman (in the chair), Dr. T. D. Griffiths (President), Mr. Andrew Clark (Chairman of Council), Dr. J. H. Manley, Mr. C. H. W. Parkinson, Dr. Maxwell Ross, Dr. J. C. Thresh, and Dr. Dawson Williams.

Dr. Groves was reappointed Chairman of the Committee for the ensuing twelve months.

The Committee adopted the following resolutions:

"That it be recommended to the Council to take steps to obtain security of tenure of medical officers of health, adequate salaries and pensions, and to increase the control of the central authority by improving the status of the Local Government Board for England and Wales and its President.

"That it is desirable that the Local Government Board should be modelled on the constitution of the Board of Admiralty, with a Cabinet Minister as President, and the head of the medical department as one of its members.

"That it be recommended to the Council that steps be taken to again promote in Parliament the Bill to assure security of tenure for sanitary officers."

REVIEWS.

THE HOUSING HANDBOOK. By W. Thompson, Richmond (Surrey) Town Council. A practical manual for the use of officers, members, and committees of local authorities, etc. Pp. 101 + xvii. Price 6s. Cheap edition, 2s. 6d. London: The National Housing Reform Council, 432, West Strand, 1903.

Mr. Councillor Thompson has made the subject of housing peculiarly his own, and his exertions in endeavouring to find a solution to this difficult problem are well known. The handbook which he now presents contains a great body of information relative to schemes all over the country which Mr. Thompson has carefully collected, and if it is only to obtain the plans of all the buildings erected as a result of such schemes, medical officers and others would do well to obtain the book.

When to this, however, is added information as to cost, rents, methods of construction, and other details, it seems to the writer to be a book well-nigh indispensable to those interested in this work. There is also a summary of the law on the subject, together with model bye-laws relating to new buildings, and various other information, statistical and otherwise, which may be useful.

HOUSING BY VOLUNTARY ENTERPRISE. By James Parsons, Barrister-at-Law. Pp. 115, 8vo. Price 2s. 6d. Westminster: P. S. King and Son, 1903.

This is a criticism of the action of local authorities under Part 3 of the Housing Act, and the reader is invited to form his own conclusions from the arguments set before him. The conclusion we draw is that Mr. Parsons would leave the whole problem for private builders or companies to work out as best they can, and he feels the utmost distrust of anything that municipalities may undertake. During the last twenty years he has been intimately acquainted with the housing question in some of the poorest parts of London, and those who wish to hear the case for "private enterprise" clearly put forward will find it in this book. It is well that one who is qualified to speak on the subject from practical experience should criticise municipal work, because there is always a tendency for local authorities to think they can do no wrong. Mr. Parsons is, however, not above criticism himself, and one may easily pick holes in some of his reasoning. We agree with him, however, when he points out the danger of erecting buildings in the centre of towns for persons who could with advantage live in the suburbs. It is only for those who, from the nature of their work, are compelled to live in the centre that houses should be there erected, and that is a principle which is being gradually recognised by local authorities. The author selects the East London Dwellings Company as an example of the excellent work which voluntary enterprise may accomplish. The first-fruits of this company were Katherine Buildings, which are claimed to be the result of the views of the highest authorities; the fittings were to be of the simplest, the rents low, and the buildings airy and wholesome. We know these buildings well, and all we would say is that the marked improvement in the character of the company's later buildings justifies the assumption that Katherine Buildings were not models to be

followed. Probably most people will agree that there is plenty of scope for both private and public enterprise in building suitable houses for the poorer classes.

A GUIDE TO THE HOUSING ACTS. By Arthur P. Poley, B.A., Barrister-at-Law. London: Eyre and Spottiswoode. Price 3s. 6d.

The passing during last Session of another Housing Act has afforded the author an opportunity of bringing out a new text-book on this subject. It appears to be well up-to-date, both as regards cases and statutes. Beyond this we do not think it will prove of much assistance, either to members or to non-legal officials of local authorities. The real desideratum at present is not a legal work, but one dealing with the Housing Acts in a clear, simple, and popular style. These Acts are so complicated that perhaps the task is well-nigh impossible; but the author has hardly attempted it, for the four chapters of which this book is mainly composed prove to be rather difficult reading. The statutes are printed in an appendix. The index is fairly complete, but the omission of a table of contents is unusual and inconvenient.

INDIRECT INFECTION IN WHOOPING-COUGH.—John. L. Morse (*Boston Med. and Surg. Journ.*, October 1, 1903) recently circularized the members of the American Pediatric Association inquiring as to their experience of the transference of whooping-cough by a third party. Forty replied. Three of them reported five cases, one of which seemed rather doubtful. Opinions vary as to its possibility. He thinks it hardly possible to draw positive conclusions. The cases which were given seemed to justify the assumption that whooping-cough can be carried by a third person, but the fact that forty members of so wide experience see so few cases proves that it must be very rare.

"RETURN" CASES OF SCARLET FEVER.—It is probable that, although in a certain proportion of cases the patient may serve merely as a carrier in his secretions of infection from the ward, in the majority of instances when "return" cases occur he is at the time of discharge, and for some time afterwards, an active incubator of scarlet fever organisms in his throat and nose. On this point I would lay stress on the analogy between diphtheria and scarlet fever. In diphtheria it is a well-known fact, irrespective of whether the patients are treated in hospital or at home, that a certain number remain infectious for protracted periods, and in these cases there is usually rhinorrhœa. In such chronic cases the infection may persist for three or more months.

What occurs in diphtheria almost certainly occurs in scarlet fever in a small proportion of the total cases; and in scarlet fever, as in diphtheria, it is not, in my opinion, as a rule a question of hospital influence, but of the natural history of the disease.

These chronic cases of scarlet fever and diphtheria represent sports of the disease. The great difficulty in scarlet fever is that, unlike diphtheria, one has at present no trustworthy bacteriological test when the patient is discharged; hence the greater difficulty in controlling "return" cases in scarlet fever than in diphtheria.—A. Newsholme, *Annual Report*.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED, 1856. RECONSTITUTED, 1888. INCORPORATED, 1891.

MIDLAND BRANCH.

COMPLIMENTARY DINNER TO DR. ALFRED HILL.

A DINNER of the Branch took place on December 10th, 1903, at the Grand Hotel, Birmingham. Present: Dr. Thomas Robinson, Branch President, in the chair; the following guests of the Branch: Dr. Joseph Groves, President of the Society; Messrs. H. G. and J. E. Hill and Dr. T. E. Hill, sons of Dr. Alfred Hill; Mr. White, Public Analyst, Derby County, as a visitor; and the following members of the Branch: Drs. Barwise, Beatty, Chatelier, Clendinnen, Bostock Hill (son of Dr. Hill), Hollinshead, McCrindle, F. H. May, Millard, Maybn Read, George Reid, Richmond, J. Robertson, and Snell.

Apologies for non-attendance were read from the following gentlemen, who were prevented from coming by their engagements: Drs. Bailey, Boobyer, D'Arcy Ellis, Fosbrooke, Marsh Jackson, Herbert Jones, Malet, Manley, Henry May, Howard Wilkinson, and George Wilson.

Apologies were also received for absence from the same cause from Drs. S. Brown, Reginald Green, J. McCarthy, Lancelot Newton, Orton, and C. S. Robinson.

The toast of "Dr. Alfred Hill" was proposed by Dr. George Reid.

Dr. REID, in proposing the toast, said: It is due to the modesty of our President and the state of health of another, and I may say older, friend of our honoured guest—I refer to Dr. May—that this important toast has been placed in such inept hands as mine. At the same time, I am comforted by the thought that at such a gathering, or, indeed, at any gathering, no matter where, of public health officers, there is no need to string together platitudes in support of such a toast, for Alfred Hill's name in itself suffices to insure its most cordial acceptance. I venture to suggest that our feelings on this unique occasion are of a complex character. While we rejoice that Dr. Hill has afforded us an opportunity of wishing him continued health and happiness on the occasion of his having reached an important turning-point in his distinguished career, we lament that we no longer shall have his active co-operation in public health work. At the same time, we are happy in the knowledge that failing health is not the cause of his retirement, but that, so far as we can see, he has years of health and strength in front of him. That this may be so is our earnest hope. If I may trust my knowledge of Dr. Hill's character, I venture to predict that, in freeing himself from what one may term the shackles of office, he has no intention of shutting out from his mind the subject which has absorbed his attention during a long lifetime. In striking contrast to many professional men even much younger than himself, and in spite of the discouragement which, no doubt, he has had to face during his long career, he has lost none of that keenness and vigour which has always characterized his work—a fact which is only explainable by the love he still retains for his work and his keen sense of duty. He might very well have thrown off his harness years ago had he allowed less unselfish



*Yours faithfully,
Alfred Hill*

motives to influence him, and for this we honour him. Is it in the least likely, then, that he will now be content to retire from the field entirely? May we not hope that he will still take a more or less active part in sanitary progress, and that we shall see him amongst us occasionally? For us of a later generation it is difficult to realize what the conditions were as regards sanitary administration when Dr. Hill first began his work in Birmingham. He was the first Medical Officer of Health of the town, and on his retirement he was the senior Medical Officer of Health of the United Kingdom, the senior now being, I believe, Sir Charles Cameron. Although his statutory appointment as Medical Officer of Health dates only from 1872, his public health work began some years before then (in 1860, I think), for he acted at first as adviser of the Corporation on public health matters through what was then known as the Borough Inspection Committee. One may infer, and infer rightly, I believe, from the designation of that committee, that there were no Sanitary Inspectors in those days, and that what inspection was done was conducted voluntarily by laymen. One can well imagine that under such circumstances our friend's position was not altogether a bed of roses. Nevertheless, he held on to the rudder, and by energy, tact, and ability, succeeded in making Birmingham what it is to-day. Meanwhile, out of nothing, we may say, the elaborate administrative machinery of to-day has, step by step, been evolved, coincident with an increase of population of nearly 100 per cent., and a decline in the death-rate of about 28 per cent.

But what about Dr. Hill's work in connection with this Society? I can recall but few occasions on which I have attended meetings of this Branch that Dr. Hill has not been present, and almost invariably when he has been present he has taken part in the discussions. He, at any rate, cannot be classed among those who, from a scientific point of view, may be said to have outlived their time; in him there is no trace of fossilism. When any novel and rather fanciful theory may have been advanced at our meetings, founded upon insufficient data, it was his logical criticism, based upon a unique experience, which usually exposed the fallacy and clinched the argument; at the same time it could never be said of him that he was lacking either in courtesy or kindly feeling towards a less experienced and, perhaps, youthful colleague on such occasions. Gentlemen, the loss of Dr. Hill to the Branch—and I fear, from what I hear, that we shall lose him—will be one from which we shall not soon recover.

But his energies have by no means been confined to the Branch. He had the honour of being the first provincial President of the old London Society; and it was through his exertions that the various Medical Officers of Health Societies then existing were amalgamated into the one important Society, the present President of which we are all so glad to see here to-night. That amalgamation, gentleman, was a great step, for which again we have to thank Dr. Hill.

In this connection it is interesting to recall the fact that one of the distinguished sons of the distinguished father—I refer to Dr. Bostock Hill—was the first President of the Birmingham and Midland Branch of the Medical Officers of Health Society.

I understand that in future Dr. Hill intends to reside in the Isle of Wight, so that we shall have to bid him good-bye; and while we part with him with much regret, we at the same time wish to assure him that we rejoice that he is entering upon a period—a long one, we hope—of well-earned leisure and happiness. We rejoice that he carries

with him the knowledge that his life-long labours have borne good fruit, and that he is likely to live to see still further developments, the outcome of the good works which he initiated; we rejoice that he is in a position to leave office with the confident belief that the cause he has so much at heart will not suffer in the hands of his able successor; but, above all, we rejoice, for his sake, that he possesses sons who are prospering, and two of whom, it must be the great joy of his life to know, hold distinguished positions in the same branch of medical work to which he himself has devoted a long lifetime.

Gentlemen, I ask you to drink, most cordially, as I know you will, the health of our good friend and comrade, Dr. Alfred Hill, and wish him every joy and happiness in his well-earned retirement.

Dr. HOLLINSHEAD added a few words in support, as also did the Chairman, who, on behalf of the Branch, presented to Dr. Hill a blotting-pad in green crocodile leather, with silver corners and silver monogram (A. H.), containing a beautifully illuminated address, signed by the Chairman of the Branch. The address, which was read by the Chairman, was as follows:

"Presented to Alfred Hill, Esq., M.D., F.R.S.E., F.I.C., by the members of the Midland Branch of the Society of Medical Officers of Health on the occasion of his retirement from active Public Health Service, and in recognition of his valuable service in the cause of Public Health during the thirty years he held the position of Medical Officer of Health to the City of Birmingham.

"(Signed) T. ROBINSON, President.

"BIRMINGHAM,

"December 10th, 1908."

Dr. Hill's health was then drunk with musical honours.

Dr. HILL, in rising to reply, said that he highly appreciated the very kind remarks made by Dr. Reid in proposing his health, and he wished to express his best thanks to the Birmingham and Midland Branch of the Society of Medical Officers of Health for their hospitality that evening, and for the handsome token of their regard with which they had presented him.

His connection with the members of the Branch had been long and invariably agreeable, and the events of that evening would always be remembered by him with satisfaction and pleasure.

He had some difficulty in choosing a subject on which to address them that night, but it had occurred to him that a few imaginary photographic projections of some of the events of his life might not be without interest to them.

"All the world's a stage . . . and one man in his time plays many parts," might be said of his career, and he hoped in the relation of some of the past events of his life he would not be considered by them egotistical; while if he wearied them with the length of his remarks, they would put it down to the garrulity of age. The first event of his life was his birth at Walsall, in 1826, and his first remembrance was the terrible thunderstorm of 1830 on the night of the death of George IV., on which occasion the devil was popularly thought to have come to claim his own. He distinctly remembered the cholera epidemic which decimated Bilston in 1832. In 1835 one of the first events occurred which most influenced his life, for in that year he was attacked by scarlet fever, and so fell in love with the doctor who attended him that he then made up his mind to be one. In 1837 the

Grand Junction Railway was opened, and so interested was he in the engines and trucks that he frequently went down to the railway, a distance of two miles from his home, three times a day, in the hope of seeing a train pass; but as there were no time-tables available in those days, and no fixed time for the trains to pass, they would understand that many of his journeys to the railway were made in vain. In 1838 he went to the Walsall Grammar School, and it was there that, as a result of lectures given by the headmaster on the subject, he imbibed his love for chemistry. He well remembered spending his pocket-money in such interesting chemicals as chlorate of potash and zinc and sulphuric acid, Florence flasks and glass tubing, while the explosive results of such purchases were still vividly impressed, as they had originally sometimes been, on his memory. In 1842, when sixteen years of age, he was apprenticed to a medical man, and he was one of those who still believed that the old system of medical apprenticeship had some advantages as compared with the present system of medical training. Dr. Hill went on to describe some of the early experiences of his apprenticeship, such as tooth-drawing and blood-letting, mentioned that one of his first patients was a man with small-pox on a canal boat, and caused considerable amusement by describing how, when not seventeen years of age and wearing an Eton jacket, he attended his first midwifery case. In 1847 he commenced to attend the medical college and hospital, and in 1849, while still a medical student, he was chosen to attend the cholera cases in the Birmingham Town Infirmary. He should never forget his experiences of that terrible disease, especially the facies of the patients and the death-like cold of their bodies, which neither warmth nor stimulation affected. In 1850 he took his diplomas in medicine and surgery, and in the following year was appointed public vaccinator and a medical officer of a parish district, both of which appointments he held for twelve years. In the same year he was appointed lecturer at Sydenham College on chemistry and toxicology, having been one of the founders of the institution, which was subsequently, in 1868, amalgamated with Queen's College. In 1861 he was appointed Public Analyst for Birmingham, and in the following year Surgeon to the Borough Prison, and during the ten years he held the prison appointment he had many examples of the tricks of the prisoners of those days, who, to escape hard labour, not infrequently feigned epilepsy, hæmaturia, and other diseases, in the hope of deceiving their medical attendant. In 1872 he was appointed Medical Officer of Health for Birmingham, commencing his duties in January, 1873, and in the same year he resigned his professorship at Queen's College, which he had held for twenty-two years. In 1875, two years after he was appointed Medical Officer of Health, he convened a preliminary meeting to consider the formation of a local Association of Medical Officers of Health, and on January 7, 1876, the first meeting of the Birmingham and Midland Association was held, and he was elected President.

In 1885 he was elected President of the Society of Public Analysts, and in 1886 was re-elected. In the same year he was elected President of the Society of Medical Officers of Health, being the first provincial Medical Officer of Health to hold that position, and he then suggested the amalgamation of the Metropolitan and provincial societies, with the result that a conference was held in Birmingham to consider the basis of a scheme. The conference was successful, and, having been re-elected President of the Society in

1887, he had the satisfaction of seeing the amalgamation of the Metropolitan and provincial societies accomplished during that year. The advantages of amalgamation soon became very evident. It gave greater strength and authority to the Society, with improved status and increased usefulness, especially in influencing legislation, approaching the Local Government Board, in the relation of the Society to other scientific societies, in the publication of transactions, and in the promotion of institutions for chemical, physiological, and bacteriological investigations, while the economy effected was considerable. Another happy result of the amalgamation, which had not originally been anticipated, was the presence there that night of Dr. Groves, the able President of the Society, who, he was glad to say, would shortly be a near neighbour, as he (Dr. Hill) was about to take up residence at Freshwater, in Dr. Groves' sanitary district. He regarded the presence of the President of the Society on this occasion as greatly enhancing the honour conferred upon him. In 1902, after holding the office for forty-two years, he resigned his position as Public Analyst, having analyzed during that period 20,000 samples of food and drink; while, as they were all aware, he in September last resigned the office of Medical Officer of Health for Birmingham, after thirty-one years' service.

Dr. Hill then went on to describe the sanitary progress made in Birmingham during his term of office. The gas and water supplies had been purchased by the Corporation, to the great advantage of the town; schemes of sewerage and sewage disposal had been completed; a great improvement scheme which provided the town with its finest street, and at the same time removed one of its most insanitary and degraded districts, had been carried out; while excellent general and isolation hospitals had been erected. The initiative in most, if not all, of those great improvements was taken by that great statesman, Mr. Joseph Chamberlain, of whom Birmingham is so justly proud, to whom it is so grateful for the unparalleled benefits he conferred upon her people, and of whom it can truly be said, "Nullum quod totogit non ornavit." The sanitary progress of the town was also favourably influenced by the closing, after analysis and report in every case, of over 4,000 shallow, polluted wells; by the abolition, still in progress, of the midden privy system; by the increase in the staff of sanitary inspectors; by the appointment of women health visitors, of the value of whose services he could not speak too highly; and by the improvements begun in the dwellings of the working classes. As a result of the improvements he had mentioned, and of many others more or less important, there had been a decline in the mortality of the town from 26.8 to 18 per 1,000 population, or upwards of 30 per cent.

But although such a great change for the better had been effected in the sanitary state, not only in Birmingham, but of other large centres of population, much still remained to be done. He was afraid there was much truth in the adage that "God made the country, but man made the town"; and, omitting the medieval epidemics, there was no doubt that many of the diseases and epidemics from which we had suffered were the result of either bad sanitary work or general sanitary neglect. Take, for instance, the cholera epidemic of 1832 in Bilston, to which he had already alluded. The sanitary circumstances of that town were of the most degraded description, and the population consisted largely of a class which had no regard for cleanliness or for the most elementary laws of domestic hygiene, with the result that cholera, on being intro-

duced, found a most fruitful breeding-place. The epidemic of 1832 lasted only seven weeks among a population of 14,492, but during that short period no fewer than 3,568 cases occurred, which was equal to an attack-rate of 1 person in 4 of the whole population, or nearly 25 per cent.; while the deaths numbered 742, equal to 1 person in 19.5, or 5 per cent. of the whole population. The figures of that terrible epidemic could be better appreciated if they applied them to Birmingham, with its present population of 530,000. Such an epidemic would have produced in Birmingham at the same rate 130,488 cases in the seven weeks, or 18,641 in a week, or 2,663 in a single day; while the deaths would have numbered during the same period 27,136, or 3,876 in a week, or 551 in a day. Thanks to modern sanitation, such an awful condition of things is now utterly unrealizable. Unfortunately, Bilston for the time took little heed of its experiences of 1832, for when cholera again visited the town in 1847 its sanitary condition was still extremely bad. Matters, however, had very much improved since then, both in Bilston and the country generally, and cholera, like typhus fever, has become practically extinct, while the mortality from enteric fever, phthisis, and other preventable diseases has greatly diminished, owing to the great results of sanitary work, whose agents, pioneers, and educators have been principally Medical Officers of Health and their staffs. They should, however, not be satisfied with the results attained, for as an outcome of further effort they might with certainty look forward to a still lower mortality, higher health, and greater longevity, than had so far been attained. Much had also been done for the improvement and wholesomeness of our food-supplies by the administration of the Public Health Acts and the Food and Drugs Acts, and but for public indifference and magisterial leniency far better results would have been attained, and he was afraid there was some truth in Hudibras' sarcastic utterance, that "to some the pleasure is as great of being cheated as to cheat." That was especially the case with regard to that most important article of food, milk, and to insure its wholesomeness and freedom from adulteration there was need for more stringent legislation, and for the purchase of samples by Governmentally appointed officials unconnected with the localities and free to act without undue influence of any kind.

Dr. Hill then briefly referred to the many changes in the Town Council and staff of the borough and city during his term of office. Not a single member of the Council accompanied him through his whole official life; while, of the staff, he had been associated with two stipendiary magistrates, two borough and city surveyors, three town clerks, three treasurers, three recorders, three clerks of the peace, four chief constables, four coroners, five magistrates' clerks, and five inspectors of nuisances. He thought he might say that he had had an active, a strenuous, and a varied life. The work was, however, congenial to him, interested as he had ever been in applied science. He had long recognised that work—so long as it was not associated with worry—was good for both bodily and mental health, and believed that "a mind unoccupied's a mind distressed." A man without work must find some, or a substitute for it, or suffer morally as well as physically, for "Satan finds some mischief still for idle hands to do." There was, however, a time to work and a time to play, and also a time to leave off work, and he felt that that time had at length arrived for him. He shrank from the idea that it should be thought of him, "Superfluous lags the veteran on the stage." Great as was his regret at resigning his work and

severing himself from his colleagues, it was tempered by a knowledge of their kindly sentiments and esteem. He had received proofs from old pupils like Dr. Hollinshead, and from many old colleagues in the public health service and in private practice. Next to an approving conscience he placed the approval and esteem of friends, for is it not true that "Esteem is the harvest of a life spent in usefulness"? It was a great delight to him to be privileged to reap such a harvest, and he should gather it with care and treasure it up with affectionate appreciation. He felt he had earned a rest. He intended to retire to a quiet country retreat, "far from the madding crowd," and, undisturbed by the responsibilities and worries of official and professional life, to enjoy natural scenery, pure air and sunshine, which he had so long extolled for the benefit of others, and genial warmth; not rejuvenescence to regard life as—

"When all the world was young, lad,
And all the trees were green,
And every goose a swan, lad,
And every lass a queen,"

but a measure of improved health, a prospect of some prolongation of life, and, he hoped, a realization of Goldsmith's dictum, who in the "Deserted Village" says:

"Blest is the man who crowns, in shades like these,
A youth of labour with an age of ease."

Though he bade them farewell, he should maintain his connection with the Society and the Birmingham and Midland Branch, and hoped occasionally to attend their meetings, while he should read with great interest in the journal the account of their proceedings, their triumphs, and their successes.

Instead, therefore, of saying a final adieu, he should simply say "Au revoir."

Dr. BARWISE felicitously proposed the toast of "The Visitors," coupling with it the names of Dr. Groves, President of the Society, and Mr. H. G. Hill.

These gentlemen briefly replied.

Home Counties Branch.—A meeting of the Branch was held at the Holborn Restaurant on Friday, November 20th, 1903. Present: Drs. Sanders, Ashby, Woodforde, Crookshank, Barclay, Brincker, Collins, Butler, Morrison, Nash, Willoughby, Sharman, and Richards, with Mr. H. Lomas (visitor).

The Hon. Treasurer then produced his balance-sheet, showing a balance in hand of £85 10s. 9d.

Contribution to the Society's Library.—Notice was given that at the next meeting of the Branch a motion would be brought forward that, in view of the fact that the library proposed to be founded by the Society would be specially serviceable to members residing in London and the Home Counties, this Branch should make a donation of £50 towards the library fund.

References.—The Branch then considered various matters referred to it by the Council, and came to the following conclusions:

1. (a) It was resolved that the Government ought to be asked to incorporate the Sheffield clauses in an adoptive Act, the adoption being subject to the sanction of the Local Government Board, so that an

assurance might be given that the powers conferred would be properly exercised.

(b) It was resolved that the compulsory isolation of phthisis was not at present desirable.

(c) With regard to the utilization of existing isolation hospitals for the isolation of phthisis, it was resolved that each case must be considered on its merits by the authorities concerned.

(d) It was resolved that all authorities should be given power to frame bye-laws relating to expectoration in public places, and that disinfection after death or removal of cases of phthisis should be made compulsory.

2. The resolution proposed by the Midland Branch was amended by the omission of the words "no food . . . that," and the word "same," and the words "at present," and with the addition of the words "or stored" after the word "sale."

3. (a) Fresh legislation as to grooming of cows was considered unnecessary, as the model bye-laws met the requirements in view.

(b) The Branch was not prepared to express a definite opinion in respect to the advisability of seeking fresh powers for insuring the cleanliness of milk. It was suggested that any fresh legislation should embody some clause providing for the compulsory disclosure of the original source of all milk sold.

4. The Branch approved of the resolution of the Northern Branch, with the addition of the word "all" before the words "Local Authorities."

5. The Branch concurred in the advisability of appointing a Minister of Public Health.

North-Western Branch.—A meeting of the Branch was held on November 26th at the Victoria Hotel, Manchester. Present: Dr. W. Berry, J.P. (President), in the chair, Drs. Vacher, Chronnell, Barlow, Niven, Wheatley, Gornall, Garstang, Hitchon, Edlin, Watkins, Peck, Coutts, and Meredith Young.

It was resolved that a discussion be held at an early date on—

1. The general sanitary condition of collieries, with special reference to ankylostomiasis.

2. The necessity for an inquiry into the influence of hospital isolation upon the prevalence, etc., of scarlet fever.

Certain questions referred to the Branch by the Council of the Society were then considered.

A. Prevention of Tuberculosis.—1. It was resolved unanimously that compulsory notification of phthisis is desirable.

2. It was unanimously resolved that it was not desirable that compulsory powers of isolation should extend to cases of phthisis.

3. That whilst it was desirable to utilize existing isolation hospital accommodation, where practicable, for the isolation of phthisis, the greatest care should be taken that such a measure should not interfere with the provision of special permanent sanatoria. The Branch further considered that existing hospitals should only be utilized in cases where the wards so utilized were not likely to be required for considerable periods at a time for the purpose for which they were primarily intended.

4. The Branch considered that the most important of the additional steps for the prevention of infection from phthisis were:

(a) The prohibition of expectoration in factories, workshops, public houses, public thoroughfares, public buildings, and public vehicles.

(b) Power to disinfect and cleanse all infected premises and articles.
B. Food-poisoning.—The Branch unanimously considered that, in the paragraph numbered 1 under this heading, the first part of the resolution (that is, from the words "that with the object" down to the words "is carried on") was impracticable. The Branch, however, were unanimously agreed on the desirability of legislation to bring all premises wherein food is prepared for sale and for human consumption up to a similar standard of sanitation to that at present applying to milk-shops and dairies.

C. Grooming of Cows, etc.—1. The Branch were in general agreement with the aim of this suggestion, but instead of the words "daily grooming of cows," they would introduce suitable words to insure that the cows be kept clean.

2. As other measures to increase the cleanliness of the milk-supply the following were suggested by the Branch:

(a) The cleansing of the hands of milkers immediately prior to milking. This would necessarily require the provision of proper washing accommodation in the milking-shed.

(b) The cleanliness of the clothing of milkers and milk-carriers.

(c) The compulsory refrigeration of milk.

(d) The carriage of milk to towns in trucks open at the sides.

(e) The securing of legislative powers dealing with the bacteriological examination of milk.

D. Expenses of Officials attending Congresses.—The Branch unanimously approved of the resolution passed by the Northern Branch.

E. Appointment of a Minister of Health.—The Branch were unanimously agreed that such an appointment was a desirable one.

Midland Branch.—This Branch held a meeting on December 3rd, 1903, at the Council House, Birmingham. Present: T. Robinson, President (in the chair,) Messrs. Ridley, Bailey, Bentty, Reginald Green, Bostock Hill, McCrindle, Malet, Henry May, Mabyon Read, George Reid, James Richmond, John Robertson, and Snell.

Dr. JAMES BEATTY read a paper on "The Notification of Phthisis."

A discussion followed, in which Messrs. Robertson, Bostock Hill, Malet, Mabyon Read, and Henry May took part. Dr. Beatty then replied.

The Branch then proceeded to consider some questions referred to it by the Council of the Society, and also a request by the Society to make some representations to the Board of Education on the teaching of elementary hygiene.

(a) Prevention of tuberculosis:

1. That, in the opinion of the Midland Branch, the compulsory notification of phthisis is desirable in the case of sanitary districts where the staff and equipment are sufficient to deal with this disease.

2. That, in the opinion of the Midland Branch, it is not at present desirable to ask for compulsory powers of isolation in cases of phthisis, advanced or otherwise.

3. The answer of the Branch was in the affirmative.

4. The Branch was of opinion that the subject does not admit of an opinion being expressed in the form of a resolution.

(b) This resolution originated with the Midland Branch.

(c) Daily grooming of cows, and washing of their teats before milking:

The Midland Branch is of opinion that it is not at present desirable to raise these questions in view of the expected report of the Commission, now sitting on the subject.

(d) Power to pay officials attending congresses:

That, in the opinion of the Midland Branch, it is desirable that Local Authorities should be empowered to pay the expenses of officials when attending congresses with the approval of their Authority.

(e) Proposed appointment of a Ministry of Health:

That the Midland Branch agrees that a re-organization of the Local Government Board is most desirable, and that the Public Health Administration should be in the hands of a body entirely distinct from the Poor Law Authority, and with a Minister at its head.

(f) The question of teaching elementary hygiene:

The Midland Branch approves of these resolutions, and informs the Society that these resolutions should, in its opinion, come from the Society, and not from the Branches.

Scottish Branch.—A meeting was held in Glasgow on November 28th. Present: Dr. J. Maxwell Ross (President); Professor Matthew Hay, Drs. McVail, Campbell Munro, Chalmers, Wilson, Templeman, MacDonald, Graham, Ebenezer Duncan, Miller, Robb, Prangnell, Somerville, Brown (Ayr), Buchan, Ledingham, and Robertson. Apologies were sent by Drs. Bruce, Nasmyth, and McKay.

After some preliminary business had been dealt with, the various questions put by the Metropolitan Branch were gone over seriatim.

1. Is compulsory notification of phthisis desirable? This gave rise to a long and most interesting discussion, which was argued from the standpoints of necessity, utility, and practicability. All the speakers were sympathetic, but only two, Drs. Duncan and Miller, supported the affirmative, the almost unanimous finding of a very representative meeting being that the time had not yet come to adopt such stringent and far-reaching powers as compulsory notification. At the same time, it was evident that every Local Authority in Scotland was making or intended to make some special effort to combat the spread of the disease.

2. To what extent (if any) should compulsory powers of isolation (hospital or home) extend to cases of phthisis, advanced or otherwise?

Again there was a long discussion, which resulted in a vote in favour of no powers being asked for, since without compulsory notification there could not be compulsory removal. In fact, did a Local Authority adopt compulsory notification, it committed itself to providing accommodation for cases requiring isolation and treatment. It was, however, agreed to answer Question (3) in the affirmative, and the finding of the Branch was that existing hospital accommodation should be utilized where safe and practicable.

4. What steps (if any) other than isolation should be included in any proposed legislation (bye-law or otherwise) to be enforced for the

purpose of preventing infection from phthisis? The reply was the enforcement of bye-laws to control spitting in places of public resort and in conveyances; also that powers should be sought to deal with infected houses.

The resolution which emanated from the Midland Branch caused some diversity of opinion, on account of its stringency in parts and vagueness in others. The powers sought would lead to serious interference with many well-conducted trades. At the same time, the Branch sympathized with the desire to control certain of the operations of trades connected with the preparation of foods.

The Branch came to the conclusion that all the powers suggested for dealing with the daily grooming of cows, washing of udders and teats, etc., were obtainable under the Contagious Diseases Animals Acts, as well as under the Dairies, Cowsheds, and Milkshops Orders. Local Authorities ought to be compelled to apply regulations and bye-laws under which ample powers might be secured. The Branch, was in entire accord with the suggestion that officials attending Sanitary Congresses should have their expenses paid by Local Authorities.

The question of the advisability of appointing a Minister of Public Health did not commend itself to the Scottish Branch, since the circumstances of legislation in the three countries are quite different.

The next meeting of the Branch will be held in February, on the third Saturday, when the deferred question of Medical Inspection of Schools will be resumed.

West of England and South Wales Branch.—A meeting was held on November 20th at 40, Prince Street, Bristol. Present: Drs. D. S. Davies, Alford, Herbert Jones, E. Walford, C. Heaven, Tubb-Thomas, C. W. Vickers, and Howard Jones, W. H. Symons, and Mr. Charles J. Waterfall.

In the absence of the President, Dr. D. S. Davies took the chair, which he vacated after the confirmation of the minutes of the previous meeting, in favour of the new President, Dr. Tubb-Thomas, who thanked the Society for the honour conferred upon him.

The President proposed that a vote of thanks be recorded in the minutes to the late President, Dr. Prichard, for the able manner in which he had presided at the meetings of the Branch. It was seconded by Dr. D. S. Davies, and carried unanimously.

Re Notification of Phthisis.—It was proposed by Dr. Symons, and seconded by Dr. Howard Jones, and carried, that "The compulsory notification of phthisis is desirable in principle."

Re Compulsory Isolation of Phthisical Cases.—It was proposed by Dr. Howard Jones, and seconded by Dr. Alford, "That the time was not yet ripe for the compulsory isolation of cases of phthisis."

Re Utilization of Present Hospital Accommodation for Phthisis.—This was agreed to on the understanding that the hospital was suitable for the purpose.

With respect to the other matters to be included in any proposed legislation for the prevention of phthisis, it was resolved to appoint a subcommittee, consisting of Drs. D. S. Davies, Symons, and Walford, to prepare a report on this matter for the next meeting.

Food Poisoning.—The first part of the Midland Branch Resolution was considered by the meeting to be unworkable, whilst the second part was carried with the addition of the word "bakehouses" after "dairies" in the last line.

Daily Grooming of Cows, etc.—The consideration of this matter was postponed until the next meeting.

The Resolution submitted to the Branch *re* payment of expenses of officials at Congresses was agreed to.

The discussion of the desirability of appointment of a Minister of Public Health was postponed *sine die*.

The next matter was the consideration of the question of the subdivision of the Branch. It was proposed by Dr. Howard Jones, and seconded by Dr. D. S. Davies, that the consideration of the matter be deferred until the membership of the Branch reached 120 at least.

An amendment was proposed by Dr. Herbert Jones, and seconded by Dr. Symons, that the matter be deferred until a meeting of the Branch, to be held in one of the Southern Counties. Five voted for the amendment, and four for the proposition.

The President then followed with his Presidential Address, dealing with Public Health Administration in Rural Districts.

Dr. Heaven proposed, and Dr. D. S. Davies seconded, a hearty vote of thanks to the President for his interesting address.

The President suitably acknowledged the vote of thanks, and referred to the number of ex-Presidents present as large.

THE USE OF ANTISEPTICS IN FOOD IN NEW SOUTH WALES.

THE Government of New South Wales is to be congratulated on the regulations which, acting on the advice of Dr. Ashburton Thompson, have been made under the Public Health Act of 1902. Section 86 of this Act places upon the Board of Health the duty of regulating the use of chemical drugs for the preservation of food. The section is so worded that the Board cannot either forbid the use of any particular preservative or the mixture of preservatives with any particular food. This difficulty has been got over by permitting the use only of "1/1000 grain per pound," which (as Dr. Thompson explains in a memorandum) is for practical purposes tantamount to unconditional prohibition. Read in this way all preservatives are forbidden to be mixed with milk and cream intended for consumption as such. The Public Health Act of New South Wales requires that all foods which are mixed with preservatives shall be legibly labelled with the nature of the preservative, and with the proportion in which it is present. The list of preservatives given in the schedule and the amount permitted, with the exceptions already indicated, are as follows: Of sulphurous acid not more than 1½ grains, of salicylic acid or benzoic acid not more than 1 grain, and of boric acid not more than 10 grains per pint of liquid or per pound of solid food. In the following foods none of these antiseptics must be mixed, save in the proportion of 1/1000 grain per pound or per pint: Milk, including condensed milk; cream, canned and bottled foods, jams and fruits, aerated waters and temperance drinks, fresh fish, vinegar, sauces, and pickles. The use of sulphurous acid and boric acid is permitted for preserved fish, bacon, and ham.

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Ankylostomiasis in Westphalian Collieries: Report to the Home Office. J. S. Haldane.

Royal Commission on Arsenical Poisoning: Final Report. Part I. 5jd. (The Commissioners consider that serious defects exist in the machinery available to safeguard the public against the introduction of poisonous and deleterious substances into food in general. Consequently, they have deemed it proper in making their recommendations to have regard to the broader issues concerned, and not merely to arsenic. They recommend more extended administration by the Local Government Board, the necessity of, official standards, and appointment of a Board of Reference. This Board of Reference, it is added, should be consultative, and not administrative.)

Home Office Orders:

No. 898: Special Exceptions—Creameries—Period of Employment of Women and Children.

No. 984: Limewashing of Factories—Exceptions.

No. 1,004: Manufacture of Electric Accumulators: Duties in regard to Work involving Contact with Dry Compounds of Lead.

Annual Report of the Chief Inspector of Factories and Workshops for 1902. Part II. Tables. 8jd.

Draft: Overtime allowed in certain Non-textile Factories and Workshops under conditions.

Bronzing: Memorandum by Chief Inspector of Factories, with Summary of Precautions recommended for Observance by Manufacturers (Forms 916 and 917).

Amended Special Rules for the Manufacture of Earthenware and China, as established, after Arbitration, by the Awards of the Umpire, Lord James of Hereford (Form 928).

Census of England and Wales, 1901: Index to the Population Tables. 2s. 6d.

The Lancet.

(No. 4,182.) The Correction of Hereditary Tendencies. Sir Samuel Wilks, Bart.

On the Use of Pure Carbolic Acid in the Treatment of Small-pox. A. E. Brindley and F. W. Bonis.

On the Value of Saline Infusion in the Treatment of Enteric Fever. D. G. Marshall.

Note on the Internal Administration of Formalin in Cases of Puerperal Fever Charles Steele.

The Uncontrolled Use of Preservatives in Food.

Determination of Fat and Total Solids in Milk. (*Archives of Pediatrics*.) (The Babcock test recommended as most reliable.)

Bacteriological Report *re* Shell-fish in connection with Outbreaks of Typhoid Fever in Glasgow.

(No. 4,183.) The Harben Lectures (Abstract of, also Editorial on). Ferdinand Hueppe. (Lecture I. General Views on the Etiology of Infectious Diseases. Lecture II. Hygiene and Serum Researches. Lecture III. Tuberculosis.)

On the Great Importance, from the Point of View of Medical Science, of the Proof that Bacteria and their Allies are capable of arising *de novo*. H. Charlton Bastian.

The Treatment of Pulmonary Tuberculosis by High-frequency Currents (Low Potential) and Intralaryngeal Injections of Antiseptics. J. Cunningham Bowie.

Some Cases of Dilatation of the Bronchial Tubes after Measles. Theodore Fisher.

An Antenatal Case of Measles. J. R. Gibson.

The Etiology of Human Tuberculosis. (Editorial.)

Experiments devoted to the Elimination of Plague in Hong Kong. (Editorial.)

The Death-rate from Alcoholism.

(No. 4,184.) The Borderlands of Diphtheria and Scarlet Fever. Hubert E. J. Biss. (Illustrated by a plan of the relations of scarlet fever with other throat infections. Subsequent correspondence.)

Relapses in Scarlet Fever. J. Darley Wynne.

A Point under the Vaccination Acts. Isaac George.

The "Red Light" Treatment of Small-pox. (Dr. J. F. Schomberg's experience of 800 cases does not corroborate the good results claimed, but Finsen holds he did not carry out the method properly. See *Journ. A.M.A.*, November 14, No. 20.)

(No. 4,185.) Occupation as a Cause of Lung Disease. Thomas Oliver.

A Group of Cancer Cases. W. G. Nash. (Continued in No. 4,186.)

Acute Contagious Pemphigus in the Newly-born. G. T. Maguire.

Primary Diphtheritic Bronchitis. (Abstract from *Presse Médicale*.)

(No. 4,186.) Typhoid Fever: a Clinical Lecture. Seymour Taylor. (Subsequent correspondence by J. T. C. Nash and W. A. Milligan.)

The Agglutination Reaction in Tropical and Asylum Dysentery. R. T. Hewlett. (Of four cases of dysentery, three reacted markedly, and the fourth slightly; an amebic case did not react at all. Two cases of asylum dysentery also reacted well. It was noteworthy that these cases reacted with the Flexner strain only, and not with the Shiga strain.)

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(No. 2,285.) The Midwives Act. (Action which is being taken in English counties having medical officers of health.)

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(No. 2,286.) The Overlaying of Infants. W. Wynn Westcott.

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An International Sanitary Bureau.

(No. 2,287.) Bubonic Plague (Kaumpuli) in Central East Africa. C. Christy.

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The Organization of the Medical Inspection of Schools.

(No. 2,288.) The Etiology of Sleeping Sickness. (With special plate.)

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(No. 2,289.) The Spread of Ankylostomiasis. T. H. Hendley.

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Hyperpyrexia in Measles. E. Barnes.

Physical Degeneration: The Food Factor.

The Milk-supply of Large Towns: Action and Inaction of Rural and County Authorities. (Replies to a series of questions addressed to the medical officers of health of counties and combined sanitary districts.)

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Are the Chief Causes of Infectious Fever connected with Vitiating of Air or with Wrong Feeding? A. Rabagliati.

Weak Points in the Sale of Food and Drugs. W. Berry.

A Comparison of Chemical and Septic Tank Systems as Preludes to Artificial Filtration. D. Archibald.

The Present Position of the Sewage Problem. W. Kaye Parry.

The Bacterial Treatment of Sewage. H. Robinson. (Discussion on above three papers by C. Rideal, G. Fowler, J. D. Watson; J. Robinson, A. J. Martin, J. E. Parker, and A. P. Evans.)

A Hospital Ward: Some Details—their Principles Recalled. A. Saxon Snell.

Electricity for Small Hospitals. W. N. Twelvetees.

Public Baths: The Influence of Planning and Construction upon the Cost of Maintenance and Administration. A. Saxon Snell. (Discussion.)

Evidence as to the Cause and Effect of the Lowering of the Permanent Water Levels in the London Water Basin. C. Beadle.

Cremation v. Burial. W. Holder.

The Scope and Limitations of Bacteriology in the Local Investigation of Infectious Disease. P. J. Cammidge.

The Failure of Steam Disinfection through Residual Air. W. Defties.

Standardization of Disinfectants. S. Rideal and J. T. Ainslie Walker. (A full summary of this paper has already appeared in *PUBLIC HEALTH*.)

The Self-purification of "Made-soil." W. G. Savage.

The Standardizing of Sewage. W. D. Scott-Moncrieff.

The Work of the West Riding Rivers Board. H. McLean Wilson.

Manufacturers and the Rivers Pollution Acts. A. G. Leigh.

Experimental Treatment of Sewage containing Trade Waste at Huddersfield. K. F. Campbell.

Experiments in Sewage Treatment at Sheffield. O. F. Wike.

Journal of State Medicine,

(November.) Harben Lectures for 1908. Ferdinand Hueppe. (Lecture I. General Views on the Etiology of Infectious Diseases.)

Some Additional Powers required for the Effectual Control of Small-pox. S. G. Moore.

Latent Scarlet Fever and its Importance Epidemiologically. P. Caziot.

The Acid-fast Bacteria: their Resemblance to, and Differentiation from, the Tubercle Bacillus. Alfred C. Coles. (Continued.)

Para-typhoid Infections. R. Tanner Hewlett.

(December.) Harben Lecture No. II. Hygiene and Serum Researches. F. Hueppe.

Shell-fish and their Relation to Disease, more particularly Typhoid Fever. J. T. C. Nash.

Water-supply. J. Parry.

Journal of the Royal Army Medical Corps, Vol. I.

(No. 1.) The Enteric Fever Problem. (Editorial.)

(No. 2.) Second Annual Report of the Pasteur Institute of India. Lieutenant-Colonel W. Semple.

(No. 8.) Report on the Production of Vaccine at the Army Vaccine Institute, Aldershot. Veterinary-Major E. R. C. Bytler.

Memorandum on the Physique of Recruits. Director-General Army Medical Service.

(No. 4.) Conservancy—Methods and Enteric Fever Incidence in India. Captain J. M. Buist.

Empiricism in Sewage Treatment. (Editorial.)

(No. 5.) The *Bacillus coli communis* considered as an Indication of Sewage Contamination of Water-supplies. Major W. H. Horrocks. (Conclusions: The *B. coli communis*—the true bacillus of Escherich—is the only organism of the coli type on which implicit reliance can be placed as an indication of sewage contamination. It should not be present in 200 c.c. of water derived from properly protected deep wells and springs. If it be not found in 10 c.c. of upland surface-waters, it is practically certain that the supply has not been recently contaminated with human faecal material.)

Recent Suggestions for the Detection of Enteric and Colon Bacilli. (Editorial.)

The Practitioner, Vol. LXXII.

(No. 5, November.) Phthisis in Relation to Life Assurance: Age Incidence of Tuberculosis. T. D. Lester.

A Note on the Bacteriological Diagnosis of Diphtheria. George Newmann.

(No. 6, December.) Immunity and Treatment. A. S. Grünbaum.

Summer Diarrhoeal Mortality in London. L. C. Parkes.

The Journal of Tropical Medicine.

(October 15th.) The Use of Kerosene as a Culicide. St. George Gray.

The Panama Canal and the Introduction of Yellow Fever into Asia. St. George Gray.

The Culicidae of Dehra Dun. Major F. Wyville Thomson.

On the Effect of Plague Serum in Experimental Plague induced by Feeding. Dr. H. Hetsch and Dr. R. Otto.

(November 2nd.) "Mansonia" Anopheloides. Lieutenant-Colonel G. M. Giles. Municipal Sewerage. Major Frederick Smith.

(November 16th.) Calabar Swellings on the Upper Congo. Sir Patrick Manson.

The Effect of Drainage and other Measures on the Malaria of Klang, Federated Malay States. M. Watson.

(December 1st.) Dysentery. Captain E. E. Waters.

Indian Medical Gazette (Calcutta).

(August.) A New Field Service. C. Dooly and C. M. Thompson.

Red Water and Rinderpest in Cattle. Stewart Stockman.

Indian Milk-supply and Infective (Epidemic) Diarrhoea. D. Simpson.

Note on the Mycoid Body found in the Blood Corpuscles in Remittent Fevers. W. Leonard Braddon. (Continued.)

(October.) Food-poisoning at Bhowanipore. J. N. Cook.

A Generally Unknown Source of Enteric Fever. W. Beevor. (He refers to the danger of bathing in baths, and also in rivers; advises avoidance of inhaling or swallowing water, and recommends washing the teeth and gargling afterwards.)

The Journal of the American Medical Association, Vol. XLI.

(No. 15.) The Purification of Water-supplies by Slow Sand-filtration. (Continued.)

Water-filtration in the United States: The Lawrence filter—Bacterial efficiency—Lessons gained from the experience at Lawrence. The Albany Filtration

Plant: Its description—Tables showing its action, efficiency, and expense. The Philadelphia Filter: Philadelphia water-supply—Its defects—The filter-beds now being constructed.

(No. 17.) Drainage, Sewerage, and Water-supply of New Orleans. George G. Earl. (With plans.)

Work at the Small-pox Laboratory in Cleveland. (Notice of recent reports in the *Journal of Medical Research*, among which are "A Study of the Agglutinating Hemolytic and Endotheliolytic Action of the Blood Serum in Variola," by Dr. Howard, and "Studies on the Etiology and Pathology of Variola," "*Streptococcus pyogenes* in Variola," "Bactericidal Action of the Blood Serum in Variola and in Varioloid," by Drs. Perkins and Pay.)

(No. 18.) Present Status of the Purification of Public Water-supplies. George W. Fuller. (The advances made during the past decade—The Lawrence experiment station—Filter-tests—The Mississippi River water at New Orleans—The economy of mechanical filters—Possibility of purification of almost any waters—Prospects for the future in this line of sanitary work. Discussion by Drs. Swartz, Chapman, Borland, Egbert, Mayer, Owen, and Messrs. Earl and Fuller.)

The Etiology and Prevention of Infantile Diarrhoea. J. H. Mason Knox, E. G. Schorer, William H. Welch, H. M. Bracken, C. T. Probst, F. Wells, H. Mitchell, etc. (The speakers contended that the stools should be disinfected.)

Relation of the Municipal Milk-supply to the Health of Children. George W. Goler and H. O. Marcy.

(No. 19.) Leprosy in the Hawaiian Islands. J. Daland.

Leprosy from a Sanitary Standpoint. J. Dyer. (Discussion on above papers by Drs. Swartz, Sanders, Bracken, Lindsay, and French.)

Consumption not the Only Problem: The decrease of consumption and the increase of pneumonia mortality—Pneumonia a new problem in sanitation and hygiene. (Weekly Bulletin, Chicago Health Department.)

Danger from Sleeping-cars: Statement that blankets on sleeping-cars are not disinfected or cleaned oftener than once in six months—Possible danger of infection from these conveniences of travel.

Preliminary Quarantine: Provisional quarantine announcements when absolute diagnosis cannot be made.

Immigration and Public Health. A. J. McLaughlin. (Of the total number of cases of loathsome or dangerous disease found in immigrants, 87 per cent. are due to trachoma, and 10 per cent. to favus.)

Protective Inoculation against Cholera. R. P. Strong.

(No. 20.) Arrested Tuberculosis: Subsequent Histories of Seventy-nine Arrested Cases treated at the Sharon Sanatorium from 1891 to 1902. Vincent Y. Bowditch.

The "Red-Light" Treatment of Small-pox. Niels R. Finsen. (Reply to criticisms by Dr. Schanberg [see *British Medical Journal*, *supra*, and letter from Dr. Schanberg in *Journ. A.M.A.*, No. 21]. The modern "red-light" treatment not the same as that of old. Correctness of theories and good results of the method as applied. Conditions indispensable to success.)

(No. 21.) The Cultivation of *Trypanosoma Brucei*: a Preliminary Note, Frederick G. Novy and Ward J. McNeal. (Characteristics of the two forms of trypanosoma that have been cultivated.)

An Analysis of Fifteen Hundred Cases of Tuberculosis discharged from the Adirondack Cottage Sanatorium from Two to Eighteen Years Ago. Law-
 rason Brown. (Classification adopted. Results obtained in 500 cases dis-
 charged from eight to eighteen years ago. Results obtained in 1,000 cases
 discharged from two to eight years ago. Summary of results of 1,000 cases.
 Results obtained in 1,500 cases discharged from two to eighteen years ago.)

The Significance of *B. coli* in Water-supplies: Summary of Papers.

(No. 22.) The Etiology of Yellow Fever. James Carroll. (Reference to the
 work of the Yellow Fever Institute. The *Myxococcidium stegomyia*. The
 probability of the organism being a yeast fungus, and not a protozoan
 parasite—Editorial.)

The Significance of Infection, Heredity, and Predisposition in the Development
 of Pulmonary Tuberculosis. (Frequency of pulmonary tuberculosis among
 the careless and poor. Recent memoir by Schwarzkopf on the communica-
 tion of tuberculosis [*Deutsches Archiv f. Klinische Medizin*, vol. lxvii.,
 Nos. 1 and 2]. The non-evidence of hereditary predisposition. Summary
 of his conclusions.)

A New Departure for City Health Boards. (The recent introduction by the
 Health Department of New York City of trained nurses for school service.
 The methods employed. The use of the visiting nurse as an adjunct to the
 modern inspection of public schools.)

Chicago Mortality for Twenty Years. (With diagram.)

Tuberculosis in India. Dr. Cook, Medical Officer of Health, Calcutta. (The
 Hindoos, who eat no beef, who practically sterilize all the milk and cow
 products they use, are no more exempt from tuberculosis than the Christian
 and Mohammedans in their midst. The comparative infrequency of tuber-
 culosis in Indian children may possibly be accounted for by the late period
 of weaning, and the almost universal practice of maternal nursing. Tuber-
 culosis in India is, as a rule, a disease of adult life, and Dr. Cook seems to
 think that its propagation is almost always by contagion through sputum.
 The editor of the *Indian Medical Gazette* remarks that tuberculosis in all
 its forms is less frequent, according to his own observation, among native
 children than among those of the Eurasians or Europeans. So far, Indian
 testimony seems to be in favour of the contagiousness of the disease, and
 against Behring's theory of infant infection.)

American Medicine (Philadelphia).

(September 26th.) Typhoid Fever: An Analysis of 717 Cases. John McCrae.
 Spotted Fever (Tick Fever) of the Rocky Mountains: A New Disease. John F.
 Anderson.

Some Biologic Differences between the Natural and the Artificial Feeding of
 Infants. David L. Edsall.

(October 10th.) The Role of Local Sanatoriums in Preventing the Spread of
 Tuberculosis. De Lancey Rochester. (Two types required, one for incipient
 cases, another for advanced cases.)

(October 24th.) The Susceptibility of the Negro to Tuberculosis. T. D. Cole-
 man. (Immorality, irregular habits, general lack of hygiene, causes a
 greater mortality than among white persons.)

(November 7th.) A Study of School Hygiene: Development of Children and
 Preventive Medicine. Alice M. Smith.

New York Medical Journal.

(September 26th.) Is Registration and Disinfection a Successful Method of
 combating Pulmonary Consumption? Thomas J. Mays. (He analyzes
 the death records from pneumonia and tuberculosis in a number of cities,
 and claims to find that the combating of tuberculosis by disinfection, regis-
 tration, etc., seems to increase the pneumonia mortality, and that in
 a number of the localities where these are practised there has been an
 increase in phthisis during the last five years. In subsequent discussion
 Dr. Mays' statistics were characterized as exceedingly misleading—see
Journ. A.M.A., No. 17, October 24th, 1903.)

The Necessity of Special Legislation for the Prevention of the Contamination of
 our Water-supply as a Preventive of Typhoid Fever. James Mitchell.

(October 8rd.) The Sources and Methods of Infection in Pulmonary Tubercu-
 losis. J. O. Cobb. (In man, while he admits the inhalation possibilities,
 he thinks the principal avenue of infection is through the ingesta. Milk he
 does not consider an important factor, basing his opinion largely on the
 great frequency of tuberculosis among the Chinese and other people that
 do not use milk to any extent. His personal opinion is that tuberculosis
 can be conveyed both by inhalation and ingestion, but largely, if not princi-
 pally, by infected food, the common house-fly being the medium of convey-
 ance from the ejected sputum to the food on which it alights.)

American Journal of the Medical Sciences.

(October.) The Community and Tuberculosis. Beverley Robinson.

An Epidemic of Typhoid Fever due to Impure Ice. R. H. Hutchings and A. W.
 Wheeler.

The Transmission of Bovine Tuberculosis by Milk. George M. Kober.

(November.) Uncinariasis in Texas. A. J. Smith. (Contains a full description
 of the *uncinaria duodenalis* or *anchylostoma duodenale*, illustrated with
 plates, showing its anatomy, filtration bucket used in washing fecal
 matter, etc.)

Uncinariasis in the United States Army. C. F. Craig.

The Fermentation Theory of Infection and Immunity. J. W. McLaughlin.

Medical News (New York), SEPTEMBER 26.

Concerning some Points in the Treatment of Typhoid Fever. Glentworth R.
 Butler.

Note on Typhoid Fever and Scarlet Fever, with Special Reference to the Diag-
 nostic Value of Blood Cultures. Ludvig Hektoen.

Typhoid Fever in Infancy and Childhood. J. P. Crozer Griffith.

Nourishment, Medication, Hydrotherapy, and General Management of Typhoid
 Fever Cases. W. T. Baker.

Medicine, Detroit, OCTOBER.

A Case of Typhoid Cholecystitis with Calculi, but without any evidence of
 Typhoid Fever. Jesse M. Burlew.

The Serum Therapy of Scarlet Fever. Heliodor Schiller. (Schiller thinks all
 streptococci are closely related, and that any antistreptococcic serum ought
 to have some effect on scarlet fever cases. In his own experience here re-
 ported he was unable to get the Moser and Tavel serum, but obtained
 material made probably somewhat after the Marmorek method, which he

employed in two cases, both septic.* A decided change was noted after the serum injection. The earlier treatment, consisting of the use of Cr  d  's ointment, the care of the mouth, strychnine, dietetic, and hydropathic measures, caused no improvement, but a change for the better was seen after the serum injections. In both the cases there was a relapse, which he credits to renewed invasion of the system by the streptococci. Reaction from the serum was again prompt.)

Journal of Medical Research (Boston), OCTOBER.

- A Study of the Agglutinating, Hemolytic, and Endotheliolytic Action of the Blood Serum in Variola. William T. Howard, junior.
 Studies on the Etiology and Pathology of Variola. Roger G. Perkins and George O. Pay.
Streptococcus Pyogenes in Variola. *Ibid.*
 Bactericidal Action of the Blood Serum in Variola and in Varioloid. *Ibid.*
 The Agglutination of the Pneumococcus with Certain Normal and Immune Sera. Augustus Wadsworth.
 A Pathology for Forage Poisoning, or the So-called Epizootic Cerebro-spinal Meningitis of Horses. (A Preliminary Note.) D. J. McCarthy and Mazyck P. Ravenel.
 The Pathology of Chronic Fluorine Poisoning. Fritz Schwyzer.

We have all heard much of the white plague (tuberculosis) in the lay and medical press, how it is propagated, how it may be prevented, how it may be cured. The world has become rather hysterical on the subject, and, no doubt, good will come of it all. But there is another plague stalking boldly in our midst, and flaunting its banners with the greatest insolence, carrying off its victims by thousands, and disabling and disfiguring thousands of others, the innocent and the guilty, with a remarkable impartiality, and yet no notice is taken of it; it is silently ignored. We must not discuss it or speak of it, or suggest remedies for its extermination; like many things in the Pacific Islands, it is tabooed. We take the utmost care to prevent people catching measles, scarlet fever, chicken-pox, etc., and allow syphilis to come and go amongst us unnoticed and apparently uncared for. It is a most remarkable state of affairs. A poor leper, from whom the chance of taking the disease is small, is shunned, banished, and isolated, whilst a syphilitic is allowed to spread the disease at will, without restraint. It is appalling to think of the risk we all run; the innocent suffer often more than the guilty. Because the disease is now a sexual one, although it was not so originally, we must not control it or arrest its spread, or endeavour in any way to ameliorate the condition of those unfortunates who suffer from it. Our neighbours across the line will not allow emigrants with favus to land, but welcome the syphilitic if he have a few dollars in his pocket. Is it not most illogical to build hospitals in order to protect people from measles and scarlet fever, and to allow syphilis to spread itself unchallenged? It is time that the profession took the subject up and educated the public to a better knowledge of sanitary laws.—Presidential Address by F. J. Shepherd, M.D., Canadian Medical Association, Montreal, 1902.

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EDITORIAL.

THE CONTROL OF THE MILK SUPPLY.

WE have, on more than one occasion, recently drawn attention, by means of notes or the publication of papers, to the importance of the effectual control of the milk supply. But under the special circumstances, we need offer no apology for devoting an entire issue of PUBLIC HEALTH to the question. The special circumstances are that there has recently been an awakening as to the importance of the subject, a large body of new evidence has been forthcoming, and more than one Sanitary Authority has given careful consideration to the question of milk supply. The awakening has been due in part to the excellent advocacy of our contemporary the *British Medical Journal*, and of other organs interested in the public health. Fresh evidence has been brought forward in such reports as that of Dr. Newman in Finsbury, and in the records of milk-borne outbreaks by Dr. Pierce at Woking, Mr. Gifford Nash at Bedford, and Dr. Darra Mair at Lincoln. The milk-borne outbreak of scarlet fever which occurred in certain metropolitan districts in 1901, also drew attention to the potentiality for mischief possessed by an unprotected milk supply. Then the publication in the United States of America of several important bulletins and reports regarding the milk supply, and the issue of important works and papers on the subject in this country, have also operated in the direction of stimulating renewed interest. Lastly, the establishment of milk dep  ts at St. Helens, Liverpool, Battersea, and other places, has served to give a practical turn to methods of dealing with at least one aspect of the problem.

It cannot be too clearly understood that there is a double problem in connection with the milk supply. In the first place there is the question of specialised milk supplies, and in the second place there

is the larger question, and as we think, on the whole, the more important, of the control of the ordinary milk supply. We may first briefly deal with the former. The chief facts as to the methods adopted in the various municipal milk depôts are too well known to need description here, and for those who are not familiar with the details statements will be found on later pages, in the abstracts of the Finsbury and Glasgow reports. Broadly, the plan is to provide a sterilized, modified milk, in small bottles containing what is somewhat inelegantly termed "one feed," with the object of reducing that part of the infant death-rate believed to be due to polluted milk. Possibly the effect in the direction desired has been exaggerated, but whether that be so or not, there can be little doubt that for its special purpose the milk depôt system has a great deal to recommend it. As far as it goes, it is, from a dietetic point of view, probably almost wholly good, and it possesses the further advantage of providing a milk for infants free from home pollution, which is admittedly an immense gain, not immediately obtainable by other means than some system of sealed bottles of milk containing "one feed" only. We have seen extravagant statements in the lay press, suggesting that the reduction of the infant death-rate in Battersea was due to the adoption in that district of a milk depôt. It had apparently been forgotten, or was possibly not known, that throughout the metropolis, and indeed throughout the country, the years 1902 and 1903 were characterised by a reduced infant mortality, which it may therefore be presumed had little or nothing to do with the milk depôts existing in only two or three districts. The medical officers of the districts have been the first to recognise this fact. At the same time, we do not doubt for a moment that substantial advantage follows a well managed milk depôt, although we deprecate attaching too much importance to the fluctuations of the infant death-rate as the sole criterion of the success or otherwise of the system.

But we must not fail to recognise that the milk depôt system possesses certain disadvantages. These have been well summarized by Dr. Newman,* who points out: (a) That its object being the saving of life and prevention of infantile diseases, it is necessary that the system be *individualised*, as has been done in Paris by Budin and others, and that such milk should not be distributed indiscriminately, but as far as practicable under medical supervision, and that only in this way can the real effect of the modified milk be accurately measured; (b) That in any event the source of such milk must be beyond criticism, and the milk itself of a high standard, bacteriologically and chemically, for sterilization cannot make a milk highly

* Bacteriology of Milk (Swithinbank and Newman), p. 508.

contaminated with bacteria and their toxins a really satisfactory milk; (c) That the primary business of a municipality is not to trade, whether at loss or gain, in a specialised milk, but to control and supervise the whole milk trade, and insist upon a high standard of cleanliness and purity, etc.; and (d) That if this municipal movement becomes successful, it creates problems *sui generis* which do not at present exist, such for instance that private dealers will take the matter up and carry it on in a less controlled manner, and therefore with evil results, or that the very poor may begin to look upon the municipality as a foster-mother of weakly infants, and thereby lessen parental responsibility. These difficulties are not suggested by Dr. Newman in any cryptic spirit nor given undue emphasis, but it cannot be denied that there is something in them. We agree with him that the education of the public, particularly of elder girls, in the practice of domestic cleanliness and infant feeding, is of more importance than a supply of sterilized milk by the municipality; that municipalities should use all their powers, and if necessary obtain extended powers, for the supervision of the milk supply of large towns; and that milk laboratories, sterilized milk depôts, and the like (whether municipal or otherwise), should be directed to special needs where existent, and then only under medical control, each case being individually treated and carefully observed.

In our judgment, the larger part of the milk problem is the more effectual control of the milk trade. Here once more we must refer to the chapters written by Dr. Newman in *The Bacteriology of Milk*, dealing with the conveyance of disease by milk and the control of the milk supply. They contain an immense body of facts relating to the matter which no Sanitary Authority can afford to ignore. We must here content ourselves with referring to one or two broad considerations. In the first place, we wish to emphasise the practicability of improving the milk supply. We have heard it alleged by supporters of the municipal milk movement that it is idle to attempt to improve matters, that demand for a pure milk supply is a counsel of perfection, and that therefore sterilized milk is the only way out of the problem. Now we do not share this view for one moment, nor do we believe the facts of the case lend support to it. The one chief desideratum in respect of any improvement in the ordinary supply is *cleanliness of management*. It is not so much a matter of cubic capacity of cowsheds or special modes of ventilation (though these matters have importance), as it is of clean dairying, clean cows, clean milkers, clean methods, clean utensils, and clean storage prior to use. This is now becoming more and more admitted, but it is alleged that it cannot be obtained. It is now however proved that

such is not the case. In Denmark, in certain American dairies, in several of the large dairy companies in England, by Mr. Carson in Essex, by Mr. Sørensen at York, and by many others, clean dairying is actually being carried out at this moment, and with the most excellent results. It is therefore futile to say it cannot be done. And as to home contamination, surely the *radical* and scientific method of solution is not sealed milk bottles, but education of public opinion. Dr. Niven, Dr. Newsholme, Professor Delépine, and others, have drawn attention to this point.

The evidence obtained by Dr. Timbrell Bulstrode and Mr. Huddart on the occasion of their visit to Denmark, etc., for the Departmental Committee of Food Preservatives (*see* Report, 1901, p. 283) was also in the direction of showing the importance of cleanliness and education in matters concerning the milk supply. As a result of their wide peregrinations they conclude, "that the Danes possess a somewhat higher estimate of the value of cleanliness in the cowhouse than is possessed in this country. Still we wish to state plainly that we saw nothing in this particular alone which is not frequently attained to in England, and which by the exercise of more care and intelligence could not be reached in many more instances—in a word, it was not superiority of the Danish cowhouses which impressed itself so much upon us, as the intelligent manner in which the Danes make use of the often humble facilities at their disposal." The Danes recognise that the destruction, inhibition, or regulation of bacterial activity is the basis of all successful dairying operations, and hence their milk-creed may be expressed in a few words, viz., well-ventilated and well-lighted cowsheds, pure milking, careful straining, and rapid cooling.

In the second place, we think nothing but good can come of enquiries such as that which has been carried out in Finsbury, and of which particulars appear in the present issue. It is obvious that the exact lines of enquiry will differ according to special needs and local conditions, but the very fact of ascertaining such a point as the area of gathering ground of a milk supply, at once demonstrates to the lay mind the situation of affairs. Moreover, it stimulates the trade itself, and has a beneficial effect in that way. But more than everything else, it places the Medical Officer of Health in possession of certain facts, without which he is certainly minus the requirements for control. As in a water supply, so in a milk supply, the source is a matter of the first import. And this opens up the further necessity of some control, direct or indirect, over such sources. The lack of control over the milk supply is clearly an anomaly.

Lastly, there is the matter of legislative control. In the past the legislature has mainly given powers of a kind to be exercised in the

event of an outbreak of disease traced to milk; whereas it is evident that legislation should be such as to prevent the occurrence of such milk-borne outbreaks. Then again, speaking broadly, the legislation now on the statute-book needs revision in the light of modern bacteriology and modern methods of dairying, and the whole of it needs systematising and enforcing with much greater uniformity throughout the country. There are many minor amendments which at once suggest themselves, but this is not the place to discuss them, important though they are. What we desire to urge is a firmer grasp by the local and imperial authorities of the entire problem, on preventive lines rather than on palliative and curative lines, and a unification of milk legislation.

SORE THROAT AND MILK AT LINCOLN.—The Local Government Board has issued a report by Dr. L. W. Darra Mair on an outbreak of illness which occurred at Lincoln in May, 1902. The persons affected (more than 200) were mostly adults, and exhibited similar symptoms—sickness, sore throat, fever, and sometimes a rash. Nearly all the affected households were supplied with milk from one dairy. Most of the patients desquamated, and in many of these the nature of the desquamation appeared to be typical of scarlatina. But on making inquiries as to the general course of the disease from the practitioners who attended the cases, Dr. Mair found that many symptoms present were unlike those of scarlatina. He has arrived at the conclusion that "the Lincoln epidemic was not only quite distinct from scarlet fever, but was in fact a special disease." Some of the points of distinction on which he lays stress are its frequent occurrence in old people, the rarity of albuminuria, the fall of temperature at the appearance of the eruption, the absence of "strawberry" tongue, and the rarity of vomiting. Dr. Mair finds further corroboration of his views in the bacteriological investigations of the disease conducted by Drs. Klein and Gordon. From none of the seventeen swabbings of throats examined by these authorities was the streptococcus scarlatinæ obtained; but in three cases an interesting yeast-like body was isolated which proved pathogenic to animals, and the suggestion is raised that this may have been the cause of the illness. In many of the fields at the time a brownish-red powder or "rust" was observed, and examination showed it to be similar to that from the throats of patients; it differs in failing to grow at blood temperature and in failing to produce illness in animals. It remains to be ascertained by subsequent investigation whether there is any relationship between the yeast of the Lincoln epidemic and any of the spores found in certain phases of some of these rusts, smuts, and mushroom fungi. But if it may be believed that there is some relationship, it is obvious that the main features of the epidemic may become easy of explanation. Especially does its occurrence in the spring, and its sudden termination, after a brief duration, become, in view of the short life of the yeast-like spore, readily understandable. The udders of the cows would be more or less covered with the spores, to be transferred to the milk later on in the process of milking.

THE MILK SUPPLY OF A LONDON BOROUGH.*

By GEORGE NEWMAN, M.D., F.R.S.E.,

Medical Officer of Health of the Metropolitan Borough of Finsbury.

DURING the present year we have made enquiries respecting the source of the milk sold in Finsbury. In a general way, it may be said, that vendors have three modes of obtaining milk. First, some 185 milk-sellers in Finsbury obtain their supply through milk contractors, who deal with more than a thousand country farms. There are 14 such wholesale contractors trading in the Borough. Secondly, there are some 50 milk-sellers who obtain their milk through other milk-sellers in the Borough from country farms. Thirdly, there are perhaps a dozen milk-shops which obtain part or all of their milk from town cowsheds situated in the Borough. Speaking generally, therefore, it may be said that about 235 of the 261 milk-sellers in Finsbury obtain their milk wholly or partly from country cowsheds, whereas about a score obtain their milk wholly or partly from town cowsheds.†

It is proposed to deal briefly with these two different sources.

I. COUNTRY COWSHEDS SUPPLYING MILK TO FINSBURY.

The fourteen contractors deal with some 1,111 farms situated at varying distances from London. The table (*see* p. 259), and map (*see* p. 260), set out the main facts with regard to the distribution of the towns and villages where the farms are situated which send milk.

In addition to the farms dealing with contractors, some 70 farms, situated in a like manner in different parts of the country, deal direct with 21 of the larger milk-sellers, and in this way about 60 shops are supplied. Hence, about 1,200 farms send milk into Finsbury more or less regularly.

The country sources, as will be seen from the map (*see* p. 260), show a characteristic distribution. Much of the milk is derived from the great milk-producing counties of Derbyshire, Staffordshire, Leicestershire, Warwickshire, and Wiltshire, and very little appears to come

Contractor.	No. of Farms.	Counties in which Farms are chiefly situated.	No. of Milk Sellers supplied in Finsbury.
A	13	Derby, Essex	9
B	48	Wilts, Derby, Berks, Somerset, Norfolk, Hants, Worcester, Dorset, Oxford, Gloucester, Cambridge	6
C	3	Stafford, Derby	4
D	400	Berks, Wilts, Bucks	18
E	100	Leicester, Dorset, Warwick, Cheshire, Suffolk, Somerset	21
F	80	Norfolk, Essex, Cambs., Derby, Leicester	31
G	3	Derby, Stafford, Northampton	7
H	58	Leicester, Warwick, Stafford, Derby, Herts	16
I	70	Devon, Dorset, Wilts, Derby, Stafford	9
J	70	Stafford, Derby, Leicester	24
K	1	Middlesex	4
L	60	Derby, Leicester, Bucks	2
M	60	Leicester, Middlesex, Stafford, Derby, Bucks, Bedford, Gloucester, Derby, Cambridge, Essex, Norfolk, Bucks, Stafford, Hunts, Leicester, Warwick	32
N	200		
TOTALS	1111		185

from the home counties. On the map 280 towns and villages are marked. The distances of these places, in straight measurement, are as follows:—

Within the 25 mile radius equal 2 (0·7 per cent.)

„ 50 „ „ 13 (4·6 „)

„ 100 „ „ 111 (39·5 „)

„ 150 „ „ 145 (51·9 „)

„ 200 „ „ 10 (3·5 „)

It is evident that 95 per cent of all the milk which comes into Finsbury from the country must of necessity spend several hours on the railway. From one cause or another this period of transit from farm to milk-shop averages 10 to 12 hours. An example will illustrate what actually happens. A certain contractor in Finsbury obtains his milk from a number of farms in the Derbyshire and Staffordshire district. He possesses a more or less correct list of the farms with which he deals, and a correct list of his milk agents through whom he does his business. He receives between 1,000 and 1,500 gallons of milk daily, and it is delivered in ordinary milk churns at Euston or St. Pancras stations early in the morning. At R., in Staffordshire, he has an agent who obtains milk from some half dozen farms within three or four miles of R. railway station. Milking takes place between 4 and 6 p.m., and the milk is strained, and some of it cooled, and placed in churns and sent to R. railway station. The milk undergoes various vicissitudes on the railway (whose company does not

* Abstract from a Special Report on the Milk Supply of the Metropolitan Borough of Finsbury, November, 1903.

† We have a register in Finsbury of the source of the milk of every milk seller, whether it be town or country, so that it would be practicable at any moment to trace a milk supply with some degree of accuracy. A register is also kept of all the milk shops in the Borough, containing particulars of each in respect to general and particular sanitation, management of milk trade, &c.

this one contractor supplies directly 10 wholesale and retail milk-vendors, also directly six retail milk-vendors, and indirectly 16 retail milk-vendors. Thirty-two shops in all, therefore, in this Borough get their milk from this contractor. But the ten wholesale dealers carry on a retail trade inside and outside the Borough. For example: No. 28 is such a milk shop, doing no wholesale but only a retail trade in Finsbury. A brief consideration of this chart will reveal the complexity of the trade, and the extreme difficulty of tracing the exact source of the milk sold by wholesale or retail in any of these 32 shops. Nor is this a matter of merely theoretical interest. It involves the entire question of tracing infection and adulteration. We know much of the milk in Finsbury is adulterated (see p. 273); we also know that every now and then disease is conveyed by milk sold in Finsbury (see p. 285), and yet, under existing circumstances, we are unable to trace its origin, or say who it is that is to blame for bringing the whole local milk trade under suspicion.

The Condition of Country Cowsheds.—The long period of transit and the opportunities of contamination of the milk which thereby occur is not, however, the only fact to be borne in mind. There is the further question of the condition of the farms and cowsheds from which the milk is obtained.

The sources of pollution of milk are various, and depend upon many minor circumstances and conditions. But for all practical purposes there are four chief opportunities between the cow and the consumer when milk may become contaminated.

1. At the farm.
2. During transit to the milk-shop.
3. After arrival in the shop.
4. At the home of the consumer.

Here it is only necessary to refer to the contamination arising at the farm. There are diseases of the cow, uncleanness of the cow, insanitary and ill-ventilated cowsheds, uncleanly milking, and diseased or dusty milkers, all of which agencies may add their quota of contamination to the milk. It is, therefore, evident that the community living in Finsbury has a direct interest in the condition of the farms from which is derived the milk they daily consume. The next step therefore to discovering the source of the milk supply of the Borough, seemed to me to be to learn, if possible, something of the conditions obtaining in the contributory farms. For the following information, which for obvious reasons can only be stated in general terms, I am indebted to the official reports of the County Medical Officers of Health in Staffordshire, Derbyshire, Leicestershire, Wiltshire, &c., from which most of the Finsbury milk comes.

Staffordshire.—The Medical Officer of Health of Stoke-on-Trent, from near which a large quantity of Finsbury milk is derived, writes, in his annual report for 1900, that he has made a special inspection of the cowsheds in his district, with the following results: "In nearly every instance the cowsheds were overcrowded; in some instances as little as 350 cubic feet only being allowed for each cow. The ventilation of the sheds was, in most cases, not attended to in the slightest degree. In some it was necessary to open the doors for a few minutes before going in, on account of the oppressive smell and moisture-laden air; in some there was no means of ventilation. The fodder was frequently stored in the shed, or in a loft above in direct aerial communication with it. In most sheds the lighting was very deficient. In some there was no means of admitting light other than by the open door. In few was there any attempt at keeping the floors or walls clean, and in some cases they were filthy. The hind-quarters of the cows were in a similar condition. In one instance the Sanitary Inspector refused to recognise the erection as a cowshed, the conditions were so bad. In some instances drainage of the sheds was very defective, or absent altogether, and immense accumulations of manure were within a few feet of the doors. It is satisfactory to note that in a few cases some of the defects were remedied, but little or nothing was done in the worst instances, even after repeated efforts." In 1901 he again reports: "There are in the borough 16 dairies and cowsheds, and 31 milk-shops. The model regulations of the Local Government Board came into force in the Borough in November, 1901. In this district the cows are fed on grass most of the year, but for two or three months they are kept in the sheds all day, with the exception of a few minutes each day when they are out to water. In many instances the cubic space per cow is much below 800 feet, and some as low as 400 cubic feet. The ventilation of the sheds has in several instances been much improved. In some, however, it is still bad. In all cases greater care in watching the condition of the air in the sheds is necessary. The fodder is frequently stored in the shed or in a loft above, in direct aerial communication with it. In many of the sheds the lighting has been much improved, but in others more lighting is necessary. The floors and walls have, on the whole, been kept somewhat cleaner than the previous year, but there is still much room for improvement. Drainage alterations have been carried out in some instances, but large accumulations of manure occur frequently within a few feet of the doors and openings for ventilation.

"In April I reported to your Committee on the grossly filthy condition of certain cowsheds in the Borough. I have, during the year,

pointed out the advisability of having a veterinary surgeon to inspect and report on the cows in the sheds. No one has yet been appointed.”*

Another illustration may be cited from a different district of Staffordshire from which milk is derived, and which is fairly representative of the condition of things prevailing in many other milk-producing districts of which I have reports. The Medical Officer of this district writes in 1900: “There are no dairies in the proper sense of the word. Milk is brought in large churns from the country, but no provision is made for storing cans and cleansing them other than will be found at any ordinary working man’s house. The cow keepers do not make any special provision, using their wash-houses, and in some cases the cellars, in which to keep and wash the cans. In one case in which the cellar was used I found a drain communicating with the sewer. I am satisfied that the class of cowkeepers in this district, with one or two exceptions, have a very hazy idea of the importance of making separate provision for storing the milk and pails. With regard to the cowsheds, from what I have seen, the regulations might as well have never been issued. There are two only that I can conscientiously report as being well kept and clean; but even those are open to improvement as to ventilation, drainage, and storing of manure. The system under which cowkeeping exists is not likely to ensure good sanitation. Any working man who can afford it thinks he knows how to keep cows—he goes on with his usual work and the wife looks after the cows; the consequence is they very rarely get groomed, and you find their hind quarters plastered all over with manure, and slop and filth lying all about the place. At some of the cowsheds I have found the place at almost tropical heat, with slop and filth lying about, the cowkeeper protesting that the heat and the smell were both good for the cattle. Of course this means so much ignorance and laziness, which should be sharply looked after. A visit once a quarter evidently does no good, and some better and more strict supervision, new bye-laws, or more stringent regulations, is urgently needed.”†

I made other enquiries in this county, which resulted in similar information. In two cases, however, I received satisfactory reports of farms sending milk into Finsbury. I am also indebted to Dr. Reid, the Medical Officer of Health for Staffordshire, for information kindly supplied, at one time or another during the last three years, concerning the milk supply. Writing on June 9, 1903, Dr. Reid summarised the condition of Staffordshire dairy-farms as

* Report of Medical Officer, Staffordshire County Council, 1901, p. 97.
† Report on Health of Staffordshire, 1900.

follows: “I may mention generally that I very rarely come across a dairy-farm which is satisfactory as regards the cowsheds; *most are ill-lit, overcrowded, badly ventilated, and badly drained.*”

Derbyshire.—I have been unable to obtain particulars beyond the fact there are more than 1,400 dairies, cowsheds, and milk-shops registered under the Dairies’ Order, and that there have been a number of inspections, also a number of infringements of the Order. The Medical Officer of the County Council writes to me to the effect that the Dairies’ Order is now “fairly well enforced in Derbyshire as compared with the dead letter which the Orders were before the County Council came into existence.” He is further of opinion that inspection and regulation of Derbyshire cowsheds is for the protection of other districts, and he adds: “I am bound to confess I do not see why the ratepayers of a rural district, such as Sudbury or Repton, should pay for the inspection of dairies, the milk from which is consumed in London and other parts of the country. The cost of administering these Orders should come from Imperial taxation.”*

Leicestershire.—The County Medical Officer reports: “Most of the dairies and cowsheds are inspected; but the registration of dairy-men, cowkeepers, and purveyors of milk in some districts appears to be a dead letter. An important legal safeguard for the protection of the health of the people is thus allowed to remain in abeyance. In those districts where registration is not kept up to date, any man may, with impunity, commence to sell milk, no matter from what source obtained. In the event of an outbreak of infectious disease like typhoid fever, which may be due to milk supply, the difficulties of tracing the source of the infection in a district without registration, and possibly containing a number of small milk-sellers, are almost insurmountable. In my opinion, it is greatly in favour of the large milk-sellers, who have a big reputation to keep up, that registration should be enforced, by this means protecting themselves against any difficulties that might arise from the small, and often not over scrupulously clean, retail sellers.”†

With a few exceptions the farms in Leicestershire sending milk to Finsbury appear to be neither regulated or registered.

Wiltshire.—The County Medical Officer informs me that “the farms in the Highworth Rural District, of which Swindon forms a part, are very well looked after. They are frequently inspected, and a perfect register is kept. In the Cricklade and Wootton Bassett district there is no supervision as far as I am aware. This authority was one of the first to adopt regulations (in 1890) but they are not

* Report on Health of Derbyshire, 1901, p. 19.

† Annual Report, Medical Officer, Leicestershire County Council, 1901, p. 29.

enforced. Their attention has been called to the matter from time to time, apparently without effect. The provisions of the Dairies, Cowsheds, and Milk-shops Order are more or less enforced in every urban and rural district in Wiltshire, whether 'regulations' are adopted or not, except in the rural district of Cricklade."

In a general way it may be said that country cowsheds and country cows are maintained at a lower standard of sanitation than town cows and cowsheds. The Dairy Order is administered in many rural districts with considerable laxity, and the personal interests of the members of the Local Authorities lead to a certain degree of supineness. It is rather the exception than the rule for Regulations under the Order to be adopted, or if adopted to be enforced. In towns, on the other hand, Regulations are usually enforced with more or less strictness.

But the facts recorded above do not exhaust the available evidence concerning the conditions prevailing amongst cows and cowsheds in Cheshire, Derbyshire and Staffordshire, the districts which send most milk into Finsbury. The Corporation of Manchester has made it part of its duty to enquire into the sources of the Manchester milk supply, with the result that a number of facts are forthcoming to which brief reference may be made in so far as they concern the areas from which Finsbury milk is obtained.

1. *As to Cows.*—In 1901, 1839 cows were inspected in Manchester cowsheds, and one was found suffering from tuberculosis of the udder; in 1902, no case of tuberculous udder was found.

But a very different result was obtained when country cows, the milk of which is sent into Manchester, were examined. The facts are set out in the following table:—

	Farmers sending milk to Manchester.		Farmers sending tuberculous milk to Manchester.		Percentage of tuberculous milk.	
	1901.	1902.	1901.	1902.	1901.	1902.
Cheshire ...	172	198	18	25	10.4	12.7
Derbyshire ...	65	104	0	0	0.2	8.6
Staffordshire	25	25	2	1	8.0	4.0
TOTALS ...	262	325	20	26	9.2	8.4

In this table only the three counties have been taken from which milk comes into Finsbury. It is evident that a certain percentage of milk from these districts has been proved to be tuberculous. (See below, as to the condition of the milk reaching London.) But this is not all. Fortunately the Manchester Corporation followed the matter up, and endeavoured to remove the tuberculous cows. In

1902 they found that there were 31 cows in these country farms suffering from tuberculosis of the udder. Sixteen of these were slaughtered on the instructions of the Corporation, *but the other 15 were disposed of on the open market.** In one instance where a search was being made to find the animal yielding the tuberculous milk, 75 farms were visited containing 181 cowsheds. The Veterinary Surgeon reports: "The great majority of the cows and cowsheds were in a very dirty condition, and a considerable number of cows examined, while not suffering from tuberculosis of the udder, were certainly otherwise tuberculous. The farms in fact, with few exceptions, were totally unfit for dairy farms. Only a comparatively small proportion of the milk was sent to Manchester, the remainder, a very large quantity, *being sent to London.* . . . The dairyman stopped sending to Manchester for some time."†

In another case, the farmer replied to the Manchester Corporation instruction to slaughter his tuberculous cow, "asking to be allowed to keep the cow, as he had discontinued sending milk to Manchester, *and was sending to London.*" The Medical Officer of Health replied that the cow should be slaughtered." To this the Secretary of the local Milk Producers' Association replied, asking that the farmer be allowed to sell the cow in the open market, as times were hard, etc. The Medical Officer again replied that the cow should be slaughtered. After much delay the cow was slaughtered at Market Drayton, and the carcase was found to be "very extensively diseased and quite unfit for food."‡ It had therefore been unfit for milking for a long period.

Other examples might be given revealing the ways in which tuberculous cows are handed on from one farmer to another, or from one district to another, and their milk, when its sale is discontinued in one district, being sent to another. It is, surely, a disgraceful traffic, and fortunately some of these dealers have been brought to justice in Manchester. *In London we exercise no direct control over any of the farms or cows sending milk from the country.*§

2. *As to Cowsheds.*—The Veterinary Surgeon for Manchester reports as follows:—

In *Cheshire*—"Greater attempts are made at cleanliness . . . The cowsheds are, for the most part, dark and ill ventilated, and either badly drained or not drained at all."||

* Report on Health of City of Manchester, 1902, p. 141.

† Ibid., p. 148.

‡ Ibid., p. 149.

§ The Public Health (London) Act, 1891, sec. 71, only applies in the event of an outbreak of disease.

|| Report on Health of City of Manchester, 1902, p. 143.

In *Derbyshire and Staffordshire*—"The conditions show no improvement. The cowsheds are, on the whole, decidedly worse than those in Cheshire. In many cases the cubic space per cow is only about 200 cubic feet." [Local Government Board standard is 800 feet.] No suitable provision for storage of manure; yard surfaces uneven and dirty; manure kept adjacent to cowsheds; water supply very often of a questionable character; and unclean refrigeration, are all more or less prevalent in these counties.*

In 1901, report was made to the Manchester Corporation of 111 cowsheds in the districts where the farms are chiefly situated which supply Finsbury with milk.† I have tabulated the results as follows:—

	Cowsheds examined.	Dirty.	Bad light.	Deficient ventilation.	Bad Drainage.
Totals ...	111	48	73	68	64
Percentages	—	43·2	66·2	61·2	57·6

These facts concerning the condition of country cowsheds, situated in the milk gathering-ground of Finsbury, will be sufficient to show that much remains to be done in the direction of supervision and control of the dairy farms furnishing London's milk supply.

II. FINSBURY COWSHEDS.

Milk sold in Finsbury is also derived from seven cowsheds situated in the Borough, containing at the present time 118 cows. There is licensed accommodation for about 150. The number both of cowsheds and cows has diminished in recent years. In 1856, for example, in Clerkenwell alone as many as 540 cows were stabled. Ten years ago there were 13 cowsheds in the district which now constitutes the Borough of Finsbury.

Cows.—Most of the 118 cows at present stabled in Finsbury are Shorthorns or their cross. It is the practice to purchase good cows, and, on the whole, they are in good condition. Certainly the Finsbury cows are in a much better condition than the general average of cows in country cowsheds. This is due to three causes operating in the Metropolis. First, good class animals come to the London cowsheds, because the owners have to send them to the butcher when dry, and, therefore, inferior animals are a poor investment. Secondly, there is a very regular and thorough inspection by the Veterinary Inspector of the London County Council. Thirdly, there is no in-breeding. Consequently, general tuberculosis, which probably affects more

* Report on Health of City of Manchester, 1902, p. 144.

† Ibid. 1901, pp. 246-251.

than 30 per cent. of milch cows in the country (McFadyean, Delépine, etc.), only affects 20 per cent in London, and whereas 2 per cent of country cows have tuberculosis of the udder, only 0·20 per cent of London cows have tuberculous disease of the udder.*

The cows in Finsbury are not kept as clean as they might be, and in not a few cases, at the time of my last inspection, I found cows in a filthy condition and their flanks and hind quarters plastered with dirt.

Cubic Capacity.—The standard laid down by the Dairies, Milkshops and Cowsheds Order is 800 cubic feet per cow (Regulation 8.) In only one instance is the cubic capacity in Finsbury cowsheds below this figure; in the largest cowshed with 49 cows there are 560 cubic feet per cow; in the other sheds the capacities are 848, 990, 1000, 1100, 2000, and 2154 cubic feet respectively.

The condition of Cowsheds in Finsbury is, on the whole, good. The paving and drainage is satisfactory, but general uncleanness and untidiness is marked. Manure is left lying about, and the receptacles for this stuff are not cleared as often or so thoroughly as they should be. One or two of the sheds are deficient in light. But, in a general way, it may be said that the defects are not those of structure or accommodation so much as those due to careless management.

Periods of Milking.—All the cows in Finsbury are milked twice daily, in the early morning and early afternoon. I saw no evidence of thoroughly clean milking, although I was informed in most cases that milkers washed before and during that operation, and also cleansed the udders of the cows about to be milked. After milking, the milk is in all cases strained ("screened"), generally through muslin, in order to get rid of particulate matter. In five out of the seven cowsheds the milk is cooled over a Lawrence cooler. In one it is cooled in a can under a tap of cold water, and in one it is not cooled at all. I consider the entire absence of cooling a great disadvantage, but I was told that the customers preferred it not cooled. Most of the milk is sold in Finsbury on "rounds" or in shops, but some of it finds its way to other metropolitan districts. The approximate amount yielded is 10 quarts per cow per day. On the whole, and judging the matter on broad lines, there would appear to be much room for improvement in the straining, manipulation, cooling, and storage of milk in all these seven cowsheds. Rough and ready management, in a corner of the cowshed or yard, and entrusting the work to the cowman, will not suffice. Dirty milkers and dirty utensils are unpardonable.

* Annual Reports of Medical Officer, 1899-1901, and since that date Minutes of London County Council, 1902-3.

MILK SHOPS.

There are registered in the Borough 261 milk vendors, of whom 40 are confectioners or maintain coffee shops, leaving 221 milk vendors (or about one to every 450 of the population) who sell milk for consumption off the premises. For the purposes of this enquiry a thorough inspection has been made of these 221 milk-shops. They are divisible into two groups, namely: (a) dairies, and (b) general shops selling milk. There are 39 so-called dairies (or 18 per cent of the total) and 182 general shops. At the dairies only milk, butter, cheese, and mineral waters are sold as a rule. At the general shops every kind of provision and grocery is sold, and in many cases spices, soap, wood, paraffin oil, blacking, etc., are also sold. This, therefore, is the great dividing line between these milk-shops; and, as a general rule, it may be said that the dairies sell most milk (about 60 per cent of the total) and are managed in a more satisfactory and cleanly manner than the general shops. It is, of course, evident that it is impossible to manage a general provision shop, selling all sorts of miscellaneous materials, in a cleanly way. Hence it comes about that most of these general shops are open to criticism from the point of view of a pure milk supply. Several matters of importance respecting the 221 milk-shops may now be briefly considered:—

Milk Storage.—When the milk arrives from the farm, or from the contractor, which it generally does, as we have seen, in the early morning, it is necessary to store it on the milk-shop premises. Such milk may be stored for two or three hours only, or for 24 hours or more. In 35 shops (or 16 per cent) it is stored in the churns in which it arrives, or in special vessels kept for the purpose, and protected in a greater or lesser measure from pollution. In 186 (or 84 per cent of the total milk-shops in the Borough) the milk is at once placed in the counter pan (metal or earthenware) in the shop. As everyone knows, these counter pans are exposed in the shop and dipped into whenever a customer requires serving with milk. Commonly, such pans will contain from 2-4 gallons of milk, and this is the store which will last, more or less, throughout the day. As a rule, these pans and the other utensils used in the Finsbury milk-shops are fairly clean; but as the day goes by it is found that dirt collects in the pan and on the milk, owing to the fact that, as a rule, the pans are not covered. Two years ago instructions were given that every one of these pans was to be covered, and many of the milk-sellers provide themselves with muslin covers, paper frames, or metal lids. Now we found by inspection that in 161 shops no cover at all was being used. That is to say, that 73 per cent of the milk-sellers do not take

the most simple and elementary precaution to keep their milk from becoming polluted. It cannot be too strongly emphasised *that milk becomes contaminated in milk shops*, because it is not sufficiently protected. Such contamination arises from three sources: (1) Constant dipping and manipulation; (2) Dust from the air; (3) Flies.

If a pan of milk is exposed to the dusty air of a small general provision shop, as it is in 180 shops in Finsbury, for from two to twelve hours, it gains an almost incredible amount of dust and dirt. A frequent use of the dipper must inevitably convey some small quantity of dust into the milk. But this is unavoidable, and a negligible quantity. Exposure to a dusty atmosphere for a number of hours carries into the milk much more, and *flies* are responsible for a third dose of filth. I entered a milk-shop in the Borough only recently, and found nine flies in the milk-pan. The pan was nearly empty, and the vendor had occasion to empty it while I was in the shop, and it was easy to show the vendor a black scum of deposited dirt at the bottom of his pan. Flies are responsible for a great deal of the pollution of milk. They pass from putrifying animal and vegetable matter in the street to the nearest milk-pan, and deposit in the milk the filth attaching to their bodies, mandibles, wings, and legs. It is thus that typhoid fever infection was spread in the Spanish-American War and in the South African War.* It is thus that every kind of objectionable filth finds its way into *unprotected vessels of milk*. There are only 60 (or 16 per cent of the total) shops in Finsbury where the milk is protected from such pollution.

Cleanliness of Utensils.—Increasing attention is given in the matter of cleanliness of vessels by milk-sellers in Finsbury. As a result of this enquiry it appears that in five shops only were the milk pans, milk cans, and other similar utensils absolutely dirty. In 204 shops the vessels used were fairly clean, and in 12 instances they were "thoroughly clean" and in every way beyond criticism. The importance of this matter cannot be overstated. At a moderate computation some 8,000 milk vessels are used daily in the Borough. Any dust or dirt which they contain will naturally pass into the milk supply. Fifty-two shops use *house-cans* in their trade. These vary in size from half-a-pint to one quart, and it appears that 7,579 of them are in daily use. Milk is conveyed in these vessels from the shops to the consumer's home, where they may remain indefinitely before being returned to the shop.† It is satisfactory to learn that it is the custom

* American War Department, Official Report, 1900; British Medical Journal, 1901, vol. i., pp. 642, 770; and 1902, vol. ii., 986.

† In 1902 on visiting a fatal case of confluent small-pox in Valetta Street, I found eight of these milk house-cans on a small table by the patient's bed. He had used them for drinking out of.

of the 52 milk vendors using these house-cans to have them thoroughly cleansed after each use in hot water and soda.

Sanitary Condition of Milk-shops.—Out of the total of 221 milk-shops inspected in this enquiry, 116 (or 52 per cent) were found to have one or more sanitary defects. The chief defects may be tabulated as follows:—

Sanitary Defects.	No. of Milk-shops.
Dust-box accommodation defective	20
Dust-box altogether absent	15
Yard paving absent or defective	10
Yard extremely dirty or refuse accumulated	28
Water-closet defective	82
Whole drainage defective	3
Water cistern defective	4
Foul water cistern	25
Dirty premises throughout	86

As a rule, the most defective premises were those used for general purposes and where a few pints or quarts of milk were sold. In some cases, however, sanitary defects were met with at dairies carrying on a large business.*

Milk Trade in Finsbury.—A little more than one half (about 60 per cent) of the milk trade done in the Borough is in the hands of the 39 dairies, and the remainder (about 40 per cent) is in the hands of the 182 general dealers. The trade appears to be distributed as follows:—

Daily sale.	No. of shops.	Total barn gallons of milk sold daily.
Shops dealing in gallons of milk	114	1881
Shops dealing in quarts of milk	94	48
Shops dealing in pints of milk	13	4
Totals	221	1488

Assuming these figures to be the daily average throughout the year it would appear that upwards of 500,000 barn gallons of milk (i.e., a million imperial gallons), are sold in Finsbury during the year (an average of ten imperial gallons per head of the population per annum). Our returns show that 513 persons are actually engaged in the direct manipulation of this milk.

* It is, perhaps, hardly necessary to add that the condition of the Finsbury milk-shops is not altogether unique in London. Where investigations have been made somewhat similar conditions have been met with. For instance, in Paddington, in 1902, Dr. R. Dudfield reports that 51 per cent of the milk-shops in that district are general shops, or selling other articles besides dairy produce, and a large number of defects were found. In Lambeth, in 1901, 47 per cent of the milk-shops showed sanitary defects, which included general dirtiness of premises, lack of ventilation, defective drainage, &c. In Bethnal Green, in 1901, half of the milk-shops were found to be general shops selling "paraffin oil, Dutch herrings, and other odoriferous articles."

To this must be added the trade in condensed milk, respecting which we have also made enquiry. This trade, as is well known, is largely one of recent growth, and during the last ten years has shown enormous increase. We have reason to estimate that upwards of one and a-quarter million tins of condensed milk are sold in Finsbury every year. Such tins weigh about 1 lb., and contain about half a pint of fluid. Various brands are sold in the Borough, ranging from 2½d. to 5½d. in price. The most commonly used brands are Nestle's, "Tip-Top," "Head," "Cross," "Imperial," "Cup," "Goat," "Handy," "Rose," "Sunshine," etc.

CONDITION OF MILK SOLD IN FINSBURY.

(a) CHEMICAL EXAMINATION.

The Finsbury Borough Council authorise a certain number of samples of milk to be taken under the Acts, and these are examined by the Public Analyst (Mr. J. Kear Colwell, F.I.C.). The table p. 274 gives the results obtained during the last ten years in the area now incorporated as the Finsbury Borough.

Metropolitan Borough.	No. of milks examined.	No. found to be adulterated.	Percentage of adulterations.
Hackney	310	103	82.2
St. Pancras	262	84	82.0
Stepney	550	167	80.8
Shoreditch	154	46	29.9
Poplar	151	84	22.5
Finsbury	274	58	21.2
Lewisham	231	46	19.9
Stoke Newington	44	8	18.2
Battersea	157	28	17.8
Greenwich	184	28	17.1
Bethnal Green	205	38	18.1
Southwark	1057	170	16.0
Holborn	177	28	15.8
Westminster, City	574	86	14.9
Fulham	148	21	14.2
London, City	605	80	18.2
Camberwell	818	89	12.2
Chelsea	94	11	11.7
Kensington	206	28	11.1
Paddington	820	85	10.9
Wandsworth	215	28	10.7
Deptford	157	16	10.2
Islington	587	55	9.4
Bermondsey	389	31	7.9
Lambeth	810	24	7.7
St. Marylebone	202	14	6.9
Hammersmith	189	7	5.0
Woolwich	374	18	4.8
Hampstead	67	8	4.5
London as a whole	8411	1814	15.6

	No. of Samples Analyzed.	No. of Samples Adulterated.	Percentage of Adulterated Samples.	Added Water.					Percentage of Watered Milks in Samples Analyzed.	Removal of Fat.					Percentage of Milks with fat removed on samples Analyzed.
				Under 5%.	5% to 10% over.	10% to 15% over.	15% to 20% over.	20% or over.		Under 5%.	5% to 10% over.	10% to 15% over.	15% to 20% over.	20% or over.	
1883	71	29	40.8	2	8	7	2	5	33.8	—	—	1	—	4	7.0
1884	119	29	24.3	1	8	6	3	7	21.0	—	—	—	—	4	3.3
1895	121	36	29.7	3	10	4	6	2	20.7	1	—	2	—	7	9.0
1896	235	74	31.5	8	23	9	7	6	22.6	—	6	3	5	7	8.9
1897	187	46	24.6	4	14	11	5	2	19.3	—	2	2	4	2	5.3
1898	197	42	21.3	2	14	14	3	1	17.3	—	1	4	1	2	4.0
1899	205	55	26.8	9	16	9	4	6	21.5	—	2	2	6	1	5.3
1900	228	36	15.8	5	12	6	4	2	12.8	—	—	4	1	2	3.0
1901	251	56	22.3	17	13	2	3	2	14.7	—	7	4	3	3	7.6
1902	269	53	19.7	15	15	3	2	3	14.2	2	6	3	2	2	5.5

In a number of the cases in the above Table both forms of adulteration were detected, water had been added and fat removed. Such cases have been entered under "added water."

This table (*see* p. 274), is based upon an examination of the milk of all milk-sellers in the Borough, without any exception. Occasionally, by arrangement or by accident, some vendors are sampled twice or thrice in the year, and others perhaps only once. But the methods adopted are such as work automatically and cover the whole trade, the large dealer and the small dealer, without partiality.

Several points of interest will be noticed in this decennial table. In the first place the number of samples examined has increased, owing to the increased necessity of protecting the public against adulteration. Secondly, it will be observed that the percentages of adulterated samples do not vary widely. The average works out at 25.6, which is much higher than most metropolitan boroughs (*see* p. 273), as shown in the Local Government Board's report* for 1902-3.

The comparative figures for 1902 (the most recent obtainable) work out as follows:—

	Percentage of Milk adulteration:
Borough of Finsbury	21.2
London	15.6
Twenty largest towns of England and Wales	10.8
The rest of England and Wales	10.0

The percentages of adulteration for every five years since 1877 for England and Wales may also be added for comparative purposes:—

* Dr. Harris of Islington and others have furnished evidence to show that most of the adulteration is done not by the farmer but by the wholesale or retail vendor. Examinations of milk at railway stations in London have shown such milk to be superior to the milk obtained for examination from milk-shops, and judged by chemical analysis. The following figures from the Islington Report for the 3rd Quarter of 1908, may be given as an example—[Ed.] :—

	No. of Samples.	Solids not Fat.	Fat.	Total Solids.
Milk procured in transit at Finsbury Park Station	30	8.53	4.01	12.54
Milks taken on Sundays	39	8.32	3.82	12.14
Milks taken on Week-days	48	8.45	3.84	12.29
Official Standard	—	8.50	3.00	11.50

The particulars as to the genuineness or otherwise of the samples procured or purchased on week-days, Sundays, and at Finsbury Park Railway Station were as follows:—

	Number taken.	Genuine.	Adulterated.	Percentage adulterated
Samples taken Sundays	39	30	9	23.08
Samples taken on Week-days	48	41	7	14.58
Samples taken at Finsbury Park Station	30	30	0	0.00
	112	101	11	9.8

	No. of Samples in 1902.		Percentage of Adulteration in							
	Examined.	Found Adulterated.	1902.	1901.	1900.	Quinquennium.				
						1897-01.	1892-96.	1887-91.	1882-86.	1877-81.
MILK	29,452	8,427	11.6	11.2	10.8	10.6	12.3	13.2	16.7	21.1

Thirdly, an examination of the table of results of analysis will show that much the most common adulteration is that of added water. It is, of course, the easiest to manage, and appears to the offender a less formidable undertaking than absolutely "tampering" with the milk. Nor is this feature of adulteration confined to Finsbury. In London as a whole in 1901, out of 952 adulterated milks, 618 were cases of added water, 384 of abstraction of fat, and 50 both watered and deprived of fat.* It is, therefore, evident that in London, and particularly in Finsbury, a not inconsiderable amount of watering of milk is going on. For it must be remembered that it is but a very small fraction of the actual adulteration taking place which is detected by the Local Authority.†

Unsweetened condensed milk is often added to cows' milk when a sudden call is made for an increased quantity. Some large dealers are said boldly to add water to fresh milk if their supply runs short. The Sanitary Authority, of course, only obtains indirect evidence of this. If it is done, and the retail or wholesale vendor detected, prosecuted, and fined, the fine is almost invariably of so small amount that a large profit will still be the result of the transaction. On the whole there is evidence to show that the old and grosser form of milk adulteration, by the addition of water, is largely giving place to more refined methods of mixing "separated" with "whole" milk, or in other ways reducing the quality of good milk, so that it may just reach

* "The average percentage of the added water reported to have been found in the 668 watered samples was 10.1, while the average percentage of fat removed from the 484 creamed samples was 16.8. In a memorial recently addressed to us by the Dairy Trade and Can Protection Society it is stated that the quantity of milk received in London area from outside is approximately 144,000 imperial gallons a day. If this is correct, and if we assume that the samples taken for analysis in the metropolis in 1901 correctly represent the quality of this outside milk supply, it seems that Londoners pay 4d. per quart, at least £30,000 per annum, for water which has been added to the milk supplied to them."—Thirty-first Annual Report of Local Government Board, 1901-2.

† This point becomes clear when it is seen that 500,000 barn gallons of milk (one year's sale in Finsbury) are equal to 8 million pints. But 269 samples (analysed in 1902) equal 184 pints. Hence only 184 pints out of 8 million pints have been analysed. It should be understood, moreover, that the 8 million pints is, if anything, an under-estimate. In actual cost to the consumer, this amount of milk (500,000 barn gallons or 8 million pints), at the ordinary market price, works out at £67,000 per annum.

the admittedly low standard fixed by the Board of Agriculture in their Sale of Milk regulations.

The question of the addition of preservatives to milk has not claimed much attention in Finsbury up to the present, although it has been known for some time past that preservatives were being used in Finsbury milk. Recently I had occasion to suppose that a certain milk vendor was periodically adding preservatives to his milk. Accordingly I asked the Public Analyst (Mr. Colwell) to examine a dozen samples from this person, half-a-dozen to be collected by him, and half-a-dozen by myself. This was done, and the following table reveals the results:—

No.	Date of Purchase.	Specific Gravity.	Total Solids.	Fat.	Non-fatty Solids.	Preservatives.	Remarks.
1	1903 26 May	1029.5	12.46	8.82	9.14	Not found	Genuine.
2	27 "	1029.0	10.46	2.79	7.67	Not found	Added water 9.8 per cent.
3	29 "	1028.5	10.75	2.70	8.05	Not found	Added water 5.8 per cent; fat removed 5.0 per cent.
4	3 June	1082	11.28	2.60	8.68	Formalin	Fat removed 18.8 per cent.
5	4 "	1024.5	14.65	7.00	7.65	Formalin	Abnormally high fat. (?) Purchaser known.
6	4 "	1028	10.75	8.00	7.75	Not found	Added water 8.9 per cent.
7	5 "	1027	18.88	5.40	7.98	Formalin	Abnormal fat.
8	9 "	1029	11.60	8.60	8.10	Formalin	Added water 4.6 per cent.
9	9 "	1029.5	11.61	8.40	8.21	Formalin	Added water 8.5 per cent.
10	10 "	1081	12.00	8.20	8.80	Formalin	Genuine.
11	10 "	1029	11.98	8.60	8.88	Formalin	Genuine, poor quality.
12	11 "	1080.5	11.25	2.90	8.35	Formalin	Slightly below standard, probably fat removed and water added.

Preservative was found in considerable amount (approximately to 1 in 10,000 parts) in 8 samples out of the 12, and 9 samples out of the 12 showed other forms of adulteration. In only 3 samples was the milk normal and genuine.*

Probably it would be correct to say that at least 30 per cent of all the milk sold in Finsbury contains preservatives of some kind and in some degree. It varies with the season, and is as a rule greater

* See Bacteriological Report below.

on Sundays than week-days. About 50 per cent of the London dairymen are said to use preservatives.*

Condensed Milks.—Condensed milk may be defined as cows' milk from which a large proportion of water has been removed by evaporation under reduced pressure and with the aid of heat. The cream has often been removed from the milk previous to treatment, and in consequence the product is really condensed skimmed milk. Cane sugar is added, it is alleged, with the object of preservation. Such addition, however, renders subsequent dilution necessary, and eventually some brands of condensed milk are little more than a solution of cane sugar. There are many scores of different brands of condensed milk, most of which are imported.† Some are condensed whole milks.

The trade in condensed milk now carried on in Finsbury is extensive and rapidly increasing. Dr. Hope, Medical Officer of Health of Liverpool, drew attention in 1898 to the inferiority of many of these condensed milks, pointing out that the chief variation is in the amount of cream (or fat), which is generally very low, and that almost all brands show a large addition of sugar. Twenty-one out of 22 brands contained bacteria, and were not sterile. Twenty-eight per cent of the brands contained less fat than 1 per cent. (as compared with 3 in ordinary milk), and 73 per cent contained less fat than 2 per cent. Added sugar was in almost all cases about 40 per cent.‡

In 1902, Mr. Colwell (the Public Analyst) examined five samples of condensed milks being sold in Finsbury with the following results:—

(Results of analysis of condensed whole milk are also added for comparative purposes.)

Description of Sample.	Water.	Fat.	Proteid.	Lactose.	Mineral Matter.	Cane Sugar.	Deficient in Fat.
A	26.25	1.80	12.05	14.80	2.35	42.75	82 %
B	24.30	1.60	11.46	15.50	2.40	44.74	84 %
C	23.20	2.00	11.72	14.88	2.80	45.40	80 %
D	25.45	1.00	12.26	14.71	2.45	44.07	90 %
E	24.40	2.00	9.60	15.50	3.00	45.50	80 %
Sweetened whole milk ...	22.55	12.00	9.23	18.36	2.20	40.66	—
Unsweetened whole milk ...	62.39	10.80	11.09	18.07	2.05	—	—

Four of these samples were sold in cans on which were labels notifying the fact that they contained condensed machine-skimmed milk mixed with cane sugar, but on the other can no mention was

* Report of Departmental Committee on Preservatives and Colouring Matters in Food. Board of Agriculture, 1901, pp. xii-xvii.

† Food and Dietetics. By R. Hutchison, M.D., F.R.C.P., 1902, pp. 442-445.

‡ Report on Health of City of Liverpool, 1898, pp. 181-186.

made of the addition of cane sugar. Proceedings were therefore instituted as recorded above, and a conviction was obtained for the Borough Council.*

The use of such a milk for the feeding of infants frequently results in the production of "rickets," which is apparently due to excess of carbohydrate and poverty of proteid and fat in the milk. All medical men who see much of children's diseases recognise that much harm is done in this way by the continued and increasing use of such milks as that under consideration. There is also reason to believe that the presence of an excess of cane sugar in the diet of infants is apt, from fermentation in the stomach, to result in the production of acidity, colic, and diarrhoea. Particularly is this so in summer; and if in cooler weather it is possible for some time to avoid these troubles, the child wastes from want of fat in its diet, and such children die from exhaustion and stomachic diseases. The use of condensed milk is, in the opinion of many medical men best able to judge, responsible for a number of deaths of infants under one year.†

(b) BACTERIOLOGICAL EXAMINATION.

As already pointed out, the sources of pollution of milk by bacteria are fourfold, namely: (1) At the farm; (2) During transit to the milk-shop; (3) After arrival at the milk-shop; and (4) In the home of the consumer. It was Tyndall who first pointed out, in 1878, that dust particles acted as "rafts" for carrying micro-organisms, and since that date abundant and indisputable evidence has been obtained in support of his view. *Wherever and whenever dust and dirt obtain access to milk, bacteria also obtain access.* Therefore, a large number of bacteria in milk will indicate, other things being equal, a large degree of dust pollution; a small number of bacteria, under similar circumstances, will indicate a small degree of contamination. But we may go a step further and learn, if possible, the *kind* of micro-organisms present in milk, where they have come from, and what action they are having upon the milk. Some of these bacteria may be harmless; indeed, we know that some are advantageous and beneficial, assisting in the ripening of cream and flavouring of butter. But others may be of putrefactive species,

* See Report on Public Health of Finsbury, 1902, pp. 102-108.

† In reference to this class of milks Dr. Robert Hutchison, in his work on "Food and Dietetics" (1902, p. 444), says:—"There can be no doubt that an immense amount of harm is done to infants by the indiscriminate use of such milks. Babies fed on them may look fat enough, but they are pale and flabby, and often suffer from rickets; for fatness produced by abundance of sugar in the milk is by no means a sure indication of health, and the pictures of such fat but flabby infants so freely spread abroad by the makers of condensed milks are very deceptive."

bringing about decomposition in the milk to which they gain access. And a third group may be actually disease-producing species, conveying disease to the persons drinking the milk. Hence it is clear that, by a bacteriological examination, we may obtain facts of great value as to the condition of a milk, and in any case form some opinion as to the degree of pollution by dust and dirt which milk receives.

Now much of the market milk contains very large numbers of bacteria. Dr. Park, of New York, has made extensive researches into the quality of milk sold in that city, and he finds that the number of bacteria present varies according to season and according to the standard of milk-shop. In a poor district the average number of bacteria present out of 13 samples was 1,977,692 per cubic centimetre, and in a well-to-do district the average of 10 samples was 327,500 bacteria per c.c.* Similar investigations have been made in Berlin, Paris, Edinburgh, Boston, Melbourne† and other cities. As a result it has come to be recognised that even good milk may contain from 50,000 to 500,000 micro-organisms per c.c., if such are not injurious species. Several of the American Milk Commissions have laid down that 30,000 bacteria per c.c. is a suitable standard by which to judge the quality of milk, provided none of these are disease-producing. Such figures apply to freshly drawn milk, and not to milk which has travelled a long distance to market. Certainly such a standard is, at present, too high for London milks.

For the purposes of this report I have made a careful bacteriological examination of nine London milks. Purchases were made in five shops situated in Finsbury, and four shops located in the neighbouring districts of the City of London, the City of Westminster, and the Boroughs of Holborn and Islington. Three out of the nine samples were purchased in small poor shops, the other six in good class shops. The sample was bought in the ordinary way, and it was not known that it was being obtained for purposes of examination. It was collected in sterilized bottles and examined at the Town Hall within a few minutes of being purchased.‡ The results obtained are set out in the following table:—

* Journal of Hygiene, 1901, (July), p. 895.

† A report has just come to hand from Melbourne containing a record of the bacteria found in fifty samples of milk examined in 1902. The lowest number of bacteria present was 4,800 per c.c., the highest was 8,892,000 per c.c.

‡ It should be stated that the examination was made on ordinary Petri plates, and the culture medium used was best French gelatine. The milk was diluted immediately after receipt with sterilized water to a dilution of $\frac{1}{100}$. 1 c.c. of milk was added to 9 c.c. of sterilized water in small flasks, and thoroughly mixed; 1 c.c. of this $\frac{1}{100}$ dilution was then added to 49 c.c. of sterilized water and again thoroughly mixed. This gave a dilution of $\frac{1}{10,000}$, which was found necessary in order to examine the milk. Two plates of each sample were made, and the resulting colonies of bacteria were counted on the second and third days after incubation at 22 C. The figures were checked by three counters.

District of London.	Standard of Shop.	Average No. of Bacteria per c.c.	No. of Liquefying Colonies per c.c.*
City of London	Good class	4,800,000	120,000
City of Westminster	Good class	1,600,000	125,000
Borough of Holborn	Good class	4,800,000	145,000
Borough of Islington	Good class	1,600,000	10,000
Borough of Finsbury A	Good class	2,300,000	48,000
Borough of Finsbury B	Good class	1,280,000	80,000
Borough of Finsbury C	Poor class	3,200,000	45,000
Borough of Finsbury D	Poor class	2,700,000	†
Borough of Finsbury E	Poor class	840,000‡	0

The samples above recorded were obtained in a haphazard manner, and do not necessarily represent the usual quality of the milk in these several districts. It would be absurd to conclude from these figures that the milk sold in the City of London or Holborn is inferior to milk sold in Finsbury. Obviously a very large number of examinations would be necessary to form any opinion upon the comparative condition of the milk of different districts, and other conditions would also have to be considered. The table, about the correctness of which there can be no doubt, must be taken for what it represents, namely, the bacterial content of nine milks, purchased by chance and examined at the same time, from nine London milk-shops.

Without laying undue emphasis upon these results, there are three simple deductions which may, I think, be safely drawn from them. First, Finsbury milk, as sold, contains a very large number of bacteria, and certainly a number much above any standard of suitability. Secondly, a considerable number of the contained bacteria are of the liquefying or putrefactive species (varying from one to three per cent). Thirdly, in certain poor shops, of which we possess particulars, the numbers of bacteria are extremely low or the liquefying species are absent. The last figures recorded in the table (milk-shop E) afford an excellent illustration of such shops. The cause of this apparently healthy state of the milk is the liberal addition of preservatives. The table appearing on page 277 deals with the condition of milk purchased at this same milk-shop E. In such cases the findings of bacteriology must be taken in conjunction with the results of chemical examination. There can be little doubt that much of the inferior milk sold in Finsbury is bolstered up by the addition of preservatives, which are added to disguise its true character.

* These numbers are included in the total average number of bacteria per c.c.

† These plates liquefied too rapidly for correct enumeration to be made of liquefying colonies.

‡ This milk probably contained a considerable quantity of preservative.

The milks were not tested for the presence of disease-producing bacteria. The organisms present in the numbers recorded above were chiefly of two kinds: (1) The ordinary *lactic acid bacteria* of milk, which bring about the souring of milk; (2) Common, *putrefactive bacteria*, many of which liquefy gelatine, and all of which probably gain entrance to the milk from dust and dirt.* The milk from milk-shop E was exceptionally bad, and contained a number of gas-producing and milk-coagulating organisms. In a milk derived from an inflamed udder in one of the Finsbury cowsheds, the micrococcus of mastitis was found, and was practically the only organism present. These facts in respect of Finsbury milk are not exceptional. London milks have been frequently examined, with the result that marked bacterial pollution has been demonstrated. One illustration will suffice. In 1899, 50 samples of milk were examined in St. Pancras. Sixteen (or 32 per cent) were normal healthy milks; and 34 (or 68 per cent) were unhealthy milks. Of the latter, 12 samples contained pus in smaller or greater amounts, and 5 (or 10 per cent) contained the tubercle bacillus.†

A qualitative bacteriological examination of 25 samples of milk obtained in Finsbury has just been made by A. G. R. Foulerton, F.R.C.S., D.P.H., Bacteriologist to the Middlesex Hospital, and his report is as follows:—

“The samples of milk referred to were received from Dr. Newman on the following dates: Monday, 26th October, samples 1-4; Wednesday, 28th October, samples 5-12; Friday, 30th October, samples 13-20; Wednesday, 4th November, samples 21-23; Friday, 16th November, samples 24-25.

“All 25 samples were received in clean glass bottles, with new corks, and were examined immediately after they were received in the laboratory. Each bottle contained a little more than 100 cubic centimetres of milk, and the method of examination carried out was the same in each case.‡

“The results of these tests were as follows:

* The species isolated included *Bacillus liquefaciens*, *B. fluoroscorus liquefaciens*, *Staphylococcus pyogenes albus*, *Bacillus coli communis*, several *Streptococci*, *Sarcinae*, etc.

† Report on Health of St. Pancras, 1899, pp. 61-66 (Dr. Sykes).

‡ One hundred centimetres of the sample were measured out into a large glass tube, and were therein centrifugated by means of a Runco centrifugal machine for 15 minutes. The lowest ten cubic centimetres in the tube, containing all sediment, were then carefully pipetted off into a glass tube, and again centrifugated for 15 minutes.

The upper portion of the milk in the smaller test tube was then decanted, six cover-glass specimens for microscopic examination were then prepared, and the remainder of the contents of the tube were employed for the inoculation test.

Bacteria, Pus, Dirt, etc., found in Milk.	No. of Milks in which found.	Percentage of Total No. of Milks Examined.
Pus or "pus-like" corpuscles ...	8	32
Staphylococci ...	7	28
Streptococci ...	8	32
Diplococci ...	12	48
Bacillary Forms ...	20	80
Yeasts ...	9	36
Sarcinae ...	3	12
Epithelium ...	2	8
Acid-Fast Organisms ...	3	12
Dirt ...	10	40

“Three samples of the milk contained “acid-fast” bacilli, which morphologically resembled *Bacillus tuberculosis*, but which were proved by the inoculation test to be free from the latter micro-organism.

“As regards *B. tuberculosis*, none of the twenty-five samples produced tubercular infection in the guinea-pig; all must therefore be pronounced as free from *B. tuberculosis*. With regard to the other types of organisms found, there are only two which require special mention. *Yeasts* are commonly found in samples of milk taken for analysis in the ordinary routine, and their presence in large excess may be taken as a general indication of staleness of the milk.

“Micro-organisms belonging to the group of *Streptococci* are also frequently found in milk, and their exact significance, when thus found in large quantities, is not definitely ascertained. But in a number of cases milk in which *Streptococci*, of one species or another, have been found in predominating numbers, has been suspected of being a cause of disease in man.

“Taken on the whole, the result of the examination of these twenty-five samples of milk may be said to be satisfactory from the Public

The six coverglass specimens were then stained in warm carbol-fuchsin for 15 minutes, decolourised in a 83 per cent. dilution of nitric acid in water, washed in water, counter-stained, and mounted in the usual way.

A careful microscopic examination was then made of each cover-glass, with a view to the detection of “acid-fast” bacilli, if present, and at the same time a note was made of the predominating types of other micro-organisms which were present in the sediment, and notice was taken of any abnormal quantity of foreign matter present. Inasmuch as it is impossible to distinguish by microscopic examination only, between certain harmless “acid-fast” bacilli; which may be found in milk, and *Bacillus tuberculosis*, and, moreover, since the latter may be present in milk in such small quantity as to be overlooked in such an examination, it was necessary to test each sample by inoculation. The remainder of the sediment left after the microscopic preparations were made was injected into the ham of a guinea-pig. The several guinea-pigs were killed by a dose of chloroform on the twenty-first day after inoculation, and the site of inoculation, and the neighbouring lymphatic glands and abdominal organs were carefully searched for evidence of tubercular infection. A.G.R.F.

Health point of view, and so far as the question of tubercular infection is concerned. At the same time, some of the samples contained an unnecessary amount of foreign dirt."

Mr. Foulerton furnished a Table of details showing the results of examination of each of the 25 milks sent to him. The table on page 283 is an abstract of his findings.

The results of this examination reveal no tuberculosis in this series of samples, but considerable bacterial pollution of various kinds. It should be noted that none of the milks examined had been sold, and therefore whatever pollution they contained was derived from contamination at the farm, in transit, or at the milk-shop, and not at the home of the consumer.

A word may be added as to tuberculosis. We cannot tell what percentage of the milk coming into Finsbury actually contains the germs of this disease, but there is little doubt that some of it does. In Liverpool about 2 per cent of the *town-produced* milk has been proved to be tuberculous, and 9 per cent of the *country* milk. In Hackney on one occasion 22 per cent of the milks examined bacteriologically were found to be tuberculous; in Woolwich in 1902, Dr. Davis reported 10 per cent of the milk examined bacteriologically to be tuberculous; in Camberwell in 1902, 36 milks were examined for the tubercle bacillus, and in 4 (or 11·1 per cent) the organism was found; in the City of London in 1902, 24 milks were similarly examined, and tubercle was not found in any of them; and in Islington about 14 per cent of the milks examined bacteriologically contained the tubercle bacillus. In 1901 in Croydon 6 per cent, and in London as a whole 7 per cent of the milks examined were found to contain the tubercle bacillus. These figures are sufficient to show that not only does London milk contain large numbers of bacteria (which is evidence of pollution), but a certain percentage of it contains the germs of tuberculosis.

Finally, it may be pointed out that the chief explanation of the large number of bacteria found in London milks is two-fold. In the first place, as already pointed out in the present report, London milk has generally travelled a considerable distance from the country, and as much as 12-24 hours have elapsed since the milk left the udder. Delépine and others have shown that the effect of *time* and *temperature* upon the multiplication of bacteria in milk is an intimate one. Given warm weather, and little or no refrigeration of the milk, and the organisms present will increase with almost incredible rapidity. Naturally, time will favour such multiplication. Consequently, a milk which when it left the farm contained some thousands of bacteria, will contain millions of bacteria some hours after when it reaches

the milk-shop in London. In the second place, in addition to the pollution milk undergoes at the farm, there are many opportunities for its contamination in transit and at the milk-shop. In winter very much the same degree of pollution will be found as in summer, *but at a later stage* in the life history of the milk. What occurs in, say, six hours in summer may occur in winter in twelve hours. These facts emphasise the extreme importance of *protection* and *refrigeration* of all milk sent to the Metropolis. The matter is fully discussed elsewhere.*

THE RELATION OF MILK TO DISEASE.

Since the middle of the last century it has been known that, on occasions, the milk supply is the means or vehicle by which disease is spread. In 1875, Dr. Michael Taylor, of Penrith, traced an outbreak of scarlet fever to the contamination of the milk supply with the infection of that disease. Since that date some 300 epidemics of scarlet fever, typhoid fever, and diphtheria, involving many thousands of persons, have been traced to infection conveyed by milk.† Nineteen of these epidemics have occurred in London, not including those in outlying suburbs. There have also been a number of outbreaks of sore throat illness (such as occurred at Hackney in 1900)‡ traced to an infected milk supply. Epidemic diarrhoea, which in the summer months carries off so many infants, is, without doubt, in part due to the milk supplied to young children. Indeed, the whole question of high infant mortality is probably intimately related to the consumption of milk. Lastly, there are the numerous records of illness due to the consumption of ice-cream, made, as in Finsbury, from skim milk.

THE CONTROL OF THE MILK SUPPLY.

The control of the milk trade in Finsbury is in the hands of (a) the Local Authority and (b) the trade itself. The Local Authority in the Metropolis exercises control of the milk supply by three statutes:—

(a) The Dairies, Cowsheds, and Milk-shops Orders, 1885-1899.

(b) The Public Health (London) Act, 1891.

(c) The Sale of Food and Drugs Acts, 1875-1899.

There are other ways, as for example, by Certified Milk and Infant

* The Bacteriology of Milk (Swithinbank and Newman); see also Report on the Public Health of Finsbury, 1902, pp. 73-79.

† For a discussion of this subject, see "The Bacteriology of Milk," by Swithinbank and Newman, 1903, pp. 259-391.

‡ In this outbreak not less than 150 persons were affected with a septic sore throat traced to infected milk. See Report on Sanitary Condition of Hackney, 1900 (Dr. King Warry), p. 60.

Milk Depôts, by which a Local Authority may exert an indirect influence upon the milk supply of its district.

Without entering into details, I am of opinion that certain amendments in the law, as regards the control of the milk supply in the Metropolis, are urgently required. It is a remarkable fact that many provincial cities and towns have more extensive and adequate powers for controlling their milk supply than exist in London, which is, in fact, much behind in this matter.* The chief legislative requirements in London would appear to be the following:—

1. The Regulations under the Dairies Order, now in force in London, require revision and amendment. They were drawn up, I understand, under the Metropolitan Board of Works, and have not since been revised. They are not now abreast of present knowledge of the conditions of a pure milk supply, nor are they even as satisfactory as the Model Regulations. No. 17 (5) requiring clear udders and clean milkers) is altogether omitted in the London Regulations.

2. Section 71 of the Public Health (London) Act, 1891, requires modification in order to facilitate more expeditious action when it is necessary to stop the milk supply of a particular farm, dairy, or milk shop. The Public Health (Scotland) Act, 1897, secs. 60 and 61, give much wider powers and duties in this connection than anything existing in London. Taken as a whole, the Scotland Act is the most advanced and satisfactory milk legislation now in force in the United Kingdom.

3. Under the Sale of the Food and Drugs Acts, a somewhat urgent requirement is the right to take samples of milk *outside* the boundary of a Local Authority, if it is believed the milk is to be sold within the boundary.† It is also necessary that the recommendation of the

* Manchester, Liverpool, Leeds, Bradford, Oldham, Sheffield, Stockport, and many other towns have powers for the protection of their milk supply under Local Acts containing milk clauses. How much behind we are in London in these matters is not only illustrated by the progress made in the provinces, but by the advance in dairy control in America. In a special report just issued by the U.S. Department of Agriculture on *The Milk Supply of Two Hundred Cities and Towns*, there is abundant evidence in favour of much stricter supervision. It may also be mentioned that in the new Regulations (1901) under the Order adopted in the City of London, a special clause has been added requiring all vessels used for milk storage to be at all times covered.

† The case of *McNair v. Cave*, heard in the High Court of the King's Bench is of importance from having definitely decided that it is not legal for an Inspector to take samples for analysis under the Sale of Food and Drugs Act outside his own district, and that the words "places of delivery" in section of the Sale of Food and Drugs Act, 1879, must be construed as meaning "places of delivery within the district of a Sanitary Authority in connection with which the Inspector taking the samples has been appointed."

Departmental Committee, that the use of preservatives and colouring matter in milk should constitute an offence under this Act, should be included in any amended legislation.

4. Various additional powers are also required, which have at present no counterpart in existing legislation in London, though some of the powers exist in provincial Local Acts, and Milk clauses or in the Public Health (Scotland) Act, 1897. Without being exhaustive, it may be said that the following powers are certainly required in one form or another:—

(i.) Power to require a dairyman to supply to the Medical Officer of the District a list of his customers, on payment of a small sum for the service. Provision to be made for this requirement to apply (a) to the supply of retail vendors by wholesale vendors; (b) to the supply to consumers by retail vendors.

(ii.) Power to require a dairyman to furnish to the Medical Officer of the District a list of the sources of his supply. In cases in which the retail vendor receives milk through a middleman, it would suffice for the middleman to keep a register of the sources from which he supplies the retail vendor.

(iii.) Powers to ensure that one vendor selling to another shall be required to keep a record of such transactions and, if possible, the source from which the supply is derived.

(iv.) Powers to the Sanitary Authority to compensate a milk-vendor whose milk supply is stopped at the request of the Authority on account of suspicion that it is infective, and whose milk is, as the result of further inquiry, subsequently determined not to have been infective.

(v.) Powers to the County Council to exclude infected milk from the Administrative County of London, and necessary powers of inspection of dairies and cattle outside London supplying milk to London. And further that the same powers should be exercisable by Local Authorities when the exigencies of the case appear to require prompt action.

(vi.) Powers to the London County Council respecting the exclusion, after necessary inspection of any farm, of tuberculous milk from its district, and the seizure of such cows as are suffering from tuberculous disease of the udder.

(vii.) Powers of legal control over the milk contractor or middleman, similar to those now exercised over the milk-vendor.

Other than statutory powers are possessed by a Local Authority in respect of the milk supply. They may be referred to under three headings, viz.: certified milk, municipal milk supplies, and the education of the trade and the public.

CERTIFIED MILK.

Some municipalities, amongst which is that of Sunderland, have adopted a semi-official control of the milk supply by laying down certain conditions upon which they would encourage the sale of milk. Certificates are issued stating that such and such milk is produced under special regulations drawn up and approved by the Health Committee of the Corporation. The certificate has to be renewed every year; and is cancelled immediately any breach of the regulations takes place. Dr. Scurfield informs me that five farmers doing a large business in the town are so certified, and have found the regulations to be most helpful to their business and beneficial to their herds. Certificates are granted by the Health Committee to dairy farmers, respecting the milk supplied from their farms, if, in addition to complying with the regulations made by the Council under the Dairies, Cowsheds and Milk Shops Order of 1885, they also carry out the following regulations as to the construction and management of their farms and dairies.

Construction.—1. The byre must be well lighted, ventilated, paved, and drained.

(In a well-lighted byre, every part of the byre should be easily visible in the day time with the doors closed.)

(In a well-ventilated byre the air will not feel oppressively close, or smell disagreeably when the cows are all housed and the doors shut.)

2. The dairy must not communicate directly with the house, and must be well ventilated.

3. The place for washing and boiling the milk utensils must not communicate directly with the house, and must have a proper water supply.

4. An efficient refrigerator or cooler for the milk must be provided.

Management.—1. Only cows which pass a veterinary surgeon's examination, the examination to include the application of the tuberculin test, must be kept. The veterinary surgeon's certificate for each cow, together with the temperature chart after the application of the tuberculin test, must be sent to the Medical Officer of Health. Newly bought cows must be kept apart from the others till they have been examined and tested.

2. The milk must be of first-rate quality.

(Samples of the milk will be taken from time to time to ascertain that the quality is really first-rate.)

3. The cows must be kept as clean as possible.

4. The byre must be kept as clean as possible. The ceiling should be cleared of dust and cobwebs at least every three months, and the

walls and ceilings whitewashed every six months. The manure should be taken out twice a day, and the walks and gutters flushed with water.

5. The farmer must at once notify any case of infectious disease, including consumption, measles, and whooping-cough, occurring on the farm, or in the families of his employes, and take measures, satisfactory to the Medical Officer of Health, for preventing the possibility of the infection of the milk by such case.

6. Hay or food must not be stored in the byre, but kept in an adjoining building.

7. The dairy must only be used as a dairy, and the place for washing the milk utensils for that purpose only.

Milking.—1. The air of the byre must be kept as free from dust as possible, and at milking time especially so.

2. The udders and teats must be cleaned before milking.

(It is also recommended that the tail and hind-quarters of the cows should be clipped.)

3. The milker must wash his or her hands thoroughly before milking, and also rinse the hands in water after milking each cow.

4. The milk must not remain a moment longer in the byre than is absolutely necessary, and must be at once strained and cooled.

5. The milk of any cow showing signs of disease of the udder, or of other disease, must not be used for sale.

It will be seen that such regulations deal with dairy farmers, and are not, in the same form at all events, equally applicable to milk vendors. The idea of municipally-certified milk is, however, suggestive, and possibly something of this nature may become desirable in the effort to raise the standard of the milk supply, even above the minimum requirements of the law. The method has been widely adopted in America.*

*The system is worked in America by means of "Milk-Commissions." Such exist in New York, Philadelphia, New Jersey, and other places. A voluntary society of medical men and others form a commission, which issues certificates to certain dairy farmers who comply with the conditions laid down. These conditions include a high sanitary standard as to cow and cowshed, and a minimum quality of the milk. For example, the barn-yard and stables must be kept clean and in absolutely good condition; the water supply must be pure; the cows must be healthy and clean; the milkers must wash before milking; the utensils and vessels used must be kept clean; and the milk itself must be of a certain standard. This standard consists chiefly in three conditions, viz.—the milk must contain not more than 30,000 bacteria per cubic centimetre, the acidity must not be over 2 per cent., and at least 8.5 per cent. of fat must be present. These are the broad facts. The details differ in the different Commissions. But all agree in requiring a high standard of dairy-farming, a good quality of milk, and constant supervision and inspection. At first, considerable difficulty was encountered in reaching the quality required, but eventually it was attained. Refrigeration of milk at 50-55°F., within two hours after milking, was found to be necessary to reduce the number of bacteria to the necessary standard. The system in America has resulted in demonstrating the practicability of obtaining a clean and pure milk supply, when it is made necessary.

MUNICIPAL MILK DEPÔTS.

Several towns have established municipal milk depôts for the supply of milk to infants. The idea seems to have originated in Dr. Leon Dufour's establishment at Fécamp, in Normandy, and has now been adopted at Liverpool, St. Helens, Bradford, Battersea, and other places in this country. In principle it consists in supplying "humanized" sterilized milk in stoppered bottles, each bottle containing sufficient food for one meal only. In England, it is most largely carried out at Liverpool, where there are now four branches, with sterilizing apparatus at two of them. The process is as follows:—

When the milk is received from the farm it is tested and passed through a fine sieve. It is then "modified" (by addition of sugar and water to make it more suitable for infants) and bottled by means of a special apparatus. The bottles are placed on trays in the sterilizer, which is then closed and the steam admitted. When the temperature reaches 200° F. no further heat is applied, and this temperature is maintained for half-an-hour. The milk is then ready for sale.

In addition to the Corporation Depôts, arrangements have been made with over 30 dairies, situated in various parts of Liverpool, to keep a stock of the municipal sterilized milk,* so that customers may obtain a supply conveniently. As many as 3,000 bottles per day have been prepared and sold in Liverpool.†

In 1902, the Metropolitan Borough of Battersea commenced to adopt this method, and now some 400 children are being fed with the milk. The milk is humanized and sterilized, as at Liverpool. The process of humanization adapts the milk to the weakly infants' digestive organs, the sterilization kills the germs, and as the bottle is not opened—or should not be opened from the time it enters the sterilizer until the infant is ready to take milk from it direct (no feeding bottle should be used)—home contamination, unless it is wilful or due to extreme carelessness, is prevented.

Upon the recommendation of the Health Committee, the Battersea Borough Council decided, on the 10th July, 1901, to adopt this method, and voted a sum of £400 to start the scheme. Premises were taken at 28, York Road, and adapted for the work at a cost of £250. The remaining £150 was devoted to the purchase of appliances, and the Depôt was opened on June 5th, 1902. The appliances in use when the Depôt was opened were as follows: 1 sterilizing chamber with

* Reports on Health of City of Liverpool, 1901 and 1902.

† "The Depôt is presently conducted at a loss of about £500 annually."—*Glasgow Report on Infant Milk Depôts.*

two trolleys; 1 bottle-filling machine; 1 mechanical bottle-washing brush, with rinser and draining racks; 250 wire baskets; 25 gross graduated 7 oz. bottles; 1 baby weighing machine; 2 milk churns, cans, strainers, measures, etc. Additional appliances have since been purchased as the work has increased, and additional alterations have been made to the premises.

When the Depôt was first opened, a uniform charge of 1s. 6d. per week was made, but it was found that this amount barely covered the cost of the milk in the case of the older children, and in December the charge for infants between six and eight months old was raised to 1s. 9d. per week, and for children over eight months to 2s. per week. An extra 6d. per week is now charged for children living outside Battersea.* An arrangement has been made with the Board of Guardians, whereby the Relieving Officer is empowered to issue weekly orders for milk in lieu of giving money in outdoor relief. The milk is given out from the central station, 28 York Road, and at the Municipal Buildings, the Public Baths, and the Branch Libraries. As worked at present the Depôt results in financial loss (£150 annually), and according to the official Auditor it is not a statutory expense.

At York, a voluntary society, the York Health and Housing Association, has started a milk depôt of this kind, and has five branches. The regulations and arrangements are similar to those being carried out in Liverpool and Battersea, except that the source of the milk is controlled, the farm and cows being placed under strict regulations.

There can be little doubt that this kind of milk supply may be of great service to the children of the poor, in the reduction of infantile mortality, due to the use of contaminated or infected milk. It is not, however, of the nature of control of the milk supply, but rather, of a specialised supply, to meet special needs. There is evidence to show that at Liverpool, Battersea, and other places, it has had beneficial results in meeting the special need.

It has, however, several limitations unless properly managed. Its object being the saving of life and prevention of infant diseases, it is necessary that the system should be *individualised*, i.e., each mother must be separately advised, each infant inspected and weighed periodically, each home inspected, the condition of the milk regularly tested, and the source of the milk kept under control, the cows and cowsheds, from which the milk is derived, being supervised by a veterinary surgeon and the Medical Officer of Health. And here,

* The Council pay 9½d. per gallon for milk, 1s. 4½d. for cream.

in any event, the quality of the milk used must reach a high standard, chemically and bacteriologically. If these conditions are not fulfilled, it seems to the writer that a municipal sterilized milk supply can only be a palliative measure of transient usefulness.*

EDUCATION OF THE TRADE AND THE PUBLIC.

The Local Authority should, as far as practicable, act as a bureau of information and education respecting the milk-supply. Many of the smaller milk-vendors require educating as to the importance of cleanliness in milk dealing, and not a few of the public are in need of much the same knowledge. *The trade will supply what the public demand.* If the public demand a clean, pure milk-supply, they will eventually get it; and a great deal remains to be done in the direction of an enlightened public opinion on this question. If a farmer or a milk purveyor knew that if he neglected sanitary precautions and absolute cleanliness his milk would not find a market, he would very quickly accustom himself to comply with the necessary requirements. Legislation is able to do a great deal, but private enterprise in the trade and an enlightened public opinion will do very much more in the direction of purifying the milk supply.† The Local Authority may assist in obtaining these beneficial results: (1) By distributing information in the form of leaflets; (2) By encouraging the teaching of older girls in elementary schools in the technique of infant feeding and management; (3) By teaching personal health and domestic economy in the homes of the people; (4) By obtaining the services of one or more lady visitors, or a lady sanitary inspector, who would give practical advice and instruction in the home. An impure milk supply is potential of much injury to a community, and it is the dissemination of information that seems to be required. To obtain a naturally pure milk supply is of more consequence than to furnish a sterilized milk supply. Possibly, in a district like Finsbury at the present time, both may be needed, and it is quite certain that vastly more care must be taken over the milk supply if preventable disease is to be prevented.

A word may be said on the domestic sterilization of milk by boiling. There can be no doubt that this is the safe course. There is no

* The common desideratum, surely, is a naturally pure milk supply, rather than an artificially purified and humanized supply. The latter question appears to the writer to be one requiring careful consideration, but of a different nature from the former. If undertaken by a Local Authority, it would appear desirable to do it *very thoroughly*, after the manner of Budin's work in Paris. Humanized milk should be given only on medical advice, and not indiscriminately.

† Several of the large dairy companies, such as the Aylesbury, Welford, etc., have proved how much can be done in this direction.

substantial evidence to prove that the nutritive value is diminished below that of human milk, or that such boiled milk is less digestible. The changed palatability of boiled milk is perhaps its chief disadvantage, but this may be reduced to a minimum by adopting certain precautions in boiling it, or by using one of the better forms of domestic sterilizers (Aymard's sterilizer is now widely recommended). England is almost unique in its custom of drinking milk raw, and there can be little doubt that the simple practice of using boiled milk would at once remove many of the evils which arise from the consumption of raw milk.

In other portions of the present report many facts will be found dealing with the practice of milk purveyors, which are full of suggestion as to the particular points requiring the attention of the trade. The prevalent idea among milk purveyors appears to be that if they do not actually adulterate their milk they are within the law, and are doing what is necessary to protect their trade. But this is not sufficient. Of course, adulteration is wrong, and testing for it is essential, but the health of the cows producing the milk, the health of persons handling it, and the conditions to which it is exposed, are in reality much more important, if judged by the results arising when these three matters are neglected. It is a commercial fraud to adulterate milk, but surely it is even more serious to endanger people's health and lives by allowing milk to become dangerously polluted. In brief, therefore, it may be said that what is needed is: (a) milk from healthy cows, and (b) clean handling at the farm and in milk-shops. As already pointed out, *time* and *temperature* are the two things which mostly influence the growth of bacteria in milk, and therefore (c) cool and rapid treatment must be added. The time elapsing between the milking of the cow and the consumption of the milk is also affected by the period occupied in railway transit.

This raises two points of importance concerning the trade. First, it appears that a certain amount of mixing of milks is practised during transit on the railway. The *modus operandi* seems to be to take a measure of milk (about half-a-gallon) from each of a number of churns and to pour it into a churn, and then to replace the quantity removed from these churns with separated milk taken from another churn, consigned to the milk-sellers. The reason, according to Dr. Harris, of Islington, who has enquired into this matter, that the milk is mixed at the station is that all the milk churns consigned to a dealer are not necessarily delivered at a central store, but are distributed to several branches situated in various districts. Clearly the only remedy for this practice is for the railway companies to prohibit the mixing of milks at their stations.

In the second place, there is the question of sealing the churn previous to transit, which is desirable as a preventive of mixing milks and as a protection of the farmer against the accusation that if certain milk be adulterated it must have been tampered with by him or on the railway. The defence, which has been not infrequently set up by vendors and consignors, has been that the railway companies do not permit the churns to be sealed. This is absolutely incorrect. For in a letter dated 29th May, 1899, the Assistant Secretary of the Board of Agriculture inquired of the Railway Companies' Association through the Board of Trade if it was their practice to require milk churns to be unlocked, and if in consequence the consignor is unable to take any precautions to prevent persons tampering with their contents. In reply, he was informed by the Railway Companies' Association, in a communication dated 12th October, and signed by Sir Henry Oakley, that "senders have been for a long time allowed to send milk in sealed cans, the Companies accept the declaration of the senders as to the quantity conveyed, no extra charge being made; the only condition the Companies require to be fulfilled is that the tare weight of the cans shall be stamped on the outside of the can, so that in case of doubt the quantity of milk within the churn can be approximately ascertained by allowing 10½ lbs. for each gallon of milk declared. It does not appear to the Companies that there is any difficulty in the senders protecting themselves against alleged loss of milk in transit by sealing, padlocking, or otherwise fastening the cans." The railway companies should insist, not only in the interests of their servants, who are practically looked upon as the delinquents, but particularly in that of the public, that all cans sent to them for delivery shall in future be locked, sealed, or fastened. There cannot be the least doubt that, if the railway companies refused to carry milk in unfastened cans, the adulteration of milk would be much checked, and the unfortunate farmer would cease to be so frequently, and often undeservedly, made the scapegoat for the large wholesale milk vendors in London and elsewhere.

Lastly, there can be no doubt that in addition to the contamination of milk at the farm, in transit, and at the milk-shops, serious pollution may occur at the home of the consumer. To obviate this, education of the public is greatly needed.

THE ADMINISTRATION OF THE DAIRIES, COWSHEDS, AND MILKSHOPS ORDERS.*

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It is pretty generally agreed that the majority of cowsheds are neither properly constructed, nor maintained in the efficient sanitary condition that they should be, and although some of the more recently erected buildings undoubtedly show an improvement over those of older date, very few comply with the regulations respecting dairies, cowsheds, or milkshops as adopted by most sanitary authorities since 1899.

In many of them there is no adequate provision made as regards one or more of the following points:—(1) Lighting; (2) Ventilation; (3) Cubic space; (4) Floorage, drainage and cleansing; (5) Water supply; (6) Internal construction; (7) Surroundings; (8) General cleanliness.

1. *Lighting*.—In the majority of cowsheds there is deficient window space, whilst in many of them there are no windows at all. Some are supposed to get light by means of a "hit and miss" ventilator, which is generally fast closed, whilst others are seen which have had small windows with one or two panes of glass, but these having been broken, are replaced by wooden boards or bunches of hay.

Cowhouses so badly lighted as these one finds in a very dirty state, simply because the owners cannot see to clean them, whilst germs grow and flourish under such conditions which in the presence of air and sunlight are seldom met with. Light is a necessity for the health of the cows and for the purity of the cowshed, and should reach every nook and corner of the building. In some Regulations it is suggested that 3 square feet of window space per cow be provided, but although such a high standard is scarcely to be expected, there are very few cowsheds where more light could not with advantage be provided, and at very little expense, either by means of windows in the walls, or preferably, by glass panes or tiles in the roof.

2. *Ventilation*.—Regarding this matter many cow-keepers are very difficult to deal with. They have learned by experience that the warmer and more smothered up they keep their cows the larger is the yield of milk; but they forget, or do not understand, that by depriving the animals of fresh air they cannot possibly thrive as well as they would otherwise do, and that though the quantity of milk

* Read before the Yorkshire branch of the Incorporated Society of Public Health.

yielded is for a time larger, the quality is poorer and the milking period shortened, whilst the cows' value for selling or feeding purposes is much reduced, and the liability to tuberculosis, cold, or other disease is increased.

The provision of fresh air by means of proper ventilation is necessary for the health of the cows and for the purity of the cowshed.

Thirty square inches per cow for *inlet* of fresh air, and as much or a little more for *outlet* of impure air, have been suggested in regulations as suitable sizes for openings, but although these amounts of ventilating space may be available in the day time when the doors are left open, they are not so at night when they are closed.

Permanent inlets for fresh air can be cheaply and efficiently provided for by fixing two or more 3-inch tile pipes in the walls near the eaves, giving the pipes a slope upwards from the outside of 2 or 3 inches, and, instead of inserting them immediately over each cow's head, where one usually sees them, they ought to be fixed as near as possible above the partition between two cows and 5 to 6 feet from the floor. Three of such pipes would provide an inlet area of 21 square inches.

The heated, impure air of respiration can then find its way more directly up from the cows towards the outlets without being deflected by the incoming air from the pipes, and the position and upward slope of the latter prevent any direct draught of cold air on to the animals.

Equally efficient but more expensive special air inlet bricks might be used such, as those of Doulton or Walker.

Sherringham valves may also be provided. They act either as inlets or outlets, according to the direction of the wind.

The familiar "hit and miss" ventilator is an effective inlet, though an occasional outlet, but, except in summer, they are usually found closed.

Permanent outlets for impure air are best provided for by means of ridge ventilators on the louvre principle, and if the shed is unfortunately built with a ceiling and loft, the foul air should be carried off by large, well-made shafts opening on the ridge and provided with cowls to prevent down-draught. Lofts in a cowshed should, however, be avoided as much as possible, the building being best open to the ridge.

3. *Capacity*.—A sufficient cubic space per cow renders good ventilation easier of accomplishment; but even if the space per head is theoretically too small, much may be done to remedy the defect by providing and maintaining a good system of ventilation. Efficient ventilation may therefore be said to be of greater importance than a large amount of cubic space, as the benefit derived from the latter without the former would only be of a very temporary nature.

In cowsheds from which the animals—most likely of the hardier breeds, such as shorthorns, Ayrshires, or crossbreds—are habitually turned out of doors for some part of every day, 600 cubic feet per cow is a reasonable amount of air space to demand or expect, and as such a space only entails a floor area of about 64 square feet per cow in a single row byre, there should rarely be much difficulty in maintaining such a minimum.

4. *Floorage, Drainage, and Cleansing*.—The drainage of many cowsheds is frequently found in very bad condition, this being generally due to the irregularity of the surface and the want of proper fall in the floors. Under such conditions free drainage is impossible, and whilst cowsheds are expected to be cleaned out twice a day (the L.G.B. model regulations inadvisedly suggest "at least once a day"), one frequently finds premises which have not even been cleaned out once, such neglect therefore increasing the evils of bad drainage referred to.

One frequently sees floors with a wooden block forming the back border of the stall, this being in various stages of decay and saturated with sewage. For such a position wood is unsuitable, and should be replaced by some impervious material.

Floors are perhaps best made of concrete 6 inches thick, covered with at least 1 inch of cement, and well grooved to prevent the cows slipping. They may also be made of hard, well-burned, blue bricks on edge, laid on concrete, and well jointed with cement. The drainage channel should, however, always be made of cement concrete, in order to avoid the disadvantages often arising from jointing, though very effective channels can be made from glazed half-pipes.

The *walls* should in every case be covered with cement to a height of 5 feet, and should be made as smooth as possible, or better still, of course, made of white glazed bricks; above this height the walls should be evenly plastered. In every case the *floor* should be 3 inches above the level of the adjoining ground, and should be laid with a gentle slope from every side towards the drainage channel. The floor of the stall should have a fall of 1 inch from the feeding trough to the drainage channel, and the channel itself a fall outwards of half an inch and as much lengthwise between each stand.

All liquid should have a free passage by the drainage channel through a 6-inch pipe in the wall, and discharge outside into a trapped gully in connection with a drain and tank, and not as one often sees it, running directly into the yard to form a stinking pond through which the attendants and animals have to pass every time they go in or out of the byre.

5. *Water Supply*.—A large supply of water is an essential where

cleanliness of the cowshed is to be attained, and yet it is frequently found that little or no provision is made for such. Very few cowsheds indeed are ever swilled or washed out, and without such treatment cleanliness is impossible.

Dirt and filth should be removed, not covered up, and for this purpose water should be laid on in pipes in every cowshed, the water being obtained from a service main, or if not possible, then from a storage tank above and outside the building, into which water can be forced from a well or other convenient supply. Unfortunately, if labour of this kind is required, the work is invariably neglected. Much more might be done, in my opinion, with the large roof areas available on farm steadings to collect and store rainwater for such a purpose.

6. *Internal Construction.*—The following arrangement of a single row, back-feed cowshed, and the measurements from front to back, will generally be found suitable:—

	ft.	ins.
Feeding trough of glazed earthenware (20 by 16 by 8 inches) with single brickwork, about	2	0
Stall	6	6
Drainage channel (4 inches deep)	1	6
Back passage	6	0
Total	16	0

In the case of a double row byre the sizes of the feeding trough, stall, and the drainage channel are the same in duplicate, the centre passage remaining at 6 feet, whilst if head-feeding is adopted, an extra space at the heads of the cows is required of at least $3\frac{1}{2}$ feet. This latter method however, although it has many advantages, especially as regards more effective ventilation, is not popular, and is not often met with (only in 4 out of 110 cowsheds in my district).

The measurements I have given are average ones, and suitable when a mixed herd of cows is kept, but for smaller cows of the Jersey or Irish breeds a stall of 5 feet or 5 feet 6 inches is sufficient, whilst for large massive shorthorns the stand may well be made 7 feet long; but as it is rare for dairy farmers to limit their cattle to any one particular breed, the average length I have given of 6 feet 6 inches will be found most generally useful. I have lately suggested to one owner in my district, who is erecting a new cowshed with all of the stands $6\frac{1}{2}$ feet long, the advantages which would result if he made about one quarter of them with stalls $5\frac{1}{2}$ or 6 feet in length, which would be used for young or small cows.

If cows are fed from a head passage, the stands should not be over

6 feet long, as most cows, under such conditions, acquire a habit of raking forward in expectation of food, with a resulting littering of their beds.

The *width* of a single stall should not exceed 4 feet, nor that of a double stall 7 feet. Double stalls are the most popular, as giving easier access for milking, but single stalls are to be preferred for keeping the cows clean, as they cannot then indulge in such antics as exhibiting their "heads where their tails should be."

The internal height of a double-row cowshed should be 12 feet 4 inches to half the vertical height of the roof, and not less than 8 feet to the eaves, giving therefore a roof height of 8 feet 8 inches, or equal to one-third of the span in a cowshed 26 feet wide which is open to the ridge. In a single-row byre a height of 10 feet to half the vertical height will suffice.

7. *Surroundings.*—The cowshed should in all cases be detached, and situated at least 50 feet from a dwelling-house. The approach should be paved and kept clean, and the yard drained to a well-constructed tank. All the buildings should be provided with spouts and fall-pipes to carry off rainwater, either to a storage tank or to a surface drain, and never allowed to discharge into the fold yard, where it either forms filthy pools, or else dissolves and carries off the nitrogenous matter from the litter, which should be saved for its manurial value. The straw litter should be removed every week to a suitable manure store.

8. *General Cleanliness.*—Complaints are frequently made of the dirty deposit in milk, and when one sees the conditions under which much of the milk is obtained, there is little wonder that it should be so. Pure clean milk cannot be obtained from cows which are never groomed or cleaned, and which have their flanks and udders littered with manure; nor by milkers who pay no attention prior to milking to the cleanliness of their hands. Certain cow-keepers do give these matters their personal attention, and deserve both credit and patronage for so doing, but the majority do not, and milk obtained under such conditions is, to say the least of it, a very undesirable article of food. No amount of straining will ever remove the particles of hair, dung, etc., which can be seen as a dirty sediment if a glassful of such milk is set aside for a few hours, whilst under the microscope such swarms of motile germs are seen as to make an observer almost forswear the use of milk for ever. Simple plating on gelatine of a tenth or a hundredth part of a cubic centimetre (1·5 to 15 parts of a drop) of such a sample, and incubating for forty-eight hours, shows an almost innumerable number of bacterial colonies. (Specimens shown.)

Owing to such complaints and conditions, I have lately drawn

up a leaflet, suggesting means whereby supplies of milk might be obtained and distributed in cleaner condition. This I have had printed in card form and delivered to cow-keepers and dairymen in my district. It is as follows:—

RULES FOR THE EFFICIENT CONTROL OF MILK SUPPLIES.

The Cowshed.—1. Every cowshed must have free access of light and air. Overcrowding of animals should not be permitted.

2. The drainage of every cowshed must be maintained in good condition.

3. The floor of every cowshed must be thoroughly swept, and all dung and litter removed at least twice a day. On account of the dust raised by the process, this must be done not less than one hour before milking; slight watering before sweeping somewhat prevents this. The floors should be well swilled out with water from time to time as required. A plentiful supply of water is an absolute necessity.

4. The roof, or ceiling, and the walls (except where painted) must be properly limewashed at least twice a year (May and October). Cobwebs must on no account be permitted.

5. The yard adjoining the cowshed must be kept in a clean condition and as dry as possible. The storage for manure should be situated at some distance from the cowshed.

6. No other animal must be permitted in the cow-house, and dogs and cats should be excluded during milking.

The Cows.—1. Every cow must be groomed once daily.

2. Before milking, the udder of every cow must be cleansed by wiping with a clean, damp cloth, or by washing with soap and water and drying with a clean towel. The udder must never be left wet.

The Milkers.—1. Every person, immediately before milking, must thoroughly cleanse the hands by washing with soap and water.

2. No one having any connection whatever with any case of infectious disease, or of consumption, shall be permitted to milk or have anything to do with the milk.

3. The hands of milkers must not be moistened by dipping into the milk, nor by any other means.

4. Every milker should be provided with a suitable smock or cover-coat of a washing material.

The Milk Vessels.—1. Every can, pail, or strainer brought in contact with the milk must be cleansed immediately after use by means of hot water or steam, and, after rinsing with clean water, placed upside down in a clean, cool place till again required.

2. Milk cans must on no account be allowed to remain standing in the cowsheds.

The Milk.—1. The first stream drawn from each teat should be allowed to escape, and any milk which contains blood or stringy matter must be rejected.

2. Milk taken from an ailing cow, or from a cow suffering from any disease of the udder, must on no account be sold or mixed with any other milk for sale.

3. Milk must not be taken for sale from a newly-calving cow for at least one week after calving.

4. All milk must be efficiently strained through a fine wire sieve covered with fresh, clean cheesecloth or fine muslin (a wire sieve alone is not sufficient).

5. All milk must be cooled within half an hour of milking down to a temperature of 58 degrees by means of a refrigerator fixed in a room set apart for this purpose only. The refrigerator must be examined regularly in case of leakage.

N.B.—The existence of any contagious or infectious disease, such as diphtheria, scarlet or typhoid fevers, in the house, or in that of any of the servants, must be immediately reported to the Medical Officer of Health.

Every cow-keeper, dairyman, or purveyor of milk must be registered by the local authority. For further details, see the "Dairies, Cowsheds, and Milk Shops" Regulations, copies of which may be obtained, etc., etc.

The powers granted under the "Dairies, Cowsheds, and Milk Shops Orders" appear to me to be ample, but it is my opinion until special inspectors are appointed to put the various clauses into execution that there will be no great improvement effected in the administration of the orders.

INFANT MILK DEPÔT AT DUNDEE.—Dr. Templeman, Medical Officer for Dundee, has reported that it is advisable to start a depot for the supply of humanized sterilized milk as a food for children. After referring to the benefits to be derived from the use of humanized sterilized milk, particularly in the direction of reducing the present high rate of infant mortality, Dr. Templeman estimates that the plant capable of supplying milk for 150 or 180 infants per day would cost about £200. This would include a vertical steam boiler, sterilizing apparatus, bottles, wire basket, soak tank, bottle-washing machine, bottle filler, etc. A shop with cellar and three other apartments would require to be taken in some suitable part of the city, and this would have to be fitted up at a cost of £20. Three assistants would be required at a wage of about 20s., 15s., and 7s. 6d. per week. The experience in Leith during the nine months in which a similar scheme has been in operation is that the income from the sale of milk for sixty infants daily has been sufficient to meet the working expenses—that is, cost of milk and material, wages, shop rent (£20), and taxes.

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INFANT MILK DEPÔTS*.

THE chief object of these depôts is to supply sterilized and modified milk to infants, with the hope that it may help to reduce the infantile mortality. and at each of those which were visited several of the customers who were interviewed expressed their extreme satisfaction at the results produced by the milk on their individual children. We, however, could find no satisfactory evidence that the infantile death-rate has been appreciably influenced, although it is obvious that the substitution of a suitable for an unsuitable food must influence the healthy development of the young child. It appears to us, however, that the effect, so far as expressed on a death-rate, is to be sought ultimately in connection with the diarrhoeal mortality rate of the autumn months, rather than in the whole volume of the diseases from which infantile deaths arise, although it must be remembered that the largest depôts must, after all, supply only a fraction of the number of children in a given population, and probably will not reach that section on which infantile mortality most heavily falls.

But we think that another and scarcely less important function may be served by Infant Milk Depôts, as will be afterwards indicated.

While in London we had an opportunity of visiting the St. Francis Hospital for Infants, Hampstead Heath. Here the children range from a few weeks to several months, and they are all fed on modified milk obtained from the laboratories of the Walker-Gordon Company. "The primary object of modified milk as prepared in these laboratories is to afford an accurate means of prescribing a substitute food for infants containing the essential constituents of breast milk, viz. fat, albuminoids and milk sugar, combined in such proportions as will suit the requirements of each individual infant."

This description of the aim of the Walker-Gordon Laboratories is taken almost verbatim from a circular issued by the Company, and a more detailed description of the method will be found in a document (No. 441) issued by the Senate of the United States in connection with "A Bill to Regulate the Production and Sale of Milk and Cream in the District of Columbia," June, 1902, Appendix F. ("Impure Milk in Relation to Infantile Mortality").

On a review of all we have seen and learned by personal enquiry and perusal of some of the literature of the subject, which has recently been voluminous, we have arrived at certain definite conclusions.

Infantile mortality has a definite relationship to (a) the feeding of infants, (b) personal care of infants by parents, and (c) housing accommodation. Other elements enter into the problem, but, so far as municipal action is concerned, those are the three main elements. It is clear to us that housing schemes, unless associated with efforts calculated to meet difficulties arising out of the first two conditions, will be disappointing in reducing infantile mortality. We also believe that, if we can succeed in raising the quality, as regards purity, of the milk on which infants are fed, we shall at the same time educate and improve the sense of duty

* From a report by Councillors W. F. Anderson and J. Carswell, and Dr. A. K. Chalmers presented to the Public Health Committee of the Glasgow City Council, and adopted October 21st, 1903.

towards their infants on the part of parents. The mischief lies in polluted milk. The sources of the pollution are not only in unsatisfactory methods of milking, and in storing and conveying the milk supplied; but also very largely in dirty domestic conditions, and particularly in carelessness in the use of feeding bottles. To successfully attack, by municipal administration, all the sources of pollution, is presently impossible, but the ideal of health administration is a pure milk supply which needs no sterilization; and towards that end all our efforts should be directed. Meanwhile we must do the best possible under existing conditions, and that involves sterilization.

We therefore recommend that the Corporation should agree to the principle of supplying milk for infant-feeding in poor localities. That involves:—

1. The setting up of an establishment for the preparation of the milk supplied, modified, and sterilized according to requirements, the necessary machinery and appliances for which would not cost more than £650.

2. Depôts for the sale of the milk, or, following the example of Liverpool, it might also be supplied through the milk dealers, an allowance for retailers' profit being made.

The staff required would neither be large nor costly. We think the experiment should be made in three or four of the districts where the infantile mortality is high. The price at which the milk could be sold, consistent with reaching the poorest, would, we believe, be no more than is presently paid for ordinary milk; and, in any case, even were it necessary in order to reach those most in need of this form of assistance, a small charge upon the health rate would be justified by the result.

ECONOMICAL METHODS FOR IMPROVING THE KEEPING QUALITIES OF MILK*.

By C. F. DOANE.

Maryland Agricultural Experiment Station U.S. Department of Agriculture.

BACTERIA in milk are derived from the interior of the udder, from the exterior of the cow, from the milker, from the air, and from dairy utensils, nearly all of which sources can be regulated to a certain extent. The value of dampening the udder and flank before milking was shown by bacterial determinations in several trials. In cleansing utensils where steam is not available the author recommends the use of washing powders, the efficiency of this method having been shown in experiments previously reported.

In the purification of milk several tests were made with filters and separators. Milk filtered through animal charcoal which had been thoroughly washed in water was turned black, illustrating a difficulty in purifying milk by filtration as compared with purifying water. The use of separators for purifying milk by two city dairies failed to give satisfaction to consumers, the main objection being that milk so treated soured sooner than untreated milk. In four out of five trials made at the station, the acidity of fresh samples of separated milk was found to be

* Experiment Station Record, Vol. xv, 8, Nov. 1903.

higher than that of unseparated samples, the difference in one instance being 0.03 per cent. The cause of this variation was not investigated. It is suggested, however, that it may be due to a change in the content of carbon dioxide, due to the process of separation. The results of the tests indicate that the use of the separator for purifying milk tends to lessen rather than improve its keeping qualities.

Determinations were made of the number of bacteria and the percentage of acid in aerated and unaerated milk. At the end of twenty-four hours there was no noticeable difference in the acid content, as shown by eleven trials conducted under ordinary dairy conditions. The development of bacteria was also unaffected to any marked extent by aeration. It is therefore believed that the keeping qualities of milk are not improved by aeration.

In a series of experiments the effect of cooling milk in different ways was studied. As the temperature of the well water in the State is commonly 60° F., this temperature was used as a basis for comparison. Milk cooled immediately to 60° was compared as regards acidity and germ content with milk cooled gradually by setting in running water at 60°. At the end of five hours the milk kept in running water had a temperature of about 64°, when it was cooled quickly to 60° and both lots were kept at that temperature. In one of the four trials the milk cooled immediately remained in a condition fit for use fifteen hours longer than the milk cooled gradually. In all trials the keeping qualities of the milk were improved by prompt cooling.

In the second experiment the keeping property of milk cooled immediately to 60° was compared with that of milk in a 5-gal. can set in a half barrel of water at 60°. At the end of fifteen hours the milk set in standing water had a temperature of 66 to 74°, varying with weather conditions. It was then cooled to 60° and kept at that temperature. The milk thus treated soured from six to eighteen hours sooner than the control lots. Practically all the samples cooled immediately were fit for use at the end of forty-eight hours. In a third experiment milk cooled immediately to 60° was compared with milk cooled after standing for two hours, the results showing that the milk cooled immediately remained sweet for about twelve hours, on an average, longer than the milk not cooled until two hours after milking, illustrating the importance of prompt cooling.

Practical experiments were also made with the use of ice. A five-gallon can of milk was set about one hour after milking in a half barrel of water to which a large piece of ice had been added, the temperature of the water being about 40°. This milk was compared with milk cooled within fifteen minutes from the time of milking to 60° and kept at that temperature, the results showing no great advantage from the use of ice under these conditions. In other experiments it was found that from two to two and a half hours were required for milk set in ice water to cool to 60°, and that such milk soured in some instances as much as five hours sooner than milk cooled immediately to 60°. In a second series of experiments similar to the above a temperature of 65° was used for comparison. Milk cooled immediately and kept at that temperature remained sweet for thirty to thirty-five hours, while milk not cooled other than by setting in water at 65° did not keep over twenty-four hours. The results of the work at 65° show the importance of prompt cooling, and also that under ordinary conditions this temperature cannot be depended upon in producing milk for city markets.

Milk set in a shot-gun can in a refrigerator at 60° was found to have a temperature of 68 to 74° at the end of fifteen hours, at which time the milk was on the point of turning. On the other hand, milk cooled immediately to the temperature of the refrigerator and kept at that temperature, remained in good condition for about fifty hours.

The above practical experiments show the need of keeping milk at a low temperature, and particularly the need of cooling it immediately after milking.

THE VALUE OF WASHING COWS' UDDERS BEFORE MILKING.

EXPERIMENTS carried out by W. J. Fraser to compare the amount of dirt falling from washed and unwashed udders during the process of milking are reported (*Exp. Stat. Record*, July, 1903, vol. xiv. 11) as follows: "It was determined after several trials with three different milkers on thirty cows that it requires an average of four and a half minutes to milk a cow. A glazed dish 11 in. in diameter, the size of an ordinary milk pail, was placed in the top of a pail and held under a cow's udder in the same position as when milking. For four and a half minutes the milker then went through motions similar to those made in milking, but without drawing any milk. The amount of dirt which fell into the dish during the operation was, of course, approximately the same as would have gone into the milk during the milking process. The dirt caught in the dish was then brushed into a small glass weighing tube, the udder washed, and the process repeated. The dirt which fell from the washed udder was also carefully brushed into a weighing tube. Both tubes were then placed in a desiccator, and after drying twenty-four hours were accurately weighed on a chemical balance. Sixty trials were made at different seasons of the year. With udders that were apparently clean it was found that an average of three and a half times as much dirt fell from the unwashed udders as from the same udders after they were washed. With soiled udders the average was twenty-two and with muddy udders the average was ninety-four times as much dirt from the unwashed udders as from the same udders after washing."

A SCIENTIFICALLY WORKED DAIRY FARM.

A WRITER in the *British Medical Journal* (Jan. 2nd, 1904) describes the dairy farm of Mr. Sørensen, at West Huntington, near York, which is worked on the lines of the Copenhagen Milk Supply Company, with the advantage that the milk is obtained from Mr. Sørensen's own herd of cows.

He holds that milk should, with common care and cleanliness, be produced in such a manner as to be drunk in all confidence by the public without any necessity for Pasteurization or sterilization. The essentials, he considers, for such a milk supply are, briefly:—

1. Healthy, properly fed and housed cows.
2. Cleanliness from A to Z, and a responsible guarantee that nothing is added to or extracted from the milk.

3. Prompt and thorough cooling of the milk so as to prevent germ growth.

4. Delivery under hygienic conditions.

These conditions are all fulfilled at this farm. A York Corporation veterinary officer inspects the cows every month, and is empowered to dispose of any unhealthy or suspected animal. No brewers' grains, turnip tops, or other unsuitable foods are used; the hay the cows are fed upon, the mangolds, etc., are grown upon the farm, while water from the York city water supply is used for drinking, and also for cleansing purposes, washing the utensils, etc. The cowshed, containing fifty perfectly-groomed cows, is lofty, well lighted and ventilated, and the platform on which the cows are tethered is built short, so that their hind quarters do not rest on the ground, but over a drain made specially to carry away the manure. Thus the cows are unable to roll and soil themselves during the periods of weather too bad for them to remain out-of-doors. This is as seldom as possible, as Mr. Sørensen disapproves of housing his cows when it is possible for them to be out-of-doors.

In the cowshed a wash basin is fixed against the wall, with towels beside it, while on pegs are hung the clean smocks worn by the milkers during milking.

No money is wasted on fancy fittings, which simply increase the cost without making the milk any better. The aim is to keep everything—from the cows to the smallest utensils—sweet and clean. The cans, etc., are cleansed with live steam from a high-pressure boiler.

After the cows are milked, the milk is cooled by allowing it to flow over a corrugated cylinder, inside which cold water and ice are passed.

Most of the milk is delivered in glass bottles, which are filled and sealed at the dairy, the rest being sent out in cans, also filled and sealed at the dairy. There is a third method of sending out the milk in a sealed can with a tap. To save himself the trouble and expense of book-keeping, Mr. Sørensen has a system of payment by tickets, which are sold in books, and handed by customers to the man who delivers the milk.

The following are the charges: 3½d. per quart delivered in cans filled and sealed at the dairy; milk drawn by tap from sealed cans in the cart, per quart, 3½d.; per pint, 2d. Special table or nursery milk in sealed glass bottles, per quart, 4d.; per pint, 2d.

It does not cost more to conduct a dairy farm profitably on cleanly lines than it does to run a filthy one.

Kind of preservative.	Proteid.	Fat.
	Per cent.	Per cent.
Salicylic acid (added just before feeding) -	98.02	93.96
Boric acid (added just before feeding) -	93.84	97.16
Formaldehyde (added just before feeding) -	95.01	97.75
Boric acid (added 24 hours before feeding) -	91.00	97.57
Borax (added 24 hours before feeding) -	92.22	97.35
Formaldehyde (added 24 hours before feeding) -	94.83	98.36
Salicylic acid (added 24 hours before feeding) -	90.04	92.81
No preservative -	98.52	97.37

"In all of the series the comparative results were nearly the same, and the results in the two seasons' work were so nearly the same that it would appear that the work was exhaustive, and could be depended upon to represent fairly well the results that would be obtained if this same line of work was carried on indefinitely.

"From the results of this work many people may be inclined to think that milk preserved with formaldehyde is even to be preferred to milk treated with no preservative, as the tables evidently show it to be more digestible. . . . But it would be entirely possible for the preservative to render the milk more digestible and still have properties that would prove injurious. It is entirely possible for the preservative to unduly stimulate the digestive organs and in the course of time bring them to a diseased condition. For this reason it is impossible to say that formaldehyde, if injurious, is the least injurious of any of the preservatives used in the milk business. The fact that the other preservatives used made the milk less digestible is sufficient to condemn them. Adults could possibly drink such milk with impunity, but in the tenement districts of cities, where the babies have a hard struggle for existence, it takes a very little to turn the scale either in favour or against their chances for life."

The average gain in weight per calf during the three-day periods in which milk with boric acid was fed was 0.5 lb., milk with salicylic acid 3 lb., with formaldehyde 5 lb., and milk with no preservative 1 lb.

"The calves fed for an extended period with milk preserved with boric acid and formaldehyde made very satisfactory gains in weight. The two receiving the boric acid lost a good share of their hair, presumably from the effects of the acid."

REVIEWS.

BACTERIOLOGY OF MILK. By Harold Swithinbank, of the Bacteriological Research Laboratory, Denham, and George Newman, M.D., F.R.S.E., D.P.H., Medical Officer of Health of Finsbury, With Special Chapters, also by Dr. Newman, on the Spread of Disease by Milk and the Control of the Milk Supply. Pp. 609 and ix. Price 25s. London: John Murray.

The authors are to be congratulated on the production, after five years' labour, of what is likely to be for a very long time the standard book on milk. Various chapters deal with the chemistry, physiology, and pathology of milk; with bacteriological technique; the bacterioscopic examination of air, water, and milk; milk fermentation; economic bacteria in milk; pathogenic bacteria in milk; milk-borne disease;

THE INFLUENCE OF PRESERVATIVES UPON THE FOOD VALUE OF MILK.

C. F. DOANE and T. M. Price (*Maryland Sta. Bull.* 86—E.S.R., 12) detail a number of experiments with calves in which the digestibility of milk with and without added preservatives was tested. The preservatives used were boric acid, borax, salicylic acid, and formaldehyde, the boric acid and the salicylic acid being added to the milk in the proportion of 1 to 1,000, the borax in the proportion of 1 to 75, and the formaldehyde 1 to 10,000, it being recognised that all these amounts are in excess of the quantities usually regarded as sufficient. The average results of the experiments, which extend over two years, follow:—

the flora of milk, and the control of the milk supply; while in a copious appendix are discussed various cognate matters of interest, ranging from glass-blowing to infant milk depôts. So manifold indeed are the problems raised by the writers that it is hardly possible within the limits of a review to give more than the general impression which we have formed on reading the book. In the first place Chapter I (General Conditions affecting Bacteria in Milk) appears the least satisfactory; in places it appears to lack the perspicuity which is generally characteristic of the writers. For instance, on page 6, 45 to 50 per cent of fat is said to be found in "normal cream," while on page 8 cream is stated to contain only about 27 per cent of fat. Probably "normal cream" means cream of the quality which modern separators are generally set to produce, while the latter figure from König is the average of several specimens prepared from hand-skimmed milk. Again, on page 10, Cautley is quoted as stating that "boiling milk does not materially affect its power of clotting in the stomach," whereas in the second edition of "The Feeding of Infants" Cautley agrees with the statement on page 11 that "milk which has been raised to the boiling point is resistant to the action of rennet." Both these points are naturally of minor importance, but they happened to be matters in regard to which the reviewer was seeking for information. Other slight ambiguities can also be found in this chapter, but one must refrain from carping at a work of such great general excellence.

With regard to a bacterioscopic standard for milk, the writers admit the reasonableness of the figures adopted for certified milk in America. They point out, however, that such standards are not all-sufficient. Just as in the case of water, the kind of bacteria present and the whole past history of the milk must be reviewed before an absolute opinion could be given as to its suitability for food. Though this is perfectly true, it seems not unlikely that bacterioscopic examination may prove as useful for milk as similar examinations have proved for water, and that just as an abnormal bacterial count in a well-water may put the medical officer on the *qui vive* for surface contamination, so any great departure from the bacterioscopic standard for milk is a useful indicator of the milk having been improperly treated at some stage of its past history.

Very interesting are the results given on p. 130 *et seq.* of the writer's investigations of the bacterial content of milk, kept at various temperatures for varying periods. Though the results vary in each instance, there is at all temperatures a sudden rise in the number of bacteria, a sudden fall, a steady rise to a maximum, followed by a steady fall to ultimate sterility. The first rise is believed to be due to the development of various extraneous organisms, while the second tide is mainly due to the growth of lactic acid organisms. Many popular fallacies are exposed by the authors, notably the theory that the centrifugalization of milk will remove the bacteria. That this is a fallacy was sufficiently proved by the Bedford epidemic of 1902. In this case the milk was passed through a separator "to filter milk, removing tubercle and other disease germs." As a matter of fact, separated milk contains 25 per cent of the original organisms.

The much-debated topic of bovine tuberculosis is naturally discussed at length. Pending the report of the present Royal Commission the writers have adopted the provisional attitude "that tuberculosis in all animals is generically one and the same disease, but that it differs in various ways in different animals, and according to the strain and virulence of the infecting bacillus." They also hold that human and

bovine tuberculosis are intercommunicable, but that "cross-infection is probably less common than is generally supposed." On the other hand, they distinctly point out that in their opinion tuberculous milk "is being sold, not alone to the prejudice, but also to the risk, of the purchaser." It will be seen that this vexed question has been treated judicially, and indeed the whole chapter, which was written by Dr. Newman, merits careful study by those responsible for the control of milk and meat. In subsequent chapters milk-borne scarlatina, typhoid, and diphtheria are fully discussed, while a section on methods of enquiry into milk-borne disease is full of interest, though perhaps somewhat beyond the scope of the book.

Lastly, Dr. Newman discusses the control of the milk supply by the State, by private enterprise, and by the trade, and ends with a summary of recommendations. These are in the main identical with those made by him to the Finsbury Council, and printed in the present issue of *Public Health*,* so need not be repeated here. Perhaps some regret will be felt that the authors have not seen their way to suggest new methods of controlling the milk trade. It should, however, be remembered that short cuts are rarely practicable in Public Health work, and that true preventive work usually resolves itself into the old problems of removing filth and dispelling ignorance.

In conclusion, we can only add that while this work is German in its thoroughness, it has one feature that is essentially British, namely, it does not emanate from a State department or richly endowed University, but from the private laboratory of one of the authors, who have by years of strenuous work rendered valuable service to the State and the Public Health Service. The book is superbly got up and illustrated with chromo lithographs, Woodburytype reproductions of photographs of cultures, and numerous blocks very beautifully executed and reproduced.

DIAGRAMS FOR THE USE OF CLASSES OF TECHNICAL INSTRUCTION FOR PLUMBERS. Price 1s., 8½ in. by 5½ in., 26 pp. London: The Worshipful Company of Plumbers.

The diagrams, about 1½th full size, are the first of a series intended to illustrate some of the more important scientific principles underlying the operations of the plumber; types of apparatus; the principles of their construction; and the workmanship employed in fitting them. The diagrams and accompanying descriptions comprise: Bends, corbel and washdown w.c.'s, hydrostatics, lead work, levers applied to ball valves, overflows and wastes, soil pipe joints, specific gravity, siphons, trap showing water seal, valve closet, ventilated sink waste and gulley. The diagrams are admirably executed, and will be of value not only to plumbers, but to those engaged in both the practice and study of sanitation. Full-size diagrams (53 in. by 31 in.) are also obtainable for teaching purposes. Either set might be kept in the offices of local authorities for the benefit of builders, plumbers, and others.

* See pages 254-290.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED, 1888. INCORPORATED, 1891.

A GENERAL MEETING of the Society was held at No. 9, Adelphi Terrace, London, W.C., on Friday, January 8th, 1904. Present: The President, Dr. J. Groves, J.P. (in the chair), Drs. A. W. J. Macfadden, H. A. Colwell, C. Sanders, R. King Brown, J. Howard-Jones, J. Wheatley, W. H. Symons, H. Beale Collins, J. S. Cameron, W. A. Bond, R. Dudfield, P. Caldwell Smith, W. Butler, H. R. Kenwood, D. L. Thomas, J. Priestley, E. F. Willoughby, F. J. Allan, H. Meredith Richards, D. J. Thomas, Herbert Jones, and Mr. Wolf Defries, members; and Dr. Robert Jones, Messrs. C. E. Cassal, A. Chapman, A. J. Giles, Bernard Kitto, and E. C. Lawson, visitors.

The minutes of the last ordinary meeting, held on November 13th, were read, approved and signed by the President.

Correspondence.—Letters regretting inability to be present were read from Drs. Mearns Fraser, Lockhart Stephens, R. Pritchard, W. Berry, A. Bostock Hill, A. Newsholme, T. Taylor, and T. W. H. Garstang, Mr. Wellington Connolly (Local Government Board), Dr. Bernard Dyer, Dr. E. P. Luff, Dr. Voelcker, Mr. Carter Bell, Mr. E. M. Chaplin, Mr. T. Fairley, Mr. A. Haysman, and Mr. Otto Hehner.

REPORTS OF COUNCIL.—The Hon. Secretary read the following Reports:

SPECIAL COUNCIL MEETING HELD DECEMBER 11th, 1903.

Your Council beg to report

1. We have received and adopted the following Report from the Library Committee:—

- (a) That the Committee have elected Dr. A. Newsholme as chairman.
- (b) That the Committee have elected Dr. H. Meredith Richards to act as Temporary Honorary Librarian.
- (c) That they have given instructions for book shelves to be purchased and fitted up in the Society's room. (The Librarian will be glad to receive contributions of books for the library.)

2. We have received and adopted a report from the Finance and Journal Committee as follows:

- (a) That the Committee have elected Dr. J. R. Kaye as their Chairman.
- (b) That they have received and approved accounts paid by the Treasurer, amounting to £189 15s. 1d., and have ordered payment of outstanding accounts amounting to £53 15s. 5d.
- (3) We have authorised the Hon. Secretaries to arrange for a Deputation to the Local Government Board on the subject of the proposed Vaccination Bill, if necessary.

4. We have instructed the Hon. Secretaries to communicate with the Branches, asking them to consider and report what modifications (if any) are desirable in the byelaws issued by the Local Government Board *re* new Streets and Buildings in Rural Districts, and we have asked the Branches to reply to us before the April meeting of the Council.

COUNCIL MEETING HELD JANUARY 8th, 1904.

Your Council beg to report:

1. We have received a memorandum of considerations which are to be submitted by the British Medical Association to the President of the Local Government Board in favour of Security of Tenure for all Medical Officers of Health, and having received a Report from the Parliamentary Committee on the subject, have approved the same.

2. We have received a letter from the National Association for the prevention of Consumption, *re* Phthisis and Public Houses, and in connection therewith have instructed the Hon. Secretaries to reply stating that in the present state of the Legislature it is impossible to deal with the subject, except by voluntary effort, but that much satisfactory work is being voluntarily done in this direction at the present time.

3. We have received the following Report from the Parliamentary Committee, and have adopted the same:

- (a) That the Committee have elected Dr. J. Groves chairman.
- (b) That the Committee suggest that the Society should communicate with the Local Government Board, asking them to advise, where they think fit, the appointment of Medical Officers of Health without reference to any specified period.

4. We have received a Report from the Hon. Secretaries stating that communications have been sent to the Epidemiological Society, the Royal Statistical Society, and the Society of Actuaries, *re* a Quinquennial Census, to be taken in 1906, throughout the United Kingdom.

5. We have received and adopted the following Report from the Finance Committee.

(a) We have passed, as paid since the last meeting, accounts amounting to £53 2s. 5d., and have ordered for payment accounts amounting to £48 2s.

6. We have approved the principle of the appointment of an Executive Secretary, and have given instructions to the Finance Committee to nominate one or more persons for such appointment.

7. We have received replies from the Branches to questions dealing with

- (a) Prevention of Tuberculosis.
- (b) Food Poisoning.
- (c) Grooming of Cows.
- (d) Expenses of Officials attending Congresses.
- (e) Appointment of Minister of Public Health.

And in connection therewith we have decided that copies of the answers received dealing with the Prevention of Tuberculosis, Food Poisoning, and the Daily Grooming of Cows, be sent to every member of the Society,

We have agreed to the Resolution of the Northern Branch that it is desirable that local Authorities should be empowered to pay the expenses of Officials attending Sanitary Congresses, and have given instructions for a copy of the resolution to be sent to the Local Government Board, and we have referred back to the Parliamentary Committee the further consideration of the question of the appointment of a Minister of Public Health.

8. We have received a Report from our Representatives who have been attending the Joint Committee of the Sanitary Institute, Society of Arts, and other bodies, with reference to the provision of joint offices, and we have instructed our Representative on our behalf to join in a Memorial to

the Government with a view to obtaining a free grant of land or, failing that, to join in a search for a site to be purchased, and the preparation of a building scheme, on condition that no action be taken under the latter head which will in any way bind the Society or pledge its credit.

9. We regret to report the death of Dr. W. H. Kempster, many years Treasurer of the Society and Trustee of the Berridge Bequest, and we have instructed the Hon. Secretary to write to Miss Kempster a letter of condolence.

10. That we have dissolved, at the request of the Members, the South Australian Branch of the Society.

11. We have referred to our next meeting the consideration of a letter received from the N.W. Branch, enclosing copy of a resolution unanimously adopted by that Branch to the following effect:—"That in the opinion of the N.W. Branch, an investigation into the various problems associated with the isolation of Scarlet Fever in hospital is desirable, and that the investigation should be undertaken by a Committee of this Incorporated Society specially formed for that purpose."

12. We have appointed Drs. Newsholme, Kerr, Meredith Richards, and any other Member of the Society who may be present, as the delegates of the Society to attend a Congress on School Hygiene to be held at Nuremberg, on April 9th to 14th, 1904.

Resolved on the motion of Dr. J. S. Cameron, seconded by Dr. C. Sanders, that the Report be received and adopted.

The Society then proceeded to ballot for the election of Fellows, Members, and Associates.

The Hon. Secretary reported that the names of the Candidates who had been duly nominated had been published in the Agenda convening the Meeting.

A ballot was then taken, and the Chairman declared the following to be unanimously elected.

AS FELLOWS.

Richard Hugh Brew, L.R.C.P. & S., Chew Magna, near Bristol, M.O.H. Clutton R.D.C.; James M. Cowie, M.D., Ch.B., D.P.H., Town Hall, Manchester, Assistant M.O.H. City of Manchester; John William Davies, L.R.C.P., M.R.C.S., Ebbw Vale, Mon., M.O.H. Ebbw Vale U.D.C.; H. P. G. Elkington, M.R.C.S., L.S.A., D.P.H., Major R.A.M.C. Aldershot, late M.O.H. Gibraltar; F. Dorrell Grayson, M.R.C.S., L.S.A., Rayleigh, Essex, M.O.H. Rochford R.D.C.; T. P. Greenwood, L.R.C.P., M.R.C.S., Stamford, Lincolnshire, M.O.H. Stamford Combined Rural Districts; John H. Harris, M.D., D.P.H., 5, Victoria Terrace, Dartmouth, M.O.H. Borough of Dartmouth; Charles Edward Hollings, L.R.C.P. and S., Kilham, near Driffield, Yorks., M.O.H. Driffield, R.D.C.; F. R. Holmes Meyrick, Winton House, Basingstoke, Hants., M.O.H. Basingstoke R.D.C.; Henry Renney, M.D., D.P.H., Town Hall, Sunderland, M.O.H. County Borough of Sunderland; Francis Joseph Sadler, 21, Church Street, Barnsley, M.O.H. Borough of Barnsley; James Sandison, L.R.C.P., M.R.C.S., D.P.H., Ladywell Sanatorium, Salford, Assistant M.O.H. County Borough of Salford; Robert Thornton, M.B., C.M., D.P.H., 169, Lochee Road, Dundee, Deputy M.O.H. Dundee; W. E. Falkingridge Tinley, M.D., B.S., L.R.C.P., M.R.C.S., Hildegard House, Whitby, M.O.H. Whitby Urban District.

AS A MEMBER.

James McLashan, M.D., C.M., D.P.H., Bedworth, Nuneaton.

AS AN ASSOCIATE.

Henry Lomas, Rickmansworth, Herts. Clerk to the Rickmansworth U.D.C.

Several Candidates were then nominated for election at the next meeting.

A paper was then read by Dr. J. Spottiswoode Cameron on "The Sophistication of Foods."

A discussion followed in which the following took part: The President, Dr. P. Caldwell Smith, Dr. E. S. Willoughby, Lieut.-Col. Cassal, Dr. Robert Jones, Dr. D. L. Thomas, Dr. R. Dudfield, Dr. J. Howard Jones, Dr. Tubb Thomas, Dr. C. Sanders, Dr. H. Kenwood, Mr. Arthur Giles, Mr. A. Chapman, Mr. B. Kitto, Mr. E. E. Lawson, Mr. Wolf Defries, B.A.

Dr. Cameron replied to the discussion.

Dr. Cameron moved, in accordance with notice given, the following resolution:—

That in the opinion of this meeting of the Incorporated Society of Medical Officers of Health:—

(1) The addition to any food of any substance or substances whatever, not of the nature, quality, and substance of the article demanded by the purchaser, should constitute an offence under the Food and Drugs' Acts, unless the presence of the same be declared at the time of sale, and the approximate proportions of the substance or substances added.

(2) The addition of any preservative, other than common salt, to any food should constitute an offence under the Food and Drugs' Acts, unless the nature and maximum amount of such preservative be declared upon a label or wrapper on or containing the parcel of food purchased, and unless such maximum amount be within the limits laid down for such preservative in the report of the Departmental Committee of the Local Government Board on preservatives and colouring matters in food.

(3) No invoice or warranty should constitute a defence by a retailer for the sale of margarine as butter or without a proper label, unless such invoice or warranty be so worded as to render the giver amenable to the law for the sale of such adulterated article, or liable to be prosecuted for having given a false warranty.

(4) That the Local Government Board or the Board of Trade should have powers of declaring standards of purity for all Foods and Drugs, except dairy produce, similar to the powers conferred by statute on the Board of Agriculture in regard to milk and milk products.

(5) Where under Section 18 of the Food and Drugs Act, 1899, an article is sold in an unopened tin or packet duly labelled, but where it appears to the purchaser that after the division of the contents into three parts, as required by section 14 of the Food and Drugs Act 1875 and modified by the 1899 Act, the portions so divided are insufficient in bulk or weight for a satisfactory analysis, the purchaser may require to be furnished to him at the same time two or more such tins or packets with similar labels may, mix their contents, and divide the mixed contents as a whole into three parts as required by the Act.

To which an amendment was moved by Dr. Sanders and seconded by Dr. Kenwood, that the same be referred to the Branches for consideration.

AFTER DISCUSSION, the motion and the amendment were withdrawn and it was moved by Dr. Cameron and seconded by Dr. Sanders that the suggestions be referred to the Council for consideration. Nos 1 2, 3, and 5, as originally moved, and No. 4 amended as follows.

4. That the Local Government Board or the Board of Trade should have powers of declaring standards for the purpose of the sale of Food and Drugs Acts of all Foods and Drugs, except dairy produce, similar to the powers conferred by statute on the Board of Agriculture in regard to milk and milk products.

The Chairman put the motion, and declared the same to be carried. Resolved on the motion of Dr. Cameron: that the Council be instructed to take such action as may seem necessary, including, if they so desire, conference or joint action with the Councils of the British Medical Association, the Society of Public Analysts, the Institute of Chemistry of Great Britain and Ireland, and the Sanitary Institute.

Resolved, on the motion of Dr. Kenwood, that in connection with the foregoing references the following suggestion be also referred to the Council:—

"That it is desirable that the findings of the Departmental Committee upon the use of Preservatives and Colouring matter in Food should be made the subject of legislation without any further delay."

Resolved, on the motion of Dr. Tubb Thomas, that a vote of thanks be accorded to Dr. Spottiswoode Cameron for his paper.

Southern Branch.—A meeting of the Branch was held at Chichester, on January 1st. Present: Drs. Fraser (President), Bostock, Groves, Kelly, Stephens, Willoughby, and Griffith.

After preliminary business, the questions referred to the Branch respecting Tuberculosis and other matters were discussed, with the following result.

(a) *Prevention of Tuberculosis:*

1. Is compulsory notification of Phthisis desirable? Yes.
2. To what extent (if any) should compulsory powers of isolation (hospital or home) extend to cases of phthisis, advanced or otherwise? Compulsory powers not desirable.
3. Is it desirable to utilise existing isolation hospital accommodation where practicable, for the isolation of phthisis? It may be desirable in some cases, but is very rarely practicable.
4. What steps (if any) other than isolation, should be included in any proposed legislation (bye-law or otherwise) to be enforced, for the purpose of preventing infection from phthisis? Legislation is needed for preventing promiscuous expectoration, and the association of infectious persons with articles of food, especially in dairies. The powers possessed under I.D.P. Act and P. H. Act with regard to other infectious diseases, should be taken as referring to phthisis.

(b) *Food Poisoning.*

The Branch do not agree with the resolution in the form in which it is presented, though in sympathy with its purpose.

(c) *Daily Grooming of Cows, and the careful Washing of the Teats of Cows, prior to Milking.*

1. Is it desirable to take steps with a view to securing the introduction of fresh legislation to provide for the compulsory daily grooming of cows, and the careful washing of the teats of cows, prior to milking? Branch agrees with necessity for grooming, but fails to see how it can be enforced by legislation.
2. What other measures can be taken for generally increasing the cleanliness of the milk supply? Power should be given to

M.O.H. of any district in which the milk sold is obtained from other districts, to visit those districts, and in conjunction with the local M.O.H. to examine cowsheds and cows from which the milk comes.

(d) *Paying of Expenses of Officials attending Congresses:*

The following resolution passed by the Northern Branch: "That it is desirable that Local Authorities should be empowered to pay the expenses of the Officials, when attending Sanitary Congresses." Agreed.

(e) *The Question of the advisability of Appointing a Minister of Public Health.*

It is desirable that there should be some re-organisation of the L.G.B. with regard to Public Health Administration, but a separate Minister is not desirable.

The suggestions respecting the teaching of hygiene were agreed to. After lunch a visit was paid to St. Mary's Hospital, an institution dating from the twelfth century.

Dr. Wheatley then introduced a discussion on the desirability of an inquiry into the effect of hospital isolation of scarlet fever, and the form the inquiry should take; and concluded by moving the following resolution, which was seconded by Dr. J. G. Gornall and unanimously carried, the Secretary being instructed to forward a copy of the resolution to the Council of the Society:—

"That in the opinion of this Branch an investigation into the various problems associated with the isolation of scarlet fever in hospitals is desirable, and that the investigation should be undertaken by a Committee of this Society specially formed for that purpose."

Northern Branch.—DINNER TO DR. SCURFIELD.—On the 16th December a complimentary dinner was given by the Branch to Dr. Scurfield as a token of the esteem in which he was held by his colleagues both as their Secretary and as a Medical Officer of Health.

Dr. Scurfield has been Medical Officer of Health of the County Borough of Sunderland for ten years, and now succeeds to the important office of Medical Officer of Health of Sheffield. Dr. Scurfield has been Secretary of the Northern Branch for eight years, and has been a most genial Secretary.

The dinner was held in the Grand Hotel, Newcastle-on-Tyne, and a goodly company assembled under the presidency of Dr. Hembrough, Medical Officer of the County of Northumberland, President of the Branch.

After the loyal toasts had been duly honoured, the health of the Guest was proposed by the President, who dwelt at length on the esteem in which Dr. Scurfield was held by his colleagues, and on the loss Sunderland and the Branch would sustain by his removal to Sheffield. He trusted, however, that though Dr. Scurfield was removing from the North he would grace some of the meetings of the Northern Branch with his presence.

Dr. Scurfield very suitably replied.

Dr. Armstrong proposed the toast of "The Medical Profession," for which Sir George H. Philipson replied.

Dr. T. E. Hill proposed "Continued success to the Incorporated Society of Medical Officers of Health," and Dr. Armstrong, as a Vice-president of the Society, replied.

The health of Dr. Hembrough, President of the Northern Branch, was then proposed by Dr. Farquharson in a felicitous speech, and after a reply by Dr. Hembrough, a very enjoyable evening terminated.

North-Western Branch.—An ordinary meeting of the Branch was held at the Victoria Hotel, Manchester, on Friday, December 18th. Present: Dr. Francis Vacher (in the chair), Drs. Matheson, Smith Sinclair, Forbes, Hitchon, Brindley, Wheatley, Garstang, Gornall, Sergeant, Chronnell, Martin, Laird, Coutts, Graham, Welsh, Pringle, Hamilton, Greenwood, Spencer Low, Meredith Young, Stephenson, and Herbert Peck.

A letter of apology for unavoidable absence due to illness was read from the President, Dr. W. Berry.

The Honorary Secretary of the Branch read a letter from the Honorary Secretary of the Society relating to the teaching of elementary hygiene, enclosing copy of two resolutions passed by the Incorporated Society of Medical Officers of Health on November 13th, 1903, the said resolutions being as follows:—

1. That, in the opinion of the Incorporated Society of Medical Officers of Health, domestic hygiene, personal hygiene, and physical training should be a compulsory part of the training of all teachers.

2. That, in the opinion of the Incorporated Society of Medical Officers of Health, the teaching of elementary domestic hygiene, personal hygiene, and physical training should be compulsory subjects in all Elementary Schools.

It was unanimously resolved that the Branch support the representations of the Society as expressed in the two resolutions, and communicate thereon with the Board of Education.

Dr. Herbert Peck, Chesterfield, then read a paper on "An Experience of the Treatment of Small-pox by Red Light."

Drs. Vacher, Martin, Greenwood, Sergeant, Gornall, and Pringle took part in a discussion on the paper, and a vote of thanks was unanimously accorded to Dr. Peck for reading it.

Midland Branch.—A meeting of this Branch was held in the Council House, Birmingham, on Thursday, January, 7th, 1904. Present, T. Robinson, President, in the chair, Messrs. Barwise, Gepp, Reginald Green, Alfred Hill, McCrindle, Malet, H. May, Ortan, Richmond and Snell.

A communication from the Council of the Society was received asking what modifications, if any, were desirable in the bye-laws with respect to New Streets and Buildings in Rural Districts, issued by the Local Government Board.

It was resolved: That the Midland Branch does not think this the proper time to consider this question.

Dr. R. Green then read a paper "On some Experiments on Disinfection."

Drs. Barwise, Hill, Richmond and Snell took part in the discussion.

CURRENT PUBLIC HEALTH LITERATURE.

The Journal of the American Medical Association, Vol. XLI.

(No. 23.) The Detection of Typhoid Bacilli in Water. (The imperfections of the methods of detecting typhoid bacilli in water and the meagreness of the findings that are beyond criticism. Explanation by the comparatively short duration of life of the typhoid bacillus in water. Possibility of a diminution of the virulence of the bacillus in water.)

Prophylactic Disinfectant Inhalations in Measles and Scarlet Fever. (Egart's assumption that in measles and scarlet fever the specific virus is located in the upper respiratory tract, and his use of antiseptic sprays as a prophylactic. Favourable results obtained.)

Anti-typhoid Serum. (The difficulty of applying laboratory experience of immunization for typhoid in clinical practice. Recent experiments by Macfadyen and Rowland giving more encouraging results.)

(No. 24.) The Typhoid Epidemic at Butler, Pa. (Infection of the water supply.)

(No. 25.) An Epidemic of Typhoid Fever from Sewage Pollution of City Water Supply. Thomas F. Harrington. (The conditions at Lowell, Mass. as to water supply. Pollution of water supply by leaking of check valve and mixing of fire supply with the drinking water.)

Tuberculous and Non-Tuberculous Disease of the Respiratory Tract. (The increase of mortality from non-tuberculous pulmonary disease coincident with the decrease of tuberculous mortality. Investigation by Ascher—*Berliner Klin. Woch.*, Nov. 2, 1903—In Prussia, while tuberculosis in middle life decreases, deaths in early childhood and old age from non-tuberculous causes increase, so that the combined death rates in 1903 are just the same as they were in 1875.)

Home Management of Tuberculosis. The second Phipps' lecture by Dr. Osler and its insistence on the importance of home management of tuberculosis. The small percentage who can avail themselves of the sanatorium treatment.

The Diphtheria Bacillus as a Cause of Gangrene of the Skin. (Sailer—*Amer. Jour. Med. Sci.*, Jan., 1902—Two cases of gangrenous stomatitis following typhoid fever. Bernard and Jacob—*Arch. Méd. Exp. et d'Anat. Path.*, Sept., 1903—Case of gangrene of skin. See also *B. M. J.*, Nov. 14, 1903. The value of bacteriologic examination in such cases.)

(No. 26.) A New Châlet for the Treatment of Tuberculosis.

Medical Record (New York).

(Dec. 19.) Leprosy in Hawaii. J. T. Wayson.

An Unappreciated Source of Typhoid Infection. P. B. Barringer. (This is the closet arrangement on railway trains, whereby the faeces drop on the track. He has noted that many of the men who work on the line contract typhoid from this cause.)

Points to be observed by the Family of a Tuberculous Patient. C. P. Ambler. (He specially emphasises that phthisical patients should not handle or prepare food.)

The American Journal of the Medical Sciences, Vol. CXXVII.

- (No. 1.) Desquamation of the Skin in Typhoid Fever. David Riesman.
 The Differential Diagnosis of Typhoid Fever in its Earliest Stages. William Colby Rucker.
 The Present Status of Pseudo-Diphtheria Bacilli. Thos. W. Salmon.

Boston Medical and Surgical Journal.

- (Nov. 19 and 26.) Unclean Milk, Bovine Tuberculosis, and the Tuberculin Test—their relation to Public Health. E. R. Larned.

American Medicine.

- (Dec. 19.) The Diagnosis of Trichiniasis. William F. Cheney.
 The Influence of the Municipal Milk Supply on the Deaths of Young Children. George W. Goler.
 The Recent Epidemic of Small-pox in California. D. Crosby. (Peculiar in its mildness, rapidity of evolution, and the fact that quite a large proportion of cases responded to successful vaccination after convalescence.)

Medical News (New York).

- (Nov. 21.) The relation of mild types of Diphtheria to the Public Health: Need for Isolation. T. W. Salmon.
 (Dec. 5.) Mortality of Diphtheria in Private Practice under Antitoxin Treatment. J. Zahorsky. (In 1610 cases treated by 10 leading physicians in St. Louis, the mortality was 1.5 per cent.)
 The degree to which substances agglutinating the Shiga and Flexner bacilli are present in the Blood of non-infected persons. L. B. Pilsbury.
 Report on the Results with Different Kinds of Pure and Impure Milk in Infant Feeding in Tenement Houses and Institutions in New York City. Wm. H. Park and L. Emmett Holt. (During cool weather neither health nor mortality of children affected by the kind of milk or number of bacteria in it. Every effort should be made to obtain "clean" milk. The practice of heating milk at home to be encouraged. The use of infant milk in sealed bottles is important. The best bottle feeding gives nearly as good results as average breast feeding, but much of the former is badly done, and therefore the latter should always be encouraged.)

New York Medical Journal.

- (Nov. 21.) The Course and Diagnosis of Variola. W. L. Somerset.
 The Effect of Lemon Juice in Lemonade on Typhoid Polluted Water. W. G. Bissell.
 (Dec. 12.) The Administration of Antitoxin in Diphtheria in New York in 1902. J. S. Billings, Junr. (In 15,792 cases injected, 1,860 died, a case fatality of 11.8 per cent.; 722 of these were moribund when injected, deducting these reduces the mortality to 7.5.)
 (Dec. 19.) The Etiology of Pulmonary Tuberculosis in its relation to Diseases of the Nose and Throat. (W. Freudenthal.
 The Natural Habitat of the Tubercle Bacillus. J. W. Kime. (He thinks this is the cow.)
 Things every Tuberculous Patient should know. Martin L. Stevens. (Concise stated but nothing new.)

Berliner Klinische Wochenschrift.

- No. 35.) Origin and Composition of Alexins. R. Turro.
 No. 37.) Fever and the Elimination of Sugar. P. F. Richter. (He concludes that bacteria use up the sugar in the blood.)
 The Pathogenesis of Pulmonary Tuberculosis. F. Weleminsky. (He infected a number of animals with tuberculosis by way of the alimentary canal. He found that a number subsequently developed pulmonary tuberculosis, showing that the infection must have reached the lungs by way of the submaxillary and bronchial glands into the blood, and thence to the lungs. The germs settle in the lungs, as they meet less resistance here.)
 The Dangerous Components of Diphtheria Toxin. P. Ehrlich. (Begun in No. 35.)
 No. 44.) Tuberculous and Non-Tuberculous Affections of Respiratory Organs in Prussia since 1875. Ascher. (He finds that the combined death-rate is the same in 1901 as in 1875. While the tuberculous rate has gone down, the other has risen to correspond.)
 No. 45.) A Typhoid Fever "Diagnosticum." (Ficker has coined this word to apply to a ready-made fluid with which it is possible to obtain the Widal agglutination reaction in cases of typhoid fever.)
 Inhalation of Lime Dust in Phthisis. P. Reckzeh. (As the disease is rare in the neighbourhood of lime kilns, he thought it was due to the dust—the patients' symptoms were aggravated.)

Deutsche Archiv. für Klinische Medizin, Vol. LXXVII.

- (Nos. 1 and 2.) Disturbances in the Circulation in Infectious Diseases. (Pässler and Rolly state that their experimental and clinical researches have shown that the disturbances in the circulation induced in the course of acute infectious diseases are due to vasomotor paralysis. This is compensated for a time by extra work on the part of the heart, but the heart soon suffers from lack of its usual blood supply, and becomes unequal to the task. The collapse is thus due not to direct injury of the organ by the infection, but to the inadequate blood supply in consequence of the vasomotor paralysis. If it is possible to restore the blood supply of the heart approximately to normal, then it resumes its work and collapse is averted. In case of diphtheria, the heart may suffer in time from the direct action of the diphtheria toxin, its resisting power being reduced under the influence of the toxin until it may finally yield even without primary vasomotor paralysis. Pneumococcus toxin does not have this injurious effect.)
 The Significance of Infection, Heredity, and Predistribution in the Development of Pulmonary Tuberculosis. E. Schwarzkopf. (Summary in *Jour. A. M. A.*, No. 22, Nov. 28.)
 (Nos. 5-6.) Sputum as a Culture Medium for Tubercle Bacilli. W. Hesse. (Scraps of human sputa placed on agar form an elective culture medium for any tubercle bacilli contained therein. He makes a mixture of 10 gm. agar, 10-25 gm. glycerin, and 1,000 gm. distilled water, boiled one-half to one hour and filtered twice, and then poured into tubes in quantities of 25 c.c. in each. One-tenth normal alkaline solution is then added to each tube in varying amounts, ranging from .2, .5 to 1, 2 and 5 c.c. The mixture is then poured out on six plates, and when it has solidified and can

be turned upside down, the agar is inoculated with a scrap of sputum. The bacilli develop sufficiently for differentiation in one to three days; after one or two weeks the colonies can be differentiated by the naked eye. When this test results positively, inoculation of animals is superfluous.

Deutsche Medicinische Wochenschrift, Vol. XXIX.

- No. 40.) Discussion of Feasibility of Farm Colonies and Sanatoria for the Tuberculous on the Madeira Islands. J. Goldschmidt.
- No. 42.) Vincent's Angina. O. Hess. (Two types. (a) rarer, croupous form with pseudo-membrane, mild; (b) ulcerative diphtherial form with spirochaeta denticola in addition to the fusiform bacilli of Vincent, characteristics of Vincent's bacillus.)
- Tuberculosis of the Pharynx in Children. P. Schoetz.
- (No. 44.) Breaking-up of Faeces. P. Grützner. (This is facilitated by pouring alcohol over them. He uses an ordinary egg-beater made with the wire wound in a spiral cone, the handle fastened to the tip of the cone—See also *Münchener Med. Woch.*, No. 44.)
- No. 46.) Bacteriological Examinations of 19 cases of Dysentery (B. Flexner) Jürgens.
- Bacteriological Examinations of the roseola of Typhoid Fever. E. Birnbaum and H. Weber.
- The German Life Insurance Societies in 1902. Guttstadt.
- (No. 47.) The Industrial Protectors of Workmen. T. Sommerfeld.

Münchener Med. Wochenschrift, Vol. L.

- (Nos. 39 and 40.) Epidemic Pneumonia. F. Spact. (An epidemic of croupous pneumonia in a small German village is discussed.)
- (Nos. 40 and 41.) Does Hygiene lead to Race Degeneration? Max Gruber. (He statistically proves that where the infant mortality is high the adult mortality is also high, and that hygiene, instead of causing race deterioration, seems to be an agency for greater race vitality. He reviews a number of errors which he thinks are more or less common. Every defective individual who is weeded out in consequence of his defects has not necessarily had that defectiveness from his birth or is a born degenerate. It is also unscientific to make any sharp distinction between defectiveness and non-defectiveness, the one implying destruction and the latter perfection and growth. There is an infinite number of transitional stages between the two. Natural selection is no explanation of the facts as they occur in actual life, and it is poor policy to claim that the strong do not need the benefits of hygienic measures as well as the defective. He makes a special point of this as regards alcohol. While it has a limited selective action, it is nevertheless one of the most tremendous evils to the race. As regards mankind in general, the application of the principle of the struggle for life is not correct, and the improvement of the race will not be by the blind working of natural selection, but by rational race culture, the chance for which is afforded to a large extent by the provisions of modern hygiene and civilization.)
- No. 42.) Small-pox in Strassburg in the summer of 1903.
- The Lighting of Schools, &c. Report of Committee.
- (No. 48.) Tuberculin in Diagnosis. T. Grunewald.

- The Value of Tuberculin Diagnosis in Sanatoria. M. Pickert.
- The Use of Tuberculin in Diagnosis. W. Freymouth. (Tuberculin is of use, but as negative results are sometimes obtained in patients with marked clinical symptoms, much has yet to be worked out.)
- Streptococcus Serum Treatment in Mixed Tuberculosis Infection. Menzer. (Recovery or improvement followed its use in so many cases, that its employment is to be recommended.)
- Ship-Sanatoria. G. Baer.
- (No. 44.) A Sieve for Faeces. F. Schilling. (This appears useful for bacteriologists and others who have to examine faeces. Placed in the apparatus, the residuum left on the sieve in 6 or 8 hours is free from odour.)
- (No. 45.) Hygiene and Natural Selection. Kossmann.
- (No. 47.) Nile Blue Base as a Reagent for Carbonic Dioxide in the air. M. Heidenhain. (Solutions of varying strengths are made. A very sensitive solution is made by dissolving the stain in 80 per cent. alcohol, and then shaking into it a little finely pulverized calcium hydrate (CaO). The result is a brilliant orange which turns to blue on exposure to carbonic dioxide.)
- (No. 48.) The Pathogenicity of Löffler's mouse typhus bacillus in man. R. Trommsdor.
- Primary Tubercular Infection through the Intestines. O. Wagener. (He found primary tuberculous infection of the intestinal or mesenteric glands in 13, that is, in 17.1 per cent of 76 child cadavers, with discovery of the tubercle bacilli. Similar lesions were found in 3 others, but without the bacilli, making a total of 21.1 per cent in which primary tuberculosis of these glands was manifest.)

Centralblatt für allgemeine Gesundheitspflege Zweiundzwanzigster Jahrgang, Fünftes und Zwölftes Heft, Bonn, 1903.

- On the Price of Food and on Wages in Bonn from the year 1809 to the year 1903. Dr. H. Lichtenfeld.
- The deaths from Acute Infectious Diseases in the European Countries in the years 1891-1900. Dr. F. Prinzing, Ulm.

Bulletin de l'Académie de Médecine, Vol. LXVII.

- (Nos. 34-36.) Potable Water in Garrisons. Committee Report.

Presse Médicale.

- (Oct. 8.) Intestinal Streptococci. P. Nobécourt. Symptoms, lesions, bacteriology and pathology (continued from previous number).
- (No. 92.) The Principles of School Hygiene.
- (No. 97.) A rapid method for the discovery of Tubercle Bacilli in pathological fluids. L. Nattan-Larrier. (The method is based on the rapid development of the bacilli in the mammary gland, and their early appearance in the milk of guinea pigs inoculated. Results may be obtained as early as fifth day, as late as the 15th, according to virulence; but generally a positive result can be obtained by the 10th day.)

Giornale della Reale Società Italiana d'Igiene, Vol. XXV.

- (No. 11.) Hygiene of Schools (continued). S. Belotti.
- (No. 12.) Typhoid Fever in Padua, Statistics and Epidemiology, with yearly chart from 1868. A. Rizzoli, Municipal Medical Officer.

The Prevention of Infection. G. Pasqualis. (Sterilization of water—the use of tartaric acid for the purpose. Disinfection by means of formaldehyde—apparatus to evaporate liquid formalin. Experiments with “Higienol,” which consists of formalin, ethylic alcohol, methyl salicin, with geranium essence.)

Riforma Medica (Palermo), Vol. XIX.

(No. 24.) A fatal case of Membranous Croup caused by Friedlander's pneumobacillus. E. Cionini.

(No. 25.) The Action of Human Gastric Juice on Tubercle Bacilli. L. Ferranini. (Even with 2 per 1000 of free hydrochloric acid had no inhibiting action. Tuberculosis followed in every instance after ingestion by guinea pigs.)

(Nos. 41 and 42.) Behaviour of Yellow Fever Bacillus in the Peritoneum. Experimental Infection. G. Q. Ruata.

Mixed Typhoid and Diplococcus Infection. C. Quadroni and E. Cler. (In the two cases reported the Widal reaction was extremely marked.)

Hygiea (Stockholm).

(LXV, No. 8.) Disposition of Sewage at Berlin. K. Wahlstedt.

Artificial Feeding of Weakly Children. K. O. af Klercker.

(No. 9.) Typhoid Infection of Gall Bladder. I. Jundell.

BACTERIA IN MILK.—In the course of his evidence before the Select Committee of the New South Wales Legislature on the Use of Preservatives in Food, Dr. Tidswell, principal assistant medical officer to the Government, said that he found that 10 grains of boric acid would delay the natural souring of milk for some hours; with 22 grains there would be no souring for perhaps two or three days; with 35 to 70 grains there was no clotting for a week. Milk as taken from the cow always contained micro-organisms. As soon as it got into the pails, cans, and various other articles, it took additional bacteria, besides others, from exposure to the air. By the time the milk reached the consumer, three or four hours after milking, the bacteria had increased by thousands. They underwent rapid multiplication, which varied according to the temperature. For six or eight hours the multiplication was comparatively slow. Up to ten hours' time they found perhaps six, eight, or a dozen species, but after ten hours one group of species took command, viz., lactic bacteria, which found in the milk conditions that superlatively suited them. They increased right out of proportion to the others. After 30 hours they were practically exclusively present. They brought about acidity, and when that reached a certain proportion the milk soured. They went on acting until the milk became curdled. He had known them not only to kill everything else, but to kill themselves. There were also distinct bacteria producing putrefaction, and the milk putrefied according to the number that survived the lactic bacteria. The latter, in fact, protected milk from putrefaction. To boil the milk would destroy the lactic bacteria. Boric acid delayed the production of lactic acid, but did not kill the bacteria. It was not altogether a gain to delay the souring—Nature's warning not to use the milk—because something else was happening of unknown possibilities.

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EDITORIAL.

THE FOOD AND DRUGS ACTS.

THE paper by Dr. J. Spottiswoode Cameron on the “Sophistication of Foods,” reported elsewhere in these columns, treated of a subject so wide that it was quite impossible to deal adequately with the whole of it in a single evening's discussion. Its hygienic aspects naturally received considerable attention, and legal questions were also very much in evidence, but it was somewhat curious that the administrative side of the matter was on the whole left severely alone. Almost everyone was anxious to amend the law, but little or no attempt was made to suggest how, without amendment, it might be better carried out. Nevertheless, the paper and discussion show very clearly many of the disabilities, legal and otherwise, under which Sanitary Authorities at present suffer, and indicate the direction in which remedies are to be sought. The question of the use of preservatives was much to the fore, and though differences of opinion were expressed both as to their utility and their precise degree of harmfulness, there was an almost universal consensus of opinion in favour of giving legal effect to the recommendations of the “Preservatives Committee.” In the interests of the public, of traders, and of Health Officers alike it is in the highest degree desirable that the present period of uncertainty should be brought to an end. Unsatisfactory and inconclusive as much of the evidence given before the Committee undoubtedly was, we are at least entitled to assume that it was sufficient to justify the “Report,” and the very far from drastic “Recommendations” contained in it. If it were not, it is quite unfair that prosecutions should be taking place in many parts of the country in which the Report referred to is practically regarded as settling the scientific aspects of the cases. The position of affairs now is almost

worse than it was before the Committee was appointed, inasmuch as some magistrates act as if the recommendations were already law, while others practically ignore them; with the result that in some places vendors of foods containing antiseptics are prosecuted as a matter of course, while in others, as some of the speakers plainly stated, such prosecutions were carefully avoided because of the uncertainty attending the result. Thus one of the great defects from which the execution of the Acts has always suffered, viz., inequality of administration, is still further intensified.

Considering that these recommendations, if given legal force, would still allow the use of chemical preservatives (except formalin) in all food substances except milk, and infants' and invalids' foods, subject only to certain restrictions, and that it has been amply proved that it is possible successfully to conduct a large milk trade throughout all periods of the year without using antiseptics at all, it is difficult to believe that the adoption of such regulations would press at all hardly on the trade, while it would unquestionably be greatly to the benefit of the public and of those engaged in carrying out the law. The terms of the resolution passed by the Society at the close of the meeting, making it compulsory to declare the nature and amount of any foreign substance whatsoever added to food, and not of the nature, substance, and quality of the article demanded by the purchaser, would make it possible to deal with a number of unauthorised or unacknowledged additions to foodstuffs which at present have to pass unnoticed, but would at the same time raise questions of the greatest technical intricacy and difficulty, the discussion of which in the Courts would benefit no one but the lawyers.

Of the other points raised during the evening, that of the fixing of standards of purity, or "standards for the purpose of the Sale of Food and Drugs Act," as one of the speakers wished it to be, is by far the most important. The recent adoption of legal standards for milk products by the Board of Agriculture has certainly been of the greatest convenience to those administering the Acts, but it is doubtful if the average quality of the milk supply has risen since the "Sale of Milk Regulations" came into force, and the suggestion to increase the standard for fat is a distinct indication that it has not. The convenience of fixed standards, and the fact that every public analyst has to adopt limits of some sort, whether or not legal ones are fixed, form the strongest arguments in favour of doing for all food-stuffs what has already been done for milk, butter, and spirits, and declaring limits below which samples shall be presumed to be adulterated in the absence of evidence to the contrary. It should, however, be distinctly understood that because a sample yields

analytical figures above the standard, it is not necessarily genuine. As matters at present stand, many milk samples which have been watered down to the limit or a little below, are allowed to pass as genuine, although it is morally certain that they are adulterated. In the case of vendors *habitually* selling milk of this description, it ought to be possible to take proceedings in respect of a number of samples collectively, the presumptive evidence of an offence having been committed being in that case so strong as to amount to certainty. Of course the "appeal to the cow" would still be allowed. The United States Department of Agriculture are now actually issuing and distributing, with a lavishness in striking contrast with the methods of our own Government Departments, blue (or rather light brown) books containing definitions and standards for animal and vegetable food-stuffs, and there is no reason why Great Britain should lag behind.

The most pressing of the legal matters discussed during the evening is the need for some reform with regard to the giving of warranties. When in doubt, plead a warranty, is one of the rules of the adulterator's game. The difficulties of the prosecutor in these cases begin at the very outset, as for various reasons proceedings may not lie against the giver of the warranty; or it may turn out that the warranty is too old, i.e., more than six months, as frequently happens with milk contracts; or too new because given *after* the sample was purchased; or the warrantor, being a middleman, may himself plead a warranty. Add to this the fact that those documents bristle with technical points on which the defendant may escape, and it will be seen at once what useful weapons of defence they may be. There seem to be only two ways out of the difficulty—either to abolish the warranty clauses altogether, or to accept no invoice or warranty as a defence which does not bring the giver of it within reach of the law. The latter was the course preferred by the meeting, and expressed in the form of a resolution. The whole matter is surrounded with difficulties, but it should not be impossible for the lawyers to devise a remedy for a condition of things which at times almost threatens to bring the execution of the Act to a standstill.

Most of the other points dealt with during the evening were of comparatively minor importance. The discussion on the definition of *adulteration* was distinctly academic. The present definition is sufficient to include 999 cases out of every thousand (apart, of course, from those coming under the head of abstraction and provided for by other clauses of the Act). Moreover, in "*Smithies v. Bridge*" (1902), where milk deficient in fat to the extent of 30 per cent was proved to be the unaltered secretion of a cow, it was held that the

product of a diseased or improperly-treated animal could not be considered a genuine milk. The cases when the fat itself is of abnormal composition occur, as far as our present knowledge goes, far too seldom to call for any alteration of the law.

As regards the appointment of special tribunals and the need for heavier penalties, both are eminently desirable, the latter however would be obtained and the former would be unnecessary if magistrates had better knowledge of, and held wider views as to, the nature and objects of the laws against adulteration.

As to the general inadequacy of these laws, the only statistics at hand do not help much. In 1902 3 (*vide* last L.G.B. Report on Sale of Food and Drugs Act) 6,281 samples were adulterated, proceedings were instituted in 3,356 cases, and penalties imposed in 2,928, i.e., 82 per cent of the cases were successful. How many failed owing to defendants pleading warranties, it is impossible to ascertain, but taking into account the probable losses on this account, the percentage of convictions is not unsatisfactory. On the other hand, the fact that only 56 per cent of the cases reported as adulterated were taken into Court, requires further investigation. Is it due to defects in the law making local authorities timid? or is it owing to many of the alleged cases of adulteration being too trifling to be worthy of notice? Unfortunately, the L.G.B. Reports almost always stop short at the points where they might be of value, or the answer to this question would be forthcoming.

In any case there can be no doubt that the present adulteration laws could be enormously simplified, and strengthened too, by the substitution of a new Act for the one principal and three subsidiary Acts at present in force. These sometimes overlap, sometimes contradict one another. Parts of them have been repealed, and parts never yet carried into effect, and all these complications of necessity must seriously affect their efficiency. As an altogether new Act, however desirable, is not likely to be forthcoming for some time, it is to be regretted that more attention was not given during the evening to the problem of improving the administration of the present laws.

In the first place the method of taking samples deserves much more attention than it usually receives. There is a very general, and undoubtedly correct, impression that a lot of adulteration is going on absolutely undetected. This may be partly owing to the inadequate number of samples examined, but is much more due to the want of thought and care as to the methods of purchasing them. Many Inspectors exercise great ingenuity in performing their unpleasant duties, but they are not as a rule encouraged by the

Authorities for whom they work, and anything like an organized plan of attack is seldom thought of.

The present methods may control fairly efficiently the purity of goods sold over the counter, but they hardly touch the food of the middle and upper classes, which is ordered to be delivered at the consumer's house. The more artful vendors, however, can altogether defeat the Inspector even as to their *counter* trade, by never selling anything doubtful to customers they do not know.

The only way of dealing with these cases is to adopt the plan of taking unofficial samples—purchased by women and children—without complying with any of the formalities required by the Acts, and without therefore arousing the suspicion of the vendor. In the event of adulteration being discovered a formal purchase must be made, taking the utmost precaution not to excite suspicion. This device has the approval of the Board of Agriculture. As it does away with the difficulty of finding a constant supply of *deputies* for the Inspector, and is in no way unfair to the honest vendor, there is no serious objection to its general adoption.

Within our own experience an Inspector recently tried another plan with great success. It consisted in getting samples as they were actually being delivered at the houses of the purchasers. Out of a considerable batch of samples taken, some in this way and some by purchase at shops, all the former turned out to be adulterated, and hardly any of the latter.

Another point of great importance is the absence of any reliable statistics showing the work done throughout the country by the Sanitary Authorities. Those published by the Local Government Board, partly because the figures are not correct, and partly because they do not give the sort of information that is wanted, are almost valueless. Still another matter deserving of attention is the want of uniformity in the administration of the Acts, largely owing to the absence of controlling power on the part of the Local Government Board, or their failure to use it. This is largely the cause of the inaccuracy of the statistics in the blue-books, and is responsible for much of the outcry against the Acts on the part of some traders. There should surely be some approach to uniformity as to the number of samples taken relative to the population or to the number of shops; uniformity also as to the nature of the goods sampled, so as not to press hardly on some trades and leave others alone; and, finally, uniformity as to the distribution of the Inspectors' attention, so that certain shops are not always being visited while others are entirely neglected. The principle on which all these points should be settled, is well worthy of discussion.

THE SOPHISTICATION OF FOODS.

By J. SPOTTISWOODE CAMERON, M.D., B.Sc.,
Medical Officer of Health of Leeds.

WHILE the term sophistication, as used in connection with foods, might be understood to apply only either (1) to such adulterations as are brought about by the addition to a food of some foreign substance or substances of inferior value, but possessing a plausible resemblance to the food itself, or (2) to the actual substitution of some such inferior substance for the food itself, it is proposed in this paper to include under the term also (3) the removal from the food in part of some valuable natural constituent, and (4) the addition to the article without the knowledge of the purchaser of some foreign matter producing or preventing chemical changes in the natural food. The use of the word is thus four-fold.

The mere addition of salt to a natural food, say to a leg of pork, unless such addition be declared, should, it seems to the writer, be deemed a sophistication. The presence of salt in ham would be the presence of a recognised constituent of the artificial product called a ham, just as it would be of pickled pork sold as such, and would not be a sophistication. It is a question, however, were sodium borate used instead of sodium chloride, whether the substitution would not be really a sophistication. The difficulty here is one that crops up again and again. Were borax the usual ingredient in the pickle, so that the words "pickled pork" meant naturally to the consumer pork treated with borax or borax and salt, the presence of the borax could clearly not be deemed a sophistication. The borax is used either because the customer prefers the flavour of the pork so treated—a pork admittedly chemically treated—or because borax is more convenient to the pickler. If the presence of the boric preservative be frankly declared, so that any person who can safely eat salted pork but cannot eat boraxed pork, may avoid it, no harm is done. Pork, is, at the best, a food attended with certain risks. Many people cannot eat it at all. All chemically preserved meats are, as compared with fresh meat, distinctly altered in their nutritive value. But if the real nature of the method of preservation is well known and sanctioned by time, or if it be by an improved or more recent method, and so declared, the buyer is not wronged. If scurvy follows a too exclusive use of such food, the consumer has himself to thank for

* Paper read at the Meeting of the Incorporated Society of Medical Officers of Health on January 8th, 1904.

his folly. But if the boraxed ham, eaten in moderate amount, produces paronychia, or some necrotic disease of the matrix of the finger nails, in a man who can ordinarily eat salted ham with impunity, he has a right to expect to have his attention drawn in some way to the departure from the ordinary mode of curing in the food purchased.

Sausages are always a more or less suspected article of diet. Many of us never eat them unless they are sufficiently cooked to destroy living parasites. But the Frankfort Sausage Company deliberately preserve their sausages, under the advice of Professor Oscar Liebreich, with boric compounds, and elaborately got-up pamphlets have flooded the profession to prove that borax and boric acid are innocent, harmless, and useful preservatives. Granting that many people can excrete large quantities of these drugs without apparent injury, is it right that susceptible persons should run the risk of taking unknown quantities without warning? Elsewhere the writer has suggested that an unsuspecting person who takes a morning drink of milk, with or without a little rum, may imbibe a solution of boric compounds made partly by the addition of boric acid at the farm, partly by the addition of glacialine by the middleman, partly by the further addition of borax by the retailer, and, if he live in an hotel or a boarding-house, perhaps by a still further addition of some other boric compound in the kitchen. In his cream with his coffee, in his butter on his toast, and in his bacon, he may get further amounts, and in each case without a word of warning. In each instance the quantity is small; yet the aggregate may be large. Should such a man suffer from onychia, he is unable to hint to his surgeon that his diet has contained any harmful drug.

1. *Simple addition.*—Most people prefer the addition of a little chicory to their coffee. The flavour they contend is improved. But when 90 per cent. of the mixture consists of the cheaper article, and the only warning is the statement on the label that "This is sold as a mixture of chicory and coffee," the substitution of the inferior for the dearer substance in such quantity is clearly a fraud. Some indication of the proportions of the two articles is evidently necessary to the protection of the purchaser.

When a man asks for coffee with a little chicory in, and gets chicory with a little coffee, he is clearly getting something not of the quality of the article demanded; but I fear much the dishonest trader would escape under the protection of the eighth section of the 1875 Act. That he should do so is undoubtedly wrong.

To mention a few other articles cheapened by the addition of inferior substances, one may name* Cinnamon, which is said to be

* Report of House of Commons Committee on Food, 1896, p. xl.

adulterated by the addition of ground walnut shells; Cassia, to which spent ginger is added; Arrowroot, which often contains potato starch or tapioca flour; Oatmeal, which may consist largely of barley meal; Liquorice, which may contain rice, starch, sago, flour, miller's sweepings, and farinaceous substances generally. Beeswax is classed as a drug, and half of it may be paraffin; while olive oil is largely adulterated with cotton and other less valuable oils.

In the case of butter the law is stronger, at least in appearance. If any foreign fat be added to butter, the law requires that the mixture shall be labelled and sold as margarine. But as there is no rigid standard of butter, and as butter made from milk may contain anywhere from $4\frac{1}{2}$ to 7 per cent. of the soluble fatty acids calculated as butyric acid, good butter may have nearly a quarter of its weight of "margarine" added to it, and the analyst be unable to certify that the mixture is anything but genuine butter.*

Strong as are the provisions of the Margarine and Food and Drugs Acts, the fact remains that beef and mutton fats and foreign oils enter largely into the composition of what is sold (chiefly but not altogether in the poorer districts of our large towns) as butter.

Even the vigorous attempts of the legislature, which has shown commendable activity in dealing with dairy products, have hitherto, notwithstanding their almost Draconic severity, been far from successful in getting margarine sold under its legalized but inaccurate description. Mr. Embrey, in 1894, told the House of Commons Committee† that 25 per cent of all butter sold was in his opinion adulterated, and that only 10 per cent of the whole (that is 2·5 per cent of the adulteration) was detected. Notwithstanding the increased stringency of the 1899 Act, I doubt if these figures at all overstate the amount of adulteration at the present day, and I question if so profitable a trade as the selling of beef-fat for butter will ever be stopped, unless the assistance of the retail trader and the middleman can be secured. At present, as we shall see later, the retailer who can show an invoice indicating a purchase of "butter" may escape prosecution, although the middleman who gave the invoice cannot be had up for false warranty.

Milk, again chiefly in the poorer districts, where the fraud is most felt, and the damage to health greatest, is very commonly adulterated. Many farmers and retail dairymen sell an excellent article for milk. The Aylesbury and other London dairy companies‡ have no difficulty in obtaining milk guaranteed to contain not less than $3\frac{1}{2}$ per cent of

* Evidence before Parliamentary Committee on Food, 1894, p. 106, Long, Qn. 2046.

† *Op. cit.*, Embrey, Qq. 1269-70

‡ *Op. cit.*, Farmer, Qq. 8430-40.

fat and $8\frac{1}{2}$ per cent of solids not fat, a minimum of 12 per cent of total solids. The average they receive and deliver is of course considerably higher.* And yet until quite recently the limits in use at Somerset House were 2·5 for fat and 8·5 for solids not fat.

The exercise of the power conferred on the Board of Agriculture to set a standard, below which milk shall be presumed to be adulterated, was attended apparently in the first instance by a diminution in the sale of watered and partly creamed milks. The appeal to the cow has not in my personal experience been welcomed with any great cordiality by the dairyman selling milk of low quality.

It is to be hoped that before long the Board will follow the advice of their own specially appointed committee, and raise the fat standard to $3\frac{1}{2}$, subject to the appeal to the cow and a certain amount of consideration as to season and time of milking.

Of nine recent appeals to the cow of which I have notes, in every case the milk at the farm was far above the standard. In one case a single cow gave milk abnormally poor in fat. The specimen sold, however, was from a can containing about 9 gallons, the mixed milk of the man's six cows, and the mixed milk at the farm was returned as genuine.

In two other poor milks, with 2·73 and 2·8 per cent of fat respectively, the milk at the farm contained in the former case 6·18 and 5·42 per cent of fat in the two churns, and in the other case 4·22. Convictions were obtained in both cases.

In six cases of milk supposed to have been watered, where the total solids respectively amounted to 11·4 and 11·79 in two, and where in the other four $7\frac{1}{2}$, 31, 10, and $11\frac{1}{2}$ per cent of water was certified to have been added, the milk at the farms was found to contain 13·86, 13·13, 13·26, 13·98, 13·49, and 13·5 per cent respectively of total solids.

It seems to be a prevalent opinion that the removal of a certain quantity of fat from a rich milk is a venial offence. From a medical point of view, seeing that this is usually done by adding a quantity of separated, or skimmed milk, to that fresh from the cow, the practice is fraught with danger, as the risk of contamination, always large, is thereby enormously increased. The medical objection to watering the milk down to a certain standard is of a like nature; and in addition, the water added at some milk farms is itself so liable to pollution, that the practice ought to be altogether discouraged.† The addition

* *Op. cit.*, Ap., pp. 211-228.

† In the case where 81 per cent of added water was certified, the total solids were 8·77 containing 2·96 of fat. The total solids in the cows' milk were 13·98, containing 4·60 of fat. The pump water (the farm was outside the city), was rich in chlorides, albuminoid ammonia and especially in free ammonia. Apparently the sink wastes found their way into the well.

of water belongs perhaps rather to the class of adulterations from the addition of an inferior article, while the addition of skim milk might come under the heading of subtraction of essentials, as the effect is to diminish the most valuable constituent of new milk.

2. *Absolute substitution of an inferior article.*—This is perhaps not very common. It is too easily detected to be a paying game. The substitution of margarine for butter comes something near, but after all, margarine (so-called) and butter are similar commodities, and the adulteration comes more conveniently under the head of the addition of a foreign substance.

Vinegar frequently consists of acetic acid obtained entirely from the distillation of wood. Arrowroot is sometimes composed entirely of other starches. Brandy and whisky are not seldom merely silent spirit flavoured, while Demerara sugar may consist of beetroot sugar artificially coloured.

3. *Substitution of some ingredient.*—Besides the removal of cream, either by partial creaming or the addition of skimmed milk, there are several other adulterations of a similar character frequently practised. The addition of spent ginger is an illustration of this intermediate class, where an important ingredient is in part removed by the addition of an enfeebled portion of the natural article. Spent carraways are also used to adulterate the spice named, and candied peel is often a great part of it made up of lemon peel from which the essential oils have already been extracted.

Treacle, which used to be a by-product of the sugar refiner, now frequently contains in large quantities glucose made from maize starch, and a similar artificial glucose is not infrequently used instead of cane sugar in making jam.

4. *Preservatives.*—Considering, however, the improvements made by the 1899 Act, perhaps the most crying want at present is the enforcement by law of the recommendations of the committee appointed in 1899 by the Local Government Board, to hear evidence and report upon preservatives and colouring matters in food. The 1899 Act contained a provision that the Board of Agriculture might appoint a committee to hear evidence on standards for dairy produce. Such a commission was appointed, after the formation of the Preservatives Committee; reported before the latter finished its sittings; and if I remember rightly its findings, somewhat modified, had under the powers conferred on the Board of Agriculture become legally valid before the much more important report, at least from a medical point of view, had been issued. The Act of 1899 unfortunately did not prescribe the Court of Reference asked for by the Society of Public Analysts, except in the modified way of charging the Agricultural Board with certain responsibilities for milk and dairy produce standards.

The report of the Local Government Board's Committee, so ably presided over by Sir Herbert Maxwell, has however not been without some effect. Magistrates have in many cases looked upon the limits suggested for preservative adulterations as a sort of standard, and at the present time I have the promise of certain jam makers in the north that they will not only limit the amount of salicylic acid to the maximum indicated in the report, but declare its presence upon the label. If we could obtain this result in regard to other preservatives, notably boric compounds, we might perhaps rest satisfied for a time. If the public knowingly buys weak salicylic acid in its butter and its jam, we might let it do so. If these ingredients, as some tell us, are in these quantities innocent, no harm is done. Should they prove hurtful, the fact would in time be known, for they would not be taken ignorantly.

That the addition in most cases of chemical preservatives to foods is necessary, I am by no means inclined to admit. Science has of late years done much for us in making available the food markets of the world. The importation of tinned and dried fruits, of meats preserved in tins and partly cooked, and, still more important, of uncooked flesh in chilled chambers, has done much to keep down the price of provisions in our little island. But it seems to me quite unnecessary to add poisonous substances to our food to destroy micro-organisms which should either be killed by high, or their activities kept in abeyance by low temperature.

The position taken by the Preservatives Committee is on the whole a moderate one, and moderate counsels are usually those which prevail. The Committee suggest generally the limitation of the quantity of the preservative, and its declaration. In a few cases they would prohibit absolutely the use of certain chemicals, and in others confine them even in limited quantities to certain classes of food. Except that we shall most of us, I think, wish the presence of the drug to be declared in all cases, we can, I think, accept their decisions as wise, and ask for their enforcement as law.

Their recommendations are as follows:—

(a.) That the use of formaldehyde or formalin, or preparations thereof, in food or drinks be absolutely prohibited, and that salicylic acid be not used in a greater proportion than 1 gr. per pint in liquid food and 1 gr. per pound in solid food. Its presence in all cases to be declared.

(b.) That the use of any preservative or colouring matter whatever in milk offered for sale in the United Kingdom be constituted an offence under the Sale of Food and Drugs Acts.

(c.) That the only preservative which it shall be lawful to use in cream be boric acid or mixtures of boric acid and borax, and in

amount not exceeding 0.25 per cent expressed as boric acid; the amount of such preservative to be notified by a label upon the vessel.

(d.) That the only preservative permitted to be used in butter and margarine be boric acid or mixtures of boric acid and borax, to be used in proportions not exceeding 0.5 per cent expressed as boric acid.

(e.) That in the case of all dietetic preparations intended for the use of invalids or infants, chemical preservatives of all kinds be prohibited.

(f.) That the use of Copper Salts in the so-called greening of preserved foods be prohibited.

(g.) That means be provided, either by the establishment of a separate Court of Reference, or by the imposition of more direct obligation on the Local Government Board, to exercise supervision over the use of preservatives and colouring matters in foods, and to prepare schedules of such as may be considered inimical to the public health.

5. *Some difficulties in working the Acts. The size of a sample.*—The new Act of 1899 has produced a new difficulty. It enacts (section 18) that where a food is exposed for sale in an unopened tin or packet duly labelled, no person shall be required to sell it except in the unopened tin or packet in which it is contained. To this provision there is ordinarily no objection, but where very small samples are put up, there may not be sufficient in one tin to allow the division of the contents into three parts, which shall all three be large enough for a fair, proper, and careful analysis. It has apparently been considered in some magistrates' courts, although so far as I know, no case on the subject has been taken, that the purchaser is not allowed to purchase several tins, mix the contents together, and divide the mixture into three parts.

Warranty.—The subject of warranty has been alluded to already. Leeds has succeeded in getting several convictions on warranty, but the following is a case in which we failed. The circumstances were these: The Food Inspector purchased from a retailer as butter a substance which turned out to contain 86.18 per cent of foreign, and merely a trace of butter fat. On the hearing of the summons, the retailer produced an invoice as follows (except as to names):—

N — Road, R —.

Mrs. C., R —, Dr. to

K. and Co., Butter and Egg Merchants.

	£	s.	d.
14lbs Butter 11d.	12	10	
1/2 hundred Eggs 8/10	3	5	
	15		

On the strength of this invoice, which was handed by the dealer himself to the retailer with the articles, the latter was discharged.

On the prosecution of the wholesale dealer, who had given the invoice, the magistrate remarked that there was no authority so far as he was aware for the proposition that the mere use in an invoice of such a generic word as "butter," *simpliciter*, amounted to a warranty that it was pure, or even that it was of merchantable quality. The summons was therefore dismissed and a second summons against the same wholesale dealer for selling the same article to the prejudice of the purchaser was, at the suggestion of the magistrate, withdrawn.

If this be good law—and the decision is that of a man of eminence amongst the stipendary magistrates of the country—it would seem that an invoice may be a sufficient warranty to free the retailer from responsibility, but not sufficient to convict the wholesale dealer of breach of warranty, or to enable him to be prosecuted under section 6 of the Food and Drugs Act.*

The law of warranty requires, of course, in order that the invoice may have the force of a warranty, that it should constitute part of the contract. The invoice, for instance, must not be made after the delivery. If the invoice contains such words as "guaranteed pure," it would probably constitute a warranty, if given before the completion of the sale. In *Laidlaw v. Wilson* the invoice was dated five days after the purchase. The Sale of Food and Drugs Act, 1895, recognised only a warranty; the Margarine Act, 1887, section 7, introduced the word "invoice," and made it a defence that the person charged had purchased the article as butter with a written invoice to that effect; although it is also necessary to such defence that he should prove (1) that he had no reason at the time that he sold it to believe that the article was other than butter, and (2) that he sold it in the same state as he purchased it.

In the 1899 Act, section 20 is headed "Provisions as to use of warranty or invoice as defence, and proceedings against the warrantor." The first sub-section bars such defence, unless a copy of the warranty or invoice has been sent to the prosecutor and to the issuer. The second sub-section gives the latter the right to appear at the hearing, which may be adjourned for that purpose. The third sub-section bars the defence of warranty or invoice given by a person resident outside the United Kingdom, unless the retailer can prove that he has taken reasonable steps to ascertain, and did in fact believe in the accuracy of the statement contained in the warranty or invoice. The fourth sub-section deals with the question of the servant; the fifth, with the venue of information; while the sixth goes on to say that "every person who, in respect of an article

* Bell and Scrivener in the third edition of their "Sale of Foods and Drugs Acts" remark (p. 90): "the result is that an invoice under the Margarine Act is a defence, although it may not amount to a warranty at law."

of food or drug sold by him as principal or agent, gives to the purchaser a false warranty in writing, shall be liable, etc." In this sub-section there is nothing about a false invoice. Whether this be due to a piece of carelessness in draughtsmanship, or is a deliberate loop-hole for the escape of the wrong-doer, it is not for me to say.†

At the close of his paper Dr. CAMERON moved:—

I.—That in the opinion of this meeting of the Incorporated Society of Medical Officers of Health:—

1. The addition to any food of any substance or substances whatever, not of the nature, quality, and substance of the article demanded by the purchaser, should constitute an offence under the Food and Drugs' Acts, unless the presence of the same be declared at the time of sale, and the approximate proportions of the substance or substances added.

2. The addition of any preservative, other than common salt, to any food should constitute an offence under the Food and Drugs' Acts, unless the nature and maximum amount of such preservative be declared upon a label or wrapper on or containing the parcel of food purchased, and unless such maximum amount be within the limits laid down for such preservative in the report of the Departmental Committee of the Local Government Board on preservatives and colouring matters in food.

3. No invoice or warranty should constitute a defence by a retailer for the sale of margarine as butter or without a proper label, unless such invoice or warranty be so worded as to render the giver amenable to the law for the sale of such adulterated article, or liable to be prosecuted for having given a false warranty.

4. That the Local Government Board or the Board of Trade should have powers of declaring standards of purity for all Foods and Drugs, except dairy produce, similar to the powers conferred by statute on the Board of Agriculture in regard to milk and milk products.

5. Where under section 18 of the Food and Drugs Act 1899 an article is sold in an unopened tin or packet duly labelled, but where it appears to the purchaser that after the division of the contents into three parts, as required by sec. 14 of the Food and Drugs Act, 1875, and modified by the 1899 Act, the portions so divided are insufficient in bulk or weight for a satisfactory analysis, the purchaser may require to be furnished to him at the same time two or more such tins or packets with similar labels, may mix their contents, and divide the mixed contents as a whole into three parts, as required by the Act.

The motion was seconded by Dr. C. F. WILLOUGHBY.

DISCUSSION.

The following discussion ensued.

Dr. P. CALDWELL SMITH, in supporting the resolutions referred to the question of warranties in respect to milk, on which subject a most useful addendum might be added. The only way to deal with the matter was to take the bull by the horns and go for the abolition of warranties altogether. There was no reason why a retailer of milk should not be held responsible

† The defence of an invoice, which may not be a warranty, only holds good in prosecutions under the Margarine Act. If the prosecution be under Sect. 6 of the 1875 Act the retailer may be convicted if the warranty be insufficient.

for the milk he sold. This suggestion would receive the support of the whole of the agricultural interests. The farmer felt it to be a great hardship that he should be prosecuted for giving a false warranty, when the milk was out of his jurisdiction for many hours before it reached the consignee.

LT.-COL. CASSAL thanked the Society for their kind invitation to be present. Dr. Cameron had touched upon some of the more important and immediately pressing points connected with the Adulteration Acts, but Dr. Cameron would admit that the subject was a far wider one than could be dealt with in the short space of an evening paper. In the first part of his paper, Dr. Cameron defined what was to be understood by adulteration. There were few persons who rightly understood the meaning of the word adulteration, and the last persons to understand it were the magistrates who were called upon to adjudicate under the Acts. Adulteration in the popular idea consisted of the addition of some foreign substance to an article of food or drug. Under the law as it now stood, the Public Analyst had to report whether an article was genuine or adulterated, and he had to include cases of abstraction, which did not in any sense fall in with the popular idea of adulteration. Again, there was the production of an article by some process resulting in the production of a substance that was of the same composition as a physically adulterated article. A sample of butter was submitted to him which he certified to contain 17 per cent of foreign fat. The case was disputed, and the Inspector's sample sent to the Government Laboratory. Another portion of the sample was sent to one of his colleagues, who examined it, and who was called for the defence. It transpired that the butter had been made from the milk of two cows, and that the milk had been examined by his colleague, who stated that it was abnormal. He (the speaker) had a sample of the milk taken, and from it he made some butter. He analysed that butter, and found it contained about 30 per cent of "foreign" fat. He examined the milk and found it abnormal. It contained various substances of a very singular character. It contained swarms of micro-cocci, and in fact was a diseased milk, the product of animals in a diseased condition. The sample went to Somerset House, was analysed, and certified to contain 17 per cent of foreign fat, assuming that the cows had not been kept in a bad condition, not badly fed, or not abnormal in some other way. So that the certificate from the Government Laboratory confirmed his certificate, but contained a saving clause, that the sample might have had the composition of adulterated butter, but without the physical addition of margarine. He submitted that to produce an article of that sort was as much a fraud as to add a portion of margarine. They had a substance from the point of view of the purchaser, the same in every respect. In certifying as to the milk, he stated that there was a percentage of the fat of milk and a percentage of fat *not* the fat of milk, i.e., foreign fat. He would suggest that Dr. Cameron should extend his definition of sophistication to cover the fraud due to the improper treatment of the substances from which an article of food was to be produced. The greater part of Dr. Cameron's paper was taken up with the important question of the addition of chemical preservatives to food. He agreed that this was a pressing and important matter. He agreed that it was unaccountable that the Board of Agriculture, with the excellent report of the Parliamentary Committee before them, had not taken action to put the recommendations of that Committee into force. He would like to have seen those recommendations more stringent, but he was bound to say they might be regarded as reasonable

at present, in view of the fact that the agitation against the use of preservatives in food is yet young. He did not wish to enter into any discussion as to whether such and such a percentage of salicylic acid was injurious to health, or boracic acid regarded as dangerous, but if there was, in an article of food, a drug present in such an amount as to be capable of producing its specific effect on that article of food, by that very fact it must affect the health of the person consuming the food; that being so, if the foreign substance was found, it did not matter whether it was such and such a per cent; it was sufficient that it was there in a quantity sufficient to preserve the food. It was an exceedingly difficult thing to get magistrates to see such points as these, particularly when they got certain members of the medical profession who would appear in the witness box and say that salicylic acid was an excellent thing, and boracic acid more excellent, that they took them themselves and recommended them to children, invalids, and the aged. He contended for these reasons that special tribunals should be constituted for dealing with cases of that kind. He did not agree with Dr. Cameron that the law was draconic. By no legislature of any kind would it be possible to destroy the practice of adulteration beyond a certain point. They must have regard to all the difficulties connected with the production of food. They were very far from legislature draconic enough to put down all adulteration. The laws they had were not laws they had so very much to be thankful for. They were intricate, crowded with loopholes for the escape of offenders, and the proverbial coach and six could readily be driven through them. In his opinion the law wanted to be entirely re-cast. The position of the Society of Medical Officers of Health in the matter was one of the utmost importance. He could not sit down without suggesting to the Society the advantage of co-operation between the Medical Officer of Health and the Public Analyst. In some districts there was not that effort to work together which it was desirable there should be between the two scientific officers of an authority. There was no difficulty about it. In the interest of the professions both of Medical Officer and Public Analysts consultation and united action was of the utmost importance and in every way desirable, particularly in view of the fact that they had Authorities composed of men who did not know much about these subjects, and that it was essential that amongst the officers there should be united action.

Dr. ROBERT JONES asked for information as to the value of tinned meats, particularly for children. The question touched at the root of the physical condition of their children; he had learned that evening that these things might be prepared under abnormal or insanitary conditions, and he would be very glad to have some further information on the subject.

Dr. THOMAS (Stepney), speaking on the reference in the paper to tinned goods, put up in small quantities, said he had caused samples of tinned mustard to be purchased. The contents of the tins were mixed and divided in the usual way, and no question was raised by the magistrate as to such division. With regard to the appeal to the cow, his experience was much the same as Mr. Cassal's. He had a sample with less than 2 per cent of fat. An appeal was made to the cow. The Inspector himself milked the cow, and that sample gave a little over 1½ per cent of fat. A little time afterwards a similar defence was again raised by another seller, and an appeal again made to the cow. He was rather surprised that a milkman at another part of the town should also have a cow giving milk of that kind, and went himself to see the cow milked, and found to his surprise that it was the same cow. With regard to the substitution

of one article for another, he recently analysed a sample of saffron; when it was put into water, the colour immediately disappeared, and the base of the sample was a very light tobacco, some mineral matter put in and coloured as saffron. Six months ago he seized about eighty tons of liquorice root. It had been at the bottom of the sea for six months. He wanted to know whether it was to be used for human food. Oh no! was the reply, it was to go to America to adulterate tobacco. It was, it seemed, a common practice to adulterate tobacco with liquorice root. Dr. Willoughby stated that boric acid would only preserve an article of food for a limited time. That was not his experience, but some people thought that not only would boracic acid preserve an article, but even after decomposition had begun, bring it back to a normal state. A few weeks ago he had seized a large quantity of tinned eggs, the amount of boracic acid amounted to 70 to 115 grains per lb. The man appeared surprised when he (Dr. Thomas) told him the amount was excessive, and pleaded that if they were slightly decomposed at the start, the boracic acid would make them all right. Although they (the authority) proved to their own satisfaction that the eggs were intended for human food, the defence that they were to be used for shampooing purposes was held good. The warranty question became more acute every day. They recently had a case where a warranty was pleaded, and on proceeding against the warranty giver they lost the case, because the warranty was dated six months previously.

Dr. R. DUDFIELD, speaking on the warranty question, said that at Paddington they had just had a rather serious case in which the Act had broken down. A sample of milk was found to be 20 per cent deficient in fat. Warranty was pleaded and the case dismissed. Proceedings were taken against the middleman, but it was then found to have been purchased with a warranty from the farmer. It was hopeless to go against the farmer, for there section 20 of the Act broke down. There was no provision for dealing with a succession of warranties. The case of *Manners v. Tyler* decided that proceedings after the first warranty had to be taken in the country. One Medical Officer of Health had called his attention to a pepper case, where the pepper had been in stock for more than six months. The sample was found to be adulterated, and a warranty was pleaded. When proceedings for false warranty were taken against the wholesale vendor, the case was dismissed, and the dismissal confirmed on appeal, on the ground that the warranty was more than six months old. Milk was usually sent to London under contract executed on the first of April in each year, so that any time after the autumn, when the six months was over, the giver of the warranty could not be proceeded against. When their solicitor put the matter to him, he (Dr. Dudfield) held that the real warranty was the label on the churn. The solicitor was not with him, and his Council took the lawyer's view of the case, and decided to go no further, but to send the evidence to the Board of Agriculture and Local Government Board. At the last meeting, there was a letter from the Board of Agriculture expressing the same opinion that he had held, and now his Public Health Committee had decided to test it. A further difficulty had now cropped up, for a well-known solicitor, who was much concerned in cases under the Sale of Food and Drugs Acts, had submitted that when proceedings for false warranty were taken they could not deal with the sample that formed the basis of the original prosecution. That was fresh to him, and he did not think it an objection that could be supported. He had come to the conclusion that so long as the warranty clauses were left in the Sale of Food and Drugs Acts, the working of the Act would be practically barred.

Dr. J. HOWARD JONES, speaking on the subject of preservatives in food, said that at Newport he had adopted the method of getting the Town Council to circularize all the tradespeople drawing their attention to adulterations with boracic acid, and pointing out that if samples purchased from them were found to contain boracic acid, they would render themselves liable to prosecution. The effect of that was that the amount of boracic acid sold in the town had been largely reduced. When the Report on food preservatives was issued, he persuaded his Council to send a summary of the recommendations to all the vendors of food in the town, and in 1902 not a single sample of milk was found to contain a preservative, and no sample of butter contained more than 5 per cent. He mentioned those facts to show that they could achieve their objects to a great extent notwithstanding the Food and Drugs Acts, by educating the vendors. A large number of vendors were quite innocent, and he now found that they wrote to the wholesale people demanding an article free from certain things, and generally they managed to get it. In a similar way, when he saw recently that in Wiltshire lead had been found in cream of tartar, he advised his Council to issue a circular that if lead were found in cream of tartar, proceedings would be taken.

Dr. TUBB THOMAS said that it all depended whether the purified cream of tartar was asked for or simply cream of tartar. If only cream of tartar it was an impure article, and could contain as much lead as they liked. He had endeavoured to convince the magistrate that cream of tartar could be made without lead, although that might mean a much more expensive apparatus being used.

Dr. SANDERS said they had not kept strictly to the terms of Dr. Cameron's resolutions. With regard to Dr. Jones' question about tinned foods, he would refer him to Dr. Vivian Poore's evidence before the Committee. Personally, although he suffered from a most robust constitution, he could always tell when he had eaten foreign meat. He did not know whether Dr. Cameron would agree to the suggestion that these resolutions should be sent to the Branches for consideration. He thought it was not desirable that they should be decided at that one meeting. The tendency of the speakers had been to grumble at the Sale of Food and Drugs Acts. Each speaker had cited some particular case lost, but they did not expect to win every case taken into court. If they compared the favourable decisions under the Sale of Food and Drugs Acts with the decisions given under any other of the various Acts under which they worked, they would find the comparison was very favourable. They ought not to take up the position of requiring a law under which they would always win. The risk they ran of losing a case on a technical point was a great advantage in keeping them up to the mark. For instance, they found in his district a milkman carrying two cans, one pure, the other adulterated, the samples for the Inspector being sold from the pure can. Well, they got over that by taking samples from both cans. After that they found milk in one can and pure water in the other, but they would get over that too. No doubt the Acts contained many clauses resolutions without their being considered in the Council and by the branches. Certainly the 5th, the additional clause, he did not agree with, because he supported the view of Dr. Thomas that it was legal to take three tins, mix the contents, and divide the sample. He moved as an amendment that the resolutions be sent to the branches for consideration.

Dr. KENWOOD, in seconding the amendment, did not think that with the exception of the more recent resolution, there would be any serious

difference of opinion: indeed, he had been thinking all the evening that at the end of the meeting they would have no difficulty in passing all the resolutions except the last, and perhaps even that too. As a Society, they wanted to make the result of their meeting as valuable as possible. They would not get the best value from the meeting if they restricted the discussion to Dr. Cameron's resolutions. As Health Officers, the one important matter they had to deal with was the pernicious practice of adding unscientifically, ignorantly, and by several independent channels, these preservative agents to their food. He would second Dr. Sanders' amendment, and move also that in the opinion of the Society of Medical Officers of Health, it is highly desirable that the findings of the Departmental Committee on Preservatives and Colouring Matter in Food should be given legal expression to without further delay.

Mr. ARTHUR J. GILES (Secretary to the Grocers' Federation) said his Association was at one with the Society in their desire that the Government should give effect to the findings of the Preservatives Committee. Whether they were agreed as to the form he was not quite so sure. For the retailer it would be a great advantage; with the exception of milk, coffee, and butter, there were very few things the retailer adulterated. The difficulty with the retailer was that so many new things arose—for instance, the presence of lead in cream of tartar. The gentleman who had referred to that, however, would bear him out that it was foreign cream of tartar and not British. After that decision, however, cream of tartar would soon cease to contain lead at all. Dr. Cameron would do wisely to reconsider his judgment based on his experience where the invoice was held to be a warranty in one case and in the other not. He did not know who the magistrate was in the first case who gave that most remarkable decision, that a mere invoice was a warranty. He imagined it was one of the vagaries of those gentlemen they had heard about, but he was sure that no stipendiary would allow that the sending of an invoice constituted a warranty. If Dr. Cameron looked at the second case he would find that the magistrate, Mr. Atkinson, took a perfectly proper view, that the invoice contained nothing in the shape of a warranty. He was sure if they would put themselves in the position of those who had to buy and retail these goods, they would agree that the warranty was surrounded with difficulties. If a retailer had nothing to do with the preparation of an article, and sold it as he received it, it was only fair that he should have some means of escaping from penalties if that article was adulterated. In Dr. Cameron's paper there was a good deal of reference to preservatives. He spoke of Medical Officers of Health having been flooded with literature on the benefits of boracic acid; that was never done until a Medical Officer of Health, who had written an article on boracic acid, admitted in the witness box that he had no practical knowledge of the subject at all, that he had really read only one side of the question and had no experience of the toxic effect of boracic acid. His organization had done a good deal in assisting to stop the fraud of adulteration. The greatest difficulty they experienced was the illegal sale of margarine. He had the names of more than a dozen men now who sold margarine for butter. They occasionally prosecuted them, but they would very much rather that the Local Authority did that work. With reference to the question of the purchase of tinned foods, the High Court had decided that they could not purchase three tins and mix the contents together.

Mr. CHAPMAN said there was one point that the framer of the resolutions might consider with advantage, viz., the substitution of the expression "standards for the purpose of the Sale of Food and Drugs Act" rather

than "standards of purity." They had one first duty, their duty to the public, that they ought to carry out without fear or favour; but they ought to proceed with great caution in interfering with honest manufacturers. They ought, so far as consistent with their prior duty, to take care not to harass the honest trader. The compulsory disclosure of the addition of preservatives would inflict an injury on the manufacturer inconsistent with the advantage the public might derive. Mr. Cassal stated he would like to see a new Act substituted for the present Sale of Food and Drugs Acts. That would not be at all wise, for the present Act had done a great deal of good. There were, of course, grave objections to some parts, the greatest perhaps relating to the warranty. One or two speakers had suggested the abolition of the warranty entirely; in his opinion that would be a great mistake. It would be out of the question to expect all shopkeepers to ascertain the exact purity of their goods, but the warrantors should be associated with the retailers. That was one of the recommendations of the Royal Commission which he thought they could agree to.

Mr. KIRTO agreed with Mr. Giles that it would be a great hardship to retailers if the warranty was made of no value. Leaving out milk, and perhaps two or three other articles, there was really at the present time very little adulteration. Certain things were occasionally found adulterated, but not by the retailers, who in many cases were ignorant of such methods. It would be very hard if they had to pay fines for an adulteration of which they were ignorant. He wished he could get their magistrates to give decisions on a common sense basis. Only recently, in a case of 8 per cent of added water, the magistrate decided that it was too small for conviction. With regard to saffron, in his county (Cornwall) probably more saffron was used than in any other county; everybody used it. He had had a great number of samples taken and had never found anything substituted.

Mr. LAWSON (Chairman of the Public Health Committee, Leeds) said the Medical Profession and Medical Officers of Health were extremely enthusiastic in their profession, and the public were perhaps too indifferent as to what they took in their food. The position of the Chairman of a Public Health Committee was to hold the balance between the two. He was pleased to hear one gentleman say they ought not to harass the trader. He was sure it was not the wish of Medical Officers so to do.

Dr. TUBB THOMAS said they should not come to any hasty conclusions on the resolutions, particularly on the question of the standard of purity. At the present time London consumed many thousands of gallons of adulterated milk daily in consequence of the standard of milk being fixed. The milk trade was getting into the hands of large middlemen. They got milk of high quality from the farmer, but they delivered only what they called "standard" milk, and the milk of higher quality was brought down to standard. They should be extremely careful before they asked for standards of purity to be fixed.

Mr. WOLF DEFRIES would not discuss the physical merits or demerits of preservatives, but he thought some sort of resolution as to the use of a preservative that was not detrimental would be desirable. Dr. Cameron spoke of getting preservation by cold or heat. It was well known that in many cases the destruction of organisms by heat was not accompanied by chemical change in the substances so treated. Milk, he believed, was such an article. It was doubtful whether milk treated with heat was not a distinct adulteration. There were two kinds of adulteration covered by the Act, the one to the prejudice of the physical and sanitary condition

of the purchaser, and the other to the prejudice of his pocket. It was the former with which the Society was concerned.

The PRESIDENT (Dr. Groves) said he had long thought it a great reproach to science that it had not determined how food could be preserved apart from any deleterious material being used. Chemists should turn their efforts to that. They knew the enormous loss which would take place if all food were left to decompose. On behalf of the Society, he thanked their visitors for their able assistance. He thanked Col. Cassal for the remarks he made with reference to co-operation of Analysts with Medical Officers of Health. Some of the Fellows of the Society had a grievance against Analysts, particularly in connection with water supply. A conscientious Medical Officer of Health refused to supply the Certificate as to water supply to a new house. Some of the water was submitted to the Analyst, who found only 150 micro-organisms to the cubic centimetre, and certified that the water was fairly pure. The Authority were proceeded against for not granting a certificate, and the Medical Officer of Health was called on one side and the Analyst on the other. The Medical Officer felt that he dare not certify as wholesome water that was liable to contamination, and that was the result. He thanked Dr. Robert Jones for touching on a subject with which the Society was in great sympathy, viz., the physical deterioration of the English race. The Society had tried to impress on the Board of Education the importance of including in the code the teaching of personal hygiene, domestic hygiene, and physical training in all public elementary schools, and he thought the Society would probably go still further in that direction. He would call Dr. Robert Jones' attention to the food supply in the rural districts. It was almost impossible to get milk for children in rural districts. If it was not sent to the towns, it was used for making butter, and the labourer found it impossible to buy milk for the use of his children. He (Dr. Groves) encouraged the use of skimmed milk and dripping.

Dr. CAMERON, in replying, said Dr. Caldwell Smith and some other speakers had suggested the abolition altogether of the warranty. He was afraid that would not do, because, as the Chairman had said, they had to consider the innocent retailer, and very often the retailer was a man who had a hard struggle. He was often foolish, and sold margarine without taking the trouble to get anything but an invoice, but he (the speaker) would regret to see the warranty abolished. Referring to Col. Cassal's observations on the absence of any action on the Report of the Preservatives Committee, he pointed out that the Board of Agriculture had powers with regard to dairy produce, and that the Local Government Board had no such powers given them to deal with other articles. He had not introduced the subject of milk from diseased cows, although it had been in his mind. He left it out with many other things because one could not touch on everything. His view was that a man who sold milk that was not good milk ought to be proceeded against. He thought the time would come when the Board of Agriculture would go a step higher, and require a $3\frac{1}{2}$ or $3\frac{3}{4}$ per cent of cream; except in certain circumstances it ought to be possible to secure an average standard above 3 in the mixed milk of several cows. He did not know that they could ask to have special tribunals. They had the lay magistrates and the stipendiary, but he would certainly like to see them with a little better acquaintance with the Acts. Sometimes the magistrates appeared to be almost as ignorant on matters of everyday knowledge as Judges. With regard to margarine, if the Act was literally interpreted, it would be almost impossible to buy margarine at all. He agreed there were many

clauses in the Acts they would like to see re-cast. The difficulty of an entirely fresh Act would be that all the decisions already obtained would be lost to them, whereas they could always legislate to evade particular decisions. He agreed with what had been said as to working with Public Analysts. His own relations with his Public Analysts had always been most friendly. Tinned meats hardly came within the scope of sophistication of food, but of course if horse flesh were put into the tins instead of proper meat, that would be a fraud, and if detected should be prosecuted. On the question of the division into three parts of small tinned goods, Dr. Cameron said that at Leeds they bought three tins at the same time, mixed the contents, and divided the total so mixed. On the question of lead in cream of tartar, he said that would of course come under the 3rd sec. of the Act as an injurious mixture, and the question would then be as to the amount of lead. He agreed to some extent with Mr. Defries, and if he did not care very much about margarine or butter, still they had to administer the Act. Some adulterations were frauds rather than offences against medicine, but with preservatives that was not so, and he believed they were all injurious to some extent, even common salt. He was glad to hear that the Society Mr. Giles represented was taking samples and instituting prosecutions with regard to margarine, but he agreed that it was the duty of the Local Authority to do that. He thought perhaps the power given to the Board of Agriculture to go up and down the country and see what was being done in the matter might do some good. He accepted Mr. Chapman's suggestion to alter the words "standard of purity" to "standard for the Sale of Food and Drugs Acts."

AFTER DISCUSSION, the motion and the amendment were withdrawn, and it was moved by Dr. Cameron and seconded by Dr. Sanders, that the suggestions be referred to the Council for consideration. Nos. 1, 2, 3, and 5, as originally moved, and No. 4 amended as follows:

4. That the Local Government Board or the Board of Trade should have powers of declaring standards for the purpose of the Sale of Food and Drugs Acts of all Foods and Drugs, except dairy produce, similar to the powers conferred by statute on the Board of Agriculture in regard to milk and milk products.

The Chairman put the motion, and declared the same to be carried. Resolved, on the motion of Dr. Cameron: that the Council be instructed to take such action as may seem necessary, including, if they so desire, conference or joint action with the Councils of the British Medical Association, the Society of Public Analysts, the Institute of Chemistry of Great Britain and Ireland, and the Sanitary Institute.

Resolved, on the motion of Dr. Kenwood, that in connection with the foregoing references the following suggestions be also referred to the Council:—

"That it is desirable that the findings of the Departmental Committee upon the use of Preservatives and Colouring matter in Food should be made the subject of legislation without any further delay."

Resolved, on the motion of Dr. Tubb Thomas, that a vote of thanks be accorded to Dr. Spottiswoode Cameron for his paper.

Dr. Henry R. Kenwood has been appointed Professor of Hygiene and Public Health at University College, London, in succession to the late Prof. Corfield.

THE MILK SUPPLY OF THE METROPOLIS.

By REGINALD DUDFIELD, M.A., M.B., D.P.H.,
Medical Officer of Health of the Borough of Paddington.

It is unnecessary to emphasize the importance of milk as an article of diet, and I will only say that as it is the chief food of infants, young children, and sick persons, no effort to secure a supply which is clean, and unadulterated can be deemed too great to be made. The conditions of life have greatly changed since the pastoral age, when every family produced and consumed its own supply. Then milk was used as taken from the cow, and consumed so quickly that no noxious products arising from contamination were developed. The promised "three acres and a cow" are not likely to materialize. We have, therefore, to deal with a system of supply for large towns which may be expected to persist without material alteration, and it is our duty to see that that system is developed to the highest possible standard.

The London milk trade dates from 1860 or thereabouts, and was greatly promoted by the outbreak of cattle plague in 1865. The trade would, of course, be impossible without the numerous avenues for quick importation afforded by the railways converging on the metropolis. The consumption within the Metropolitan area was estimated some three years ago at about 60,000,000 gallons per annum. It is now probably nearer 63,000,000. In 1889 there were 10,000 cows in the Metropolis, a number which in 1900 had fallen to little more than half (5,144). At the licensing meetings of the London County Council of last year 276 licenses were granted for cow-sheds, affording accommodation for 6,047 cows, but the number actually kept there is between, 3,500 and 4,000. The average amount of milk yielded by a cow is stated to be 500 gallons per annum, so that the "local production" may be estimated at from 1,750,000 to 2,000,000 gallons per annum. The deficiency is made up from all parts of the United Kingdom, the area of supply extending occasionally as far as Scotland in the north and Cornwall in the south. Within recent years a beginning has been made of a milk trade from the continent, as much as 10,000 gallons arriving during one week of the winter of 1900-01.

Prof. Delépine, in a paper read last year before the Epidemiological Society, adduced convincing proofs not only of the well-known fact that milk is liable to undergo harmful changes when contaminated with "dirt," as distinguished from more specific contamination, but also of the importance of time and temperature as the efficient factors in the development of those noxious products. As much of the milk

reaches the town consumer twelve or more hours after leaving the cow, it is evident that he is the person who has the greatest right to demand that milk shall be produced under conditions which will keep it free from dirt, and that its transport and delivery shall be adequately supervised, so that the milk shall reach him in a sound and unadulterated state. A great responsibility rests on the local authorities of rural England in this matter, a responsibility which unfortunately is too often not recognized, or deliberately ignored. This has been recently demonstrated by the replies collated in the *British Medical Journal* of December 5th, 1903.

The proportion of the London supply which is produced within the Metropolitan area is so small, that I may dismiss it from present consideration with the remark that as it is under the joint supervision of the officers of the County and Boroughs, it should be an easy matter to secure its production in a clean and wholesome state. The rural cowsheds and farms have the most vital interest for us, but I do not propose to deal with them, as they are under the jurisdiction of provincial officers. I prefer to make the act of milking my point of departure, and to note certain mishandlings of the milk which have come under my personal observation. After that I propose to say a few words on the powers possessed by the Borough officials with regard to the supervision of the sale of milk, and to suggest certain methods which appear to me to afford a hope of a better supply.

On the occasion of official visits to dairy farms one has little chance of seeing the normal conditions of milk production. What is seen is often bad enough, but to get really behind the scenes it is necessary to live on the premises. A few summers ago I spent my holidays at a small farm in Gloucestershire, where the principal business was the supply of milk to the neighbouring town. The cows were kept in the fields, but were brought to the farmyard for milking. The principal milking shed was a narrow one, just large enough to take one cow at a time. The floor and the walls were covered with dung, the former to the depth of several inches. The milk was simply strained before being taken on the round, which included the principal refreshment contractor in the neighbouring town. The milk vessels were washed in well-water which was not thought good enough for drinking. In this case the milk was consumed so soon after being drawn, that there was not time for any toxic property to develop. If the milk had been sent to a distant town, I think the results would have been different. While admitting that very many farms are managed on much better principles, I fear that what I saw was but a sample of common experience.

I have mentioned the distances from which the Metropolitan supply

is derived. The usual milk-van is well known, and where the milk traffic is sufficiently large and regular in its dispatch, the railway companies always provide such vans. Under other circumstances the milk takes its chance, and I have seen it loaded into vans stinking of fish, and into others in which dogs have travelled. The smaller quantities get but scant care at the stations, being left while waiting for the expected train, exposed to dust and sun. Usually the churns are not locked, and so afford opportunities for pilfering, with the consequent addition of water of unknown source and quality.

Arrived in London, the milk either goes direct to the retailer, or to one of the large wholesale depôts. Many London firms, both large and small, take the utmost care of the milk consigned to them; but there is still reason to believe that "blending" is not unknown. A judicious mixing of high- and low-grade milks, without the addition of water or separated milk, can be safely effected without getting within the grasp of the law. The milk standard has not for this reason been an unmixed blessing. Structurally I think the London milk stores are satisfactory, but the same cannot be said of the manner of conveying the milk through the streets. The cans and churns are too much exposed to dust and sun, while in hot weather the means adopted to prevent heating of the milk are (to put it mildly) rudimentary. As regards the shop sale, it is only necessary to allude to the fact that it frequently takes place on premises where paraffin, wood, and other commodities of a more or less savoury character are dealt in. The counter-pan is more commonly uncovered than otherwise, in spite of the efforts of the officials, and the shop door being usually kept open (in hot weather at any rate), the milk pan is the "Happy Valley" of flies, and the catchment basin of much dust and debris from the street.

At the consumer's house the milk has to take its chance between the hot kitchen, the cooler scullery with the neighbouring sink and its trap, or the still cooler larder, if there be one, in all probability adjacent to the dust-bin. Here again it receives its quota of flies and dirt. What wonder that the milk fails to "suit the baby," who after all is the most sensitive re-agent we can use to test the purity of the milk?

The treatment so far described, except as regards "blending," is due to ignorance or more or less culpable negligence. In addition to that process, skimming, watering, and the addition of preservatives are only too common. I do not propose to dwell upon these fraudulent practices here, although I shall have something to say about them when dealing with the legal provisions relating to milk. To the latter subject I now proceed.

The Metropolis cannot be congratulated on the possession of such clear and intelligible powers of supervision over the sale of milk, as the importance of the commodity and vital interests involved entitle this, the first city of the world, to possess. Prior to the passing of the London Government Act, 1899, the County Council had the whole matter under its control, in pursuance of section 28 of the Public Health (London) Act, 1891, under which section the Local Government Board is authorized to issue such Orders as may be necessary for the Metropolis, and the County Council to make bye-laws pursuant to the same Orders. The Board has issued no Order, and consequently the County Council has made no bye-laws. By the London Government Act certain powers were transferred from the County Council to the Borough Councils, viz., the registration of dairymen and the administration of the "bye-laws and regulations for the time being in force with respect to dairies and milk." At a first glance it would appear that the supervision of the London milk trade was allocated between the two authorities in such manner as to leave the administration of the Dairies, Cowsheds and Milkshops Orders of 1885, 1886, and 1899 in the hands of the County Council, and that of the Bye-laws (non-existent) and Regulations (dated 1885) in the hands of the Borough Councils; but the definitions of "dairy" and "dairyman" contained in section 141 of the Public Health (London) Act, 1891, include in the former all places where milk is produced, manufactured, or sold, and among the latter farmers, cowkeepers, dairymen, and milk vendors. I do not know whether it is due to bad draftsmanship or intention, but it does appear to me that practically the whole of the supervision of the milk trade is now transferred to the Borough Council, except the licensing of cowsheds, expressly reserved to the County Council, and the making of bye-laws. I must admit that there is some doubt on the point, and probably the only way of clearing up such ambiguity will be by the enactment of bye-laws. I think it will be generally admitted that neither the Orders nor the Regulations are really suited to the London trade, or up to date. The Council of this Branch might with advantage take up this question, and press the Local Government Board and the County Council to exercise the powers which have been in abeyance since 1892.

As regards transport, it appears to be desirable in every way (including the interests of the milk importers) that all churns should be either locked or sealed. The railway companies are usually said to be opposed to such practice; but that allegation has been so conclusively and so frequently refuted that it need not be dealt with now. Whether the present form of churn is the best pattern is open to question. I have often thought that one of a cylindrical shape

and smaller dimensions would be better, both as regards cleanliness and convenience of handling. I should like to have the milk-vans provided by the railway companies built with double roofs and louvred sides, and all milk conveyed in such vans. The latter suggestion, however, is a matter more for the farmers than the railway companies. If the farmers would combine and arrange for a sufficient number of churns to be at a smaller number of stations, instead of a small number of churns at many stations, the railway authorities would arrange to have proper milk vans always attached to the trains. The vans used for road traffic should have solid canopies and curtains of washable material. Provision should also be made for keeping the curtains wet in hot weather. The present system of covering the churns with a dingy-looking blanket cannot be described as satisfactory, and, judging by results, is not efficient.

The foregoing suggestions, however, only deal with the milk after it has left the farmer's hands, and there is still room for other improvements. The farmer nowadays is too impecunious to inaugurate any extensive improvements, and what is required to bring milk production up to date is combination among the farmers. They should be not only the producers, but the retailers of milk. If, as seems possible, farmers will not or cannot combine, I think the wholesale firms would do well to remove their depôts to the provincial milk areas. By this means I feel sure better supervision would be exercised over the keeping of cows and their milking; less adulteration, either skimming, watering, or the addition of preservatives, would take place; and it would be possible to get the milk into the Metropolis in a much cleaner and sweeter condition. Such country depôts, if provided with motor vans, would be able to draw supplies from comparatively large areas. Seeing the number of mechanical milkers now on the market, it should be possible to put an end to hand milking. There is really no inherent difficulty in arranging for milk to reach the depôt without coming into contact with the air. At the depôt the milk would be filtered, cooled, and run into closed cans of the pattern already suggested, and despatched to London in suitable vans by fast train. At the London depôt it could be again cooled and distributed in bottles, as is done in certain towns on the continent. Proposals which are condemned in one generation as fads, so frequently become the necessities of a later generation, that I venture to hope some system such as I have sketched will ultimately come to be regarded as the proper method of conducting the trade.

No remarks on the milk trade can be considered as complete which do not touch on the question of adulteration. This subject was before the Society in January last, but I will venture to say a few words on it in special relation to milk.

The three matters which come under special cognisance are watering, skimming, and the addition of preservatives. The two former are dealt with under the sixth section of the Sale of Food and Drugs Act, 1875, and the third under the third section of the same Act.

It is commonly said that adulteration is less prevalent than it used to be, and the statistics given in annual reports are quoted in support of this statement. I question, however, whether the published statistics are a safe guide in this matter. It is a very significant fact that samples submitted by private purchasers always show a very much higher percentage of adulterated samples, than do those obtained by officials. Thus in the last Annual Report of the Local Government Board it appears, that while the proportion of adulterated samples obtained officially was only 8·8 of the whole, in the case of the seventy-two samples submitted by private purchasers 28·7 per cent were condemned. It is common experience that official purchasers require to exercise much slowness to catch old offenders. It is also common knowledge that an unexpected raid on a Sunday generally yields a good harvest of bad samples. As regards milk samples, in the whole country 11·6 per cent were adulterated in 1902, (compared with 11·2 in 1901), and in the Metropolis 15·6. It has also been found that station samples are less frequently adulterated than those obtained from retailers, except when taken under Section 3 of the Act of 1879. The Analyst for the County of Kent has probably very accurately stated the present position in saying: "The older and grosser form of milk adulteration by the addition of water to milk, is largely giving place to more refined methods of mixing 'separated' with 'whole' milk so as just to escape the Board of Agriculture limit for fat."

It appears to me that the only way to successfully combat this deliberate lowering of the nutritive value of milk, is to raise the standard. Surely it is more reasonable to fix a standard which involves an improvement in the quality of the article affected, rather than one which allows a good supply to be tampered with with impunity.

Of late years the difficulties in dealing with adulteration have been increased by two important decisions in the Court of Appeal. Section 25 of the Act of 1875 provided that a written warranty should be a good defence if the vendor of the sample satisfied the Court that he sold the substance in the same condition as he received it, and had no reason to believe that the commodity was otherwise than as warranted. Proceedings were also provided (section 27) for the giving of false warranty, but in their original form they involved the expensive procedure of summons in the place where the contract was executed. By section 20 of the Act of 1899 the latter difficulty was

in part remedied, and proceedings can be taken with respect to a false warranty in the place where the sample was purchased. It was thought that this provision applied to all givers of false warranties, but the decision given in 1902 in the case of "*Manners v. Tyler*" laid it down that those provisions applied only to (what may be styled) warranties of the first degree. Where the article has passed through several hands, and each purchaser has covered himself by a warranty, the second or more remote warrantor can only be reached by process in the district where the warranty takes effect, that is, where the consignor's liability ends. Thus in the case of a sample purchased from a retailer *A* and found to be adulterated, if a warranty be proved, proceedings against *B* who gave *A* his warranty can be taken in the district where the sample was purchased; but if *B* had a warranty from *C*, and *C* from *D*, and it is desired to take a summons against *C* or *D*, it is necessary to first find out where the warranties between *B* and *C* and *C* and *D* are current, and then journey to the courts having respective jurisdictions. The witnesses requisite in such cases are usually numerous, and the expense considerable. Moreover, there is a strong probability that, as some time is likely to have elapsed between the purchase of the sample and the hearing of the summons, the success of any proceedings will be more than uncertain. If the defence of a warranty is to remain in the Acts, which I think it should not do, then section 20 of the Act of 1899 should be amended to get over the difficulty created by the decision given in "*Manners v. Tyler*."

My reasons for thinking that the warranty defence should be done away with are: First, that it is a very simple matter to make such rough tests of milk as will suffice to arouse a suspicion of adulteration (when the aid of the Inspector can be sought under section 3 of the Act of 1879) and that every milk dealer ought to be assumed to be able to make such tests; and, secondly, that it is exceedingly rare for milk to be sold without mixing two or more supplies. The latter point has not yet been taken in any Court, but I should think that it might be successfully maintained that the mixing of two separate supplies abrogated the warranties, as, in the words of section 25 of the Act of 1875, the milk was not sold "in the same state as when purchased."

A further difficulty has been created by the case of "*Whitaker v. Pomfret Bros.*," where it was held that proceedings for a false warranty could not be taken after the expiration of six months from the date of the warranty. The sample which gave rise to that case was one of pepper, and the facts of the case do not fall in line with those of a milk case. The pepper was sold in one delivery, and the invoice was the warranty. In the milk trade it is customary to affix to each

churn a label (which is practically an invoice) stating that the contents are warranted to be pure and unadulterated, or words to a like effect. It appeared to me in a recent case that I was concerned with, that the label ought to be held to be the warranty, and the offence to be taken as committed on the day the milk was despatched.* However, in the milk cases which have been before the lower Courts since the pepper case, the contract for the supply of the milk has in each case been regarded as the warranty. Such contracts are almost invariably made for a year, so that, following the ruling in "*Whitaker v. Pomfret Bros.*," after the contract has run for six months adulteration can go on with impunity, and no one can be made responsible if the contract is to be held to be the warranty.

I would, as I have already said, do away entirely with the "warranty" defence in prosecutions under the Acts, leaving the defendant to take civil remedy if he can prove that he did not know that the commodity was adulterated, although sold to him as genuine. The conditions of food analysis are so different now from what they were at the passing of the Act of 1875, that the provision is really out of date. I venture to hazard a guess, that comparatively few actions would be taken, as I believe that a very large proportion of the adulteration of milk is done by the small retailers, from whom the bulk of such samples are obtained.

In the matter of preservatives, the difficulties of local authorities are of a different character. Although the Departmental Committee of the Local Government Board reported in 1901 on this subject in no uncertain terms, yet the burden of proof of the injurious character of such preservatives still rests upon the authority taking any case into Court. Such proof being a question of opinion and not one of fact, it is usually possible to adduce evidence of the non-injurious character of the ordinary preservatives, although I believe that the profession as a whole are of the opposite opinion. It seems incredible that the Government, after having received so strong a report, should not have given effect to the recommendations of the Committee—recommendations which follow the practice of other countries, and have been adopted by others in recent years. Further, it is unfair both to the trades concerned and to the consumer, that the matter should be left in doubt. In one district tradesmen are liable to be constantly proceeded against, for doing what those in the adjoining district do with impunity. Of the possible injury to the consumer which remains unchecked by such dilatoriness, I need say nothing here. I would commend the matter to the Council of the Branch.

* This view was not accepted by the Council's Solicitor, but was subsequently endorsed by the Board of Agriculture.

with a view to pressure being brought upon the Government to introduce the necessary legislation.

In conclusion, I desire to refer to one special part of the question of milk supply which has recently taken a prominent position—I mean the special supply for infants who are not breast-fed. This has been in several forms in the past. The large milk companies, such as the Aylesbury, Welfords, and others, have for many years provided "humanized milk," "sterilized milk," etc., while even the smallest retailer exhibits the stock sign of "nursery milk." Then there are the more specialized preparations, such as the "Walker-Gordon" and the like, most, I believe, hailing from the States. All these varieties are more expensive than the ordinary supply, and are consequently out of the reach of the poorer classes.

In this connection three facts have to be recognized and dealt with: First, the birth-rate has been for years, and still is, shrinking; second, the infantile mortality is practically what it was in pre-sanitation days; and, third, breast-feeding is out of fashion. The first and second facts make it imperative that something should be done to foster a higher rate of increase of the population than is at present prevailing. No influence external to the individual can raise the birth-rate to its former height, but we ought to be able to do something to stop the leakage due to the high infantile mortality. Neglecting that proportion of deaths of infants which is due to causes absolutely beyond our control, we may say that the greater part of the preventible mortality is due to improper food given in substitution for breast milk, and that such errors in diet (and rearing) arise from want of training in maternal duties.

It is evident that the foregoing facts demand some systematic effort, and as the question is a national one, it may seem at first sight that the establishment of milk depôts by local sanitary authorities affords the best and most suitable remedy attainable. I am unable, however, to endorse that view. Municipal depôts are not only wrong on abstract principles of political economy, but they attack the question in a wrong direction, and their influence is at the best more or less limited in scope. Parents who are without the necessary moral calibre will not stint themselves so as to have money to spend on such a supply, and even were the milk free, many would not take the trouble to fetch it. Looked at in the most favourable light, these depôts can only be regarded as makeshifts. Their establishment to my mind may be compared to the action of a gardener who cuts off the top of a weed, instead of grubbing up its roots. I maintain here what I have advocated elsewhere, that the proper procedure is to educate girls in the duties of wifehood and motherhood. I want

domestic economy and hygiene, including such subjects as the nutritive values of foods, their proper use, the care and feeding of infants, etc., to form part of the curriculum of every girls' school in the country. There are many subjects of which only a useless smattering is acquired, which can be abandoned in favour of the more useful, not to say vital, subjects I have enumerated. The "physical degeneration" and the "temperance" questions would be dealt with finally and successfully by the adoption of such a course. The children would be so fed that they would grow up healthy and vigorous in mind and body. The craving for alcohol which, in those who are not degenerates, is due to starvation (I mean by that want of nutrition, not of food) would be eliminated. Inexpensive and nourishing foods are cheaper now than they ever were; what is wanted is the due appreciation of their values and knowledge of their use. I can only approve the establishment of municipal depôts as a temporary measure, pending the time when the desired amendment of our educational system becomes operative, a time which I fear is still far distant. In this matter also London is in an unfavourable position compared with the provinces.

In provincial towns, where the milk supply is much more favourably circumstanced, such depôts can be maintained by the local authorities, but in London the Local Government Board has decreed that any expenditure of the rates on depôts is illegal. It is difficult to understand the position. Relying on my (perhaps now somewhat rusty) experience of provincial legislation, I can call to mind no special provision in any of the Health Acts authorising this expenditure. It almost appears as if the difficulty has been created by the Government Audit, but surely "what is sauce for the goose is sauce for the gander." If London cannot spend the rates in this way, the provincial towns ought not to be allowed to do so. On the other hand, if the provincial authorities, in whose districts wholesome, cheap milk supplies should be, and generally are, available, can legally incur this expenditure, then London authorities, where the milk supply is most handicapped, ought to be able to follow what is generally regarded as a good example.

On the subject of the competition between municipal depôts and the trade, I will only say this. Were the depôts regarded as part of the machinery of the Poor Law administration, instead of being managed so as to be self-supporting, and the depôts not open to customers of all classes, the question of competition would not arise. Having regard, however, to the present system of management, I feel that there is a taint of "municipal socialism" associated with them, a taint which threatens to do much harm not only to municipal institutions, but to the nation as a whole.

THE DESIRABILITY OF AN INQUIRY INTO THE EFFECT OF HOSPITAL ISOLATION OF SCARLET FEVER, AND THE FORM AN INQUIRY SHOULD TAKE.*

BY JAMES WHEATLEY, M.D. (LOND.),
Medical Officer of Health for the County of Salop.

It is not my wish to open a discussion upon the effect of hospital isolation on scarlet fever incidence or mortality, but simply upon the desirability of an investigation of an authoritative and thorough kind. I shall not bring forward any statistics bearing upon this question, but must assume that each member has carefully considered for himself the arguments that have been advanced for and against the isolation of scarlet fever in hospitals.

The pioneers of hospital isolation had, undoubtedly, good grounds for the course they took. Stated briefly, the principle underlying our action against the spread of infectious disease is to destroy infection before it can come into contact with susceptible material. For this purpose notification, isolation, quarantine of contacts, and disinfection are practised. Without isolation these measures necessarily fall to the ground. Isolation at the homes of the poor was found to be very imperfect, and consequently hospitals were provided.

It may, I think, be assumed that any course of action which systematically prevents infectious matter from coming into contact with susceptible persons will, if no fresh conditions are created, lessen the particular infectious disease, except where the disease is limited only by the exhaustion of the susceptible material. Those who say that isolation of scarlet fever in hospitals is practically without any beneficial effect, contend:—

- (1). That the most infectious period is generally over before the patient is removed to hospital.
- (2). That hospital infection counterbalances the restriction of spread due to isolation in hospital.
- (3). That isolation of scarlet fever in hospitals having been practised for thirty years, it should be possible to prove its benefit by accomplished facts.

Until quite recently no inquiry seems to have been directed towards estimating the effect of hospital isolation. In 1897 Dr. J. T. Wilson incidentally threw some light upon this question in a paper entitled

* Read at a meeting of the West of England and South Wales Branch of the Society of Medical Officers of Health.

"A Contribution to the Natural History of Scarlet Fever." His conclusions were, so far as they affect the present subject, that the great decline in the mortality of scarlet fever between 1870 and 1890 was not due to special preventive measures, and that although by isolation the prevalence of the disease has no doubt been diminished, and by proper hospital treatment the fatality lessened, yet the effect of these preventive measures (very local in their application) may almost be left out of account in considering the cause of the general reduction of scarlet fever mortality which has occurred throughout Great Britain. With this conclusion I think we all agree.

In February, 1901, Dr. Millard read before the Society a paper containing the result of a very considerable statistical investigation into this subject. His conclusions were:—

- (1). That hospital isolation appears to have failed to materially reduce the prevalence or fatality of scarlet fever.
- (2). That the fatality of scarlet fever has fallen most in those large towns that have not practised hospital isolation.

This paper has been very severely criticised. The statistics have been shown to be in many ways incomplete, and to some extent perhaps misleading. Comparisons were no doubt made between towns that were not wholly comparable, and periods were sometimes selected that did not lend themselves to comparison. It will, however, always be possible to raise similar objections to statistics which are affected simultaneously by several different agencies. To my mind the only effective criticism of this paper will be a thorough and exhaustive statistical inquiry.

The difficulties in the way of making an investigation into this subject are principally due to the fact that isolation is only one of many factors influencing the spread of infectious disease. There are the other measures commonly used for controlling infectious disease, differing in the thoroughness with which they are employed in different districts. There are differences in social conditions, habits, housing conditions, and differences in exposure to infection. There are, in all probability, conditions favourable to the spread of the disease of which we are ignorant, but which may have a very considerable influence on its distribution. There are difficulties introduced by the fact that large outbreaks of scarlet fever alternate with periods of comparative quiescence, making it necessary to use the greatest caution in comparing one locality with another, or periods of time in the same locality. Are we to give way in the face of these difficulties, and say that it is impossible to arrive at any satisfactory conclusion by means of statistics? Rather, I think we should recognize the difficulties, and deal with the question in a thorough

and comprehensive manner. If hospital isolation has had any considerable effect, it seems very unlikely that this effect will not show itself in carefully compiled statistics with sufficient clearness to satisfy an unbiassed mind. If, on the other hand, it is shown that general statistics are no use for this purpose, that in itself will be a great gain.

It has been frequently said that each Medical Officer of Health must make his own investigations. This must necessarily be so for his own town; no one else is in a position to make them. Even here, however, a Committee of Inquiry appointed by this Society could be of great help. The result of the examination of many annual reports of towns where hospital isolation is practised, has impressed me with the fact that much valuable material which would throw light on this question is being lost. In some of the reports there are certainly very thorough investigations, but these, not being conducted on uniform plans, are rarely comparable.

Dr. Niven, from a very careful and thorough analysis of the cases of scarlet fever in Manchester in 1901, came to the following conclusions:—

- (1). That hospital isolation had reduced the number of cases of scarlet fever in Manchester, but that the reduction was not so great as could be desired.
- (2). That the chief agencies against the utility of the hospital were the return cases and the overlooked and doubtful cases.
- (3). That by adequate hospital administration the return cases may probably be reduced so as to make them almost inoperative for harm.

This line of investigation is possibly the most promising, but unfortunately, it cannot be considered conclusive until return cases have ceased to occur. To my mind it is a perfectly sound argument that the recognised return cases may only represent a small portion of the cases that are infected from hospitals. The household to which the patient returns has already been exposed to infection and one or more of its members have already been attacked. It is not then so promising a field for the spread of the disease as an ordinary household. On the other hand, the patient, on returning from the hospital, mixes freely with other children, and returns to school within a short period.

I think, therefore, it is extremely probable that the hospital is responsible for many more cases than are represented by "return cases." For this reason, if for no other, it is necessary to supplement the facts obtained from a comparison of home cases with hospital cases in any given town, with a study of the incidence and mortality in various towns having different conditions of isolation. Here we

are on very dangerous ground, where every step requires the closest investigation. If it is to carry any weight, such an investigation must be made by a responsible and capable body. Personally, I believe that an inquiry will prove that hospital isolation in scarlet fever, properly conducted, will diminish both the incidence and fatality of the disease, but it may mean revolutionising our methods. It is a question of the decrease on the one hand by isolation, and the increase on the other by hospital infection.

As far as I am aware, the only objection to an investigation that has been raised is that it may shake the confidence of the public in the principle of isolation. This objection may have some force if used against bringing before the public the result of partly-thought-out and immature investigations, but it cannot have any force against such an inquiry as I am proposing. I deprecate myself even the general discussion that is going on in our medical papers, because, while it does not add to our knowledge, it intensifies the feeling that has already been introduced into this discussion, much to its detriment.

The arguments in favour of the Society appointing a Committee of Investigation may be briefly summarized:—

(1). It is certainly our duty to throw as much light on this subject as possible. Yet, although hospital isolation of scarlet fever has been extensively practised during the last twenty years, no systematic inquiries have yet been made with the object of estimating the results obtained.

(2). An inquiry is the more urgent because a doubt has been cast upon the advantages of hospital isolation, and this has been supported by figures which, although incomplete in many respects, and possibly misleading in others, have not been refuted by a fuller and more systematic investigation.

(3). Considerable feeling has been excited, obscuring the issue and adding greatly to the difficulty of solving the various problems, except by an official investigation.

(4). The difficulties that have been pointed out are so great that anything but the fullest inquiry by the most competent persons is likely to be a failure.

(5). The Committee of Inquiry might draw up a scheme for the guidance of Medical Officers of Health in reporting on the result of hospital isolation in their districts. This can only be done by some authoritative body, and is in itself sufficient justification for the formation of such a body. A scheme of this description would not only save the Medical Officer of Health much trouble, but would make his reports of much greater value, and would enable them to be compared with others and a summary of the whole compiled.

(6). An inquiry might throw considerable light upon the subject of return cases, and particularly the amount of scarlet fever that these are responsible for; also upon the suggested increased virulence of hospital-infected cases, the infectious character of various complications, and other matters connected with the isolation of scarlet fever.

(7). If an investigation is desirable, it is certainly better that we should make it ourselves, than that it should be made for us.

On these grounds I propose the following resolution: "That in the opinion of this branch an investigation into the various problems associated with the isolation of scarlet fever in hospitals is desirable, and that the investigation should be undertaken by a Committee of this Society specially formed for that purpose."

DR. CHANTEMESSE has been appointed Inspector-General of Sanitation in Paris, in succession to the late Professor Proust. Dr. Chantemesse, it need hardly be added, is a bacteriologist of note, who has made a special study of cholera and typhoid fever.

EPIDEMIC SORE THROAT COMMUNICATED BY MILK FROM COWS SUFFERING FROM SUPPURATIVE MAMMITIS.—Dr. R. W. C. Pierce, Medical Officer of Health for Guildford and Woking, has recently reported upon an outbreak in October last of sore throats, at first thought to be diphtheritic, but eventually found to be associated with streptococci and staphylococci. The cases varied in severity, some being slight attacks of follicular tonsillitis, others of quinsy with considerable amount of constitutional disturbance, and a few proved fatal. Several cases developed erysipelas of the face and neck. Information was obtained of ninety-eight infected houses, and seventy-six of these were supplied direct by two milkmen obtaining their milk from a common source. The farmer was found to have suffered from a quinsy sore throat about the middle of September, and four cows were affected with suppurative mammitis, yielding pinkish milk. Bacteriological examination showed the presence of similar organisms to those found in the throats of persons affected. The milk from two of the cows contained a large quantity of pus. It was the custom to send the afternoon's milk to Woking in the evening, and it was kept there overnight for distribution next morning. This keeping of the milk would contribute enormously to the growth of the organisms concerned, so that every drop would be thoroughly impregnated with the infection before it reached the consumer. It is noteworthy that external examination of the diseased udders gave no indication of the conditions such as would be yielded by tuberculous udders. It was only by the actual milking of the cows that the inflammatory conditions of the udder was revealed. Dr. Pierce is of opinion that nothing short of a similar periodical examination of milking cows in addition to the general examination for tuberculosis will safeguard the district against a similar occurrence in future, but we should like to point out that it must have been perfectly obvious to the person milking those cows that they were so suffering, and that the milk was of a character which should never have been sold. In such cases the person selling milk like that for food should be prosecuted.

NOTES ON A SMALL OUTBREAK OF SCARLET FEVER.*

By MARK FARRANT, L.R.C.P., M.R.C.S., D.P.H.,
Medical Officer of Health S. Thomas Rural District Devon.

THE parish of Whimple, where this outbreak occurred, is a small one, with a population of 680 at the last census. It is almost entirely agricultural, there being only a cider factory and a butter factory in the village, besides the usual collection of cottages and small shops.

There have been fourteen cases altogether, all being in school children except one. The first four were in three houses on the 28th August of this year. I inspected the scholars, but found nothing at all suspicious, except that several were suffering from colds, with sore throats, their faces being somewhat swollen. One child had a mucous discharge from the nose, which I examined, but found nothing resembling the bacillus of diphtheria. The only suspicious connection with cases anywhere else was in one house, where a teacher from a school in the next village, some four miles off, and where there had been a few cases of fever, had stopped for a few days. Three of the four cases were removed to the sanatorium, the bedding disinfected by steam, the rooms fumigated with formic aldehyde, the schools closed for the remainder of that week, and also fumigated. Then a fortnight later two more cases occurred on the same day, and both were removed and the premises treated as before. Pressure was soon after put upon parents by the attendance officer, as they would not send their children for fear of infection. The result was that two of those impressed to school were promptly infected, on Oct. 1st and 6th, the former of the two being in the same house as case No. 4, one of the first ones. This was not a return case, as the first one was not yet discharged. Another case occurred on Oct. 10th in house No. 4. The three last mentioned were removed also. I again examined the scholars; found, as before, nothing suspicious, and closed the schools for three weeks and had them again fumigated. Then we had peace for a month, when a fresh house was invaded, house No. 8. A further case appeared eleven days later, on Nov. 23rd, this time not a scholar, but a boy aged sixteen, in house No. 4, the third that had occurred there. The first case had been home nearly five weeks, while the second was not yet discharged, so it does not appear to have been a return case.

* Read at meeting of the West of England and South Wales Branch at Exeter.

A week later a further case occurred in house No. 2, where there had been two initial cases. Here these had been home about a month, and a second case occurred in house No. 6, the primary case still being in the hospital. Finally the last and fourteenth case up to the present occurred in a fresh house on 13th December.

I have not mentioned anything about milk supply, as this outbreak has none of the features of a milk epidemic; also there were no less than six separate supplies.

Summing up, there has been an epidemic lasting over three months where hospital isolation has been used most freely, ten out of the twelve cases being so treated, and the methods of disinfection as complete as I know how to make them; but in spite of intervals between the cases, some of a month in duration, the outbreak does not seem to have been amenable to control at all.

I should be glad to hear opinions as to whether the attacks were kept up by undiscovered school influence, whether the cases of re-infected houses were due to fresh ones arising from the original undiscovered source, or to inefficient disinfection. The formic aldehyde is generated by the Alformant lamps, and the steam for clothes by a portable machine of the Thresh-Delépine type.

I should have stated that seven cases belonged to the girls' school, four to the infants', and one only to the boys'. The school is a mixed one, with a separate class-room for the infants.

P.S.—Since the above was written seven other cases have occurred. On 7th Jan., a servant was affected in a fresh house, No. 9, followed on 16th Jan. by a servant in another house, No. 10. On 17th Jan. a school child was attacked in house No. 11, while on the 23rd, four children were discovered in one house freely desquamating. The initial illness in these was of uncertain date, but probably at the end of December. These children had been attending school, but excepting case in house No. 11, which was next door to this latter one, there had been no fresh case in a scholar. Up to the present (14 Feb.) we have had no more cases.

DISCUSSION.

Dr. Davies suggested a very thorough examination of all school children.

Dr. Vickers described a similar outbreak in Paignton, when he examined every child in the school affected, and kept from school all children who had sore throats or discharge from ear or nose.

Dr. Martin emphasized the importance of the fact that the outbreak was in a parish situated on the outskirts of Dr. Farrant's sanitary district, and thought that possibly infection might have been spread from the adjoining sanitary district.

ON THE PROPHYLAXIS OF THE ACUTE EXANTHEMATA*.

By JAROSLAV ELGART, M.D.

In this contribution the author first states that our prophylaxis of the acute exanthemata, viz., isolation, disinfection, etc., has hitherto been based on empiricism, and that the object of the publication of the following measures taken by him in dealing with several troublesome house epidemics of measles and scarlet fever in the Children's Hospital at Brünner, the children's department of the Infirmary, and the old provisional Children's Hospital of that place, is to give a more rational direction to preventive measures. He adverts to the difficulty in many cases, *e.g.*, where there is no infectious hospital and the patient is treated at home, of a complete and thorough isolation of the patient; the difficulty of quarantining contacts; and how hard it is to control epidemics of measles and scarlet fever in general hospitals, especially when over-filled, as the above frequently were, and with insufficient isolation wards.

He does not intend his method to displace, but to supplement, the older, well-tried preventive measures. In this method there are three factors to be considered:—

1. Where and how is the contagion produced?
2. Its point of entry into the body?
3. How does vulnerability or immunity develop?

The first two are more important than a knowledge of the contagion itself.

Infectious diseases are divided into two groups; (1) Those in which the primary symptom and affection is known, *i.e.*, diphtheria, syphilis, etc.; and (2) Those in which they are not demonstrated or doubtful, *e.g.*, measles and scarlet fever.

As a rule the disease is at first local, to be followed by a general infection. He believes that in regard to measles and scarlet fever the universal belief that the infection is acquired through the respiratory passages is based on good grounds. Acting on these views his method of prophylaxis resolves itself into a systematic disinfection of the nose, mouth, throat, and respiratory passages of contacts of these diseases.

Disinfection (1) prevents the virus from finding a nidus, and (2), if it has found one, from developing into a general infection.

In confirmation of (1) he mentions the absence of secondary cases of measles and scarlet fever in his wards after the removal of the first case, and in confirmation of (2) he cites some examples of angina and sore throat in contact cases which underwent no further development.

His mode of procedure is as follows: When a case of scarlet fever or measles is discovered in the ward of a general hospital it is promptly removed and the bed-clothes, etc., disinfected, but not the ward generally. The remainder of the patients are then subjected to antiseptic inhalations for from five to fifteen minutes twice daily for long periods. The antiseptics are conveyed through the medium of steam, and consist of one or more of the following:—

1. Aq. calcis (with distilled water equal parts).
2. Acid boric, 3 per cent solution.
3. Iodine trichlorate, .05 per cent solution.
4. Sod. chlorate, 3 per cent solution.

These act: (1) Mechanically through dissolving and washing away thick secretion; (2) Increasing lymphatic secretion through the mucous stomata; (3) Stimulation producing hyperæmia and increased phagocytosis; (4) Chemical and disinfecting action. These disinfectants will require varying from time to time, but must be non-toxic and little irritating. Gargling is impracticable for children.

Unfortunately he does not explain the nature of the inhalation apparatus, and how he gets such a substance as boric acid in sufficient quantity into steam, but no doubt this will be entered into fully in the monograph he hopes to publish soon.

To use his own words: "Having regard to these excellent results" (*viz.*, the absence of any secondary cases in wards where infection of measles and scarlet fever were introduced) "of several series of experiments, I believe I can assume with still greater justification than occurred in my first publication that in 'disinfecting inhalations' we have a means which affords reliable protection against the settling (*Einnistung*) of the infectious matter of the exanthemata in the respiratory tract, and hinders the outbreak of the illness, or at least has the result that the invading poison produces only a local reaction and cannot generalize itself. I even believe that an advanced local affection of scarlatina or measles can be cut short by energetic disinfection. Along with the inhalations constant ventilation must take place, where possible permanently."

CAUSES OF EPIDEMIC PLAGUE.

In an exhaustive report upon the second outbreak of plague in Sydney (1902), Dr. Ashburton Thompson, Chief Medical Officer of the Government of New South Wales, on the assumption that the opportunity of making accurate epidemiological observations has often been denied elsewhere by the character and density of the populations among which outbreaks have generally hitherto occurred, claims that certain conclusions (which are the outcome of the Sydney records) bearing upon the etiology of epidemic plague are entitled to have stress laid upon them; and, from the facts that in Sydney plague was in no degree assisted to assume the epidemic form by communication with the sick, or by place-infection, he considers that the leading part invariably assigned to these factors by recent writers requires revision.

It would appear that, although in Sydney the source of infection was found, and its presence even surmised, only in the bodies of diseased rats; that although the distribution of human cases bore a close relationship to that of rat cases; that although new centres of infection were repeatedly established at distant and widely separated points, to which fodder had been transported from a line of wharves known to be infested with plague rats; and that although, at those localised centres, the epidemics were preceded by epizootics among rats;—nevertheless, many individual cases seemed to throw great doubt on the efficiency of plague rats as the cause of epidemic plague. Their presence in a building was very often not accompanied by plague among any of the inmates; when such association

* Zeitschrift für Hygiene und Infectious Krankheiten. Vol. 44, Part ii., (Sept. 1908).

did occur, most frequently only one inmate was attacked; while it was a common experience that several cases often occurred among parties of people (from uninfected dwellings) between whom the sole bond was daily resort to the same places of employment, such places being known to have harboured plague rats.

These observations—indicating that the apparent absence of the only recognizable source of the infection did not betoken safety from plague, and that its ascertained presence was far from being invariably or commonly attended with plague—led, after elimination as improbable and impracticable of such hypotheses as inoculation by direct contact with virus left about by rats, and the ingestion of food accidentally contaminated by these animals, to the conclusion that infection is most probably conveyed to human beings by some intermediate agent, possessing requirements which are best answered to by the flea. While admitting that rat-fleas are not generally parasitic to human beings, Dr. Ashburton Thompson assumes that they have no repugnance to such, and, when hungry, will feed upon their blood; and he considers that all that is required to support the conclusion is proof that this mode of infection is possible, and that fleas can retain bacilli alive and active for some hours or days after receiving them. He points out that evidence of the former has been afforded by the experiments of M.M. Raymond and Gauthier at Marseilles, and Dr. Elkington at Bombay, and maintains that the flea hypothesis is exactly what is required to reconcile the apparent contradictions described above. Reviewing briefly some of the considerations upon which the conclusion is based, the mere assumption that the character and density of the populations amongst which epidemics have occurred elsewhere, have in any way limited opportunities for accurate epidemiological observations, cannot be conceded to be an accurate logical premise. If the conditions obtaining at Sydney point to one particular factor as the probable main aetiological agent, it does not, in any way, follow that other factors may not be operative and of far greater importance in places in which the conditions are entirely different. Neither can it be conceded, merely because the existence of place-infection is denied there, that the part assigned to it elsewhere, as an aetiological factor, requires revision. Overwhelming evidence points to its importance in Indian and Chinese epidemics, and, though the circumstances of persons living in Sydney are such as to minimize its dangers, the grounds upon which its existence is denied are not quite clear. The failure to isolate the virus under conditions which obtain in nature, do not justify negative conclusions, because no known method has been discovered for its isolation when in company with myriads of contaminating organisms; and, if the virus does not exist in a saprophytic form in Sydney, it is difficult to understand how rats, in many instances, become primarily infected. As to the hypotheses which are excluded as improbable and impracticable in regard to the mode of infection, there can be no doubt that infection by the alimentary canal is, if it happens at all, very rare; but, while inoculation through a solution of continuity in the skin may be an exceptional means of ingress among fully clothed races, the case is very different among races who are scantily clothed, sleep on the ground, and go about barefooted. In India, it was found by the Indian Plague Commission that buboes are found with greater or less frequency in the various regions of the body, according as larger or smaller areas of skin surface drain into the glands of the regions in question. Extracting from Vierordt's tables the fact that the areas of skin surface which drain, respectively, into the glands of the neck, the axilla, and the groin, stand

to each other approximately as the figures 1, 1·8, and 5, they compared these ratios with those representing the relative frequency of buboes in these areas, as taken from statistics, and found a very striking resemblance, the latter being as the figures 1, 1·3, and 5·5. Regarding the conclusion itself, the links in the chain which Dr. Ashburton Thompson considers require strengthening are by no means the weakest. Besides the evidence quoted by him as proving the possibility of infection being caused by fleas, Guiseppe Zirolia, of Rome (*vide Centrallblatt für Bakteriologie*, June 3rd, 1902) has demonstrated that a flea which has been starved for a time, after sucking the blood of an animal, projects (without withdrawing its proboscis) a stream of blood into the animal, by abdominal contraction, to wash out its duct before sucking afresh; and as regards the length of time during which fleas can retain bacilli alive and active, the same observer has discovered that they can do so up to seven or eight days, and that the bacilli are capable of multiplying in the fleas' bodies. The weakest link in the chain is in reality the absence of any proof that the rat-flea is, under any circumstances, so commonly parasitic to human beings as to become an aetiological factor of any epidemiological significance whatever.

SIGNS AND SYMPTOMS OF PLAGUE.

Professor Camillo Terni, Director of the Bacteriological Institute of Messina, writing in the *Zeitschrift für Hygiene* (Vol. 44, pt. 1) draws attention to the great importance of acquiring familiarity with the early signs and symptoms of plague, and adds a detailed clinical account based upon personal experience of over a thousand cases. The article, though containing nothing new or strikingly original, is both interesting and instructive, and, at a time when the shores of Europe are threatened from many directions by an invasion of plague, the greater the familiarity with its clinical manifestations which exists, the more readily will imported cases be recognized and an epidemic averted. Two points, however, in Professor Terni's account seem to call for some comment. He denies the existence of septicæmic plague as a special clinical form, but considers it to be "the last phase of an infection acquired through the skin or mucous membranes, which may be preceded by a bubo, or follow direct from gastro-intestinal infection."

Similarly, he does not consider plague pneumonia ever to be a primary affection, but states that there is always a pre-pneumonic period characterized by tonsillitis or some lesion of the mucous membrane of the primary air passages. With regard to the first of these points, many observers in the recent Indian epidemics have described cases (the so-called *Pestis fulminans* or *siderans*) in which, without any premonitory signs, rigors, fever, vomiting and physical and mental prostration have quickly appeared, and have been followed by death within a few hours. In many of these cases buboes were absent, and, in those in which they were present, certain very distinctive pathological appearances were considered to afford sufficient justification for establishing this as a distinct type dependent upon the direct primary entry of the virus into the circulation. It has, moreover, been observed that in less rapidly fatal cases of the type, the appearance of buboes in different and distant parts of the body has been simultaneous, and not gradually consecutive, as in the non-septicæmic multiple bubonic form. As to the other point, according to Montenegro, when plague pneumonia accrues by continuation of inflammation from a point of inoculation in the nasal or buccal mucous membrane, a primary bubo of the deep cervical glands is always observed; but this is not the

case when the infection has taken place by inhalation of the virus, nor when plague pneumonia is induced artificially by intratracheal injection of plague cultivation. As many cases undoubtedly occur in which such primary buboes are absent, it is safe to admit that there is some interrelation between the direct entrance of the bacilli into the lungs and the supervention of plague pneumonia. As to the manner in which this might occur, there may, as suggested by the Indian Plague Commission, be something in the form of the infective material which favours conveyance of infection into the lungs, or the bacilli may be very virulent, or—judging from the great variation of the symptoms in different cases—primary plague pneumonia may be a mixed infection, in which the secondary rôle may be played at one time by one microbe, and at another by another. The German Plague Commission suggest that pneumococci may, in many cases, be agents in preparing the way for a subsequent development of the plague bacilli in the lungs.

REVENUE ACT, 1903.

In 1890 Parliament passed the Customs and Inland Revenue Act (53 Vict. cap. 8) in which (sec 26.2) they granted exemption from inhabited house duty for houses used solely for providing separate dwellings at rents not exceeding 7s. 6d. a week for each dwelling, if there is a certificate of the Medical Officer of Health that the house is so constructed as to afford suitable accommodation for each of the families or persons inhabiting it, with due provision for their sanitary requirements. The Medical Officer must examine such premises on request, for the purpose of ascertaining whether such certificate can properly be given, if the person making the request would be liable to pay house duty were it not discharged by the production of the certificate. This exemption was in order to encourage the erection of artisans' dwellings on good lines. In 1891 Parliament extended the benefits of the Act, and last year the provisions have been again extended and embodied in a new Section (Revenue Act 1903. Sec. 11), the previous enactments being repealed except in regard to the mode of obtaining the certificate. The exact words of the Section are:—

11. (1) Where a house, so far as it is used as a dwelling house, is used for the sole purpose of providing separate dwellings:—

(a) The value of any dwelling in the house which is of an annual value below twenty pounds shall be excluded from the annual value of the house for the purposes of inhabited house duty; and

(b) The rate of inhabited house duty, in respect of any dwelling in the house of an annual value of twenty pounds but not exceeding forty pounds, shall be reduced to three pence; and

(c) The rate of inhabited house duty, in respect of any dwelling in the house of an annual value exceeding forty pounds but not exceeding sixty pounds, shall be reduced to sixpence.

(2) The provisions of this section, as respects dwellings of an annual value not exceeding forty pounds, shall not take effect with regard to any such dwelling, unless such a certificate as to accommodation and sanitary condition is produced to the General Commissioners as defined by Section 5 of the Taxes Management Act, 1880, as is mentioned in sub-section 2 of section 26 of the Customs and Inland Revenue Act, 1890, and the provisions of that sub-section as to the certificate shall apply for the purpose.

It is not now stated in the marginal note that the intention is to encourage the erection of artisans' dwellings. The new Act includes them, but it also brings in houses let in tenements or flats. The Medical Officer is entitled to have information supplied to him that houses he may be asked to examine for the purpose of granting a certificate come under sub-sections *a* and *b*; that is to say, that the various tenements or flats are rated separately, and that their respective annual value (gross rateable value) does not exceed forty pounds. These facts may be obtained from the rate books.

PRESERVATIVES IN FOOD.—In the course of the practical experiments instituted by the Department of Agriculture in New York to ascertain the effect of preservatives in food, the supply of food containing the preservative salicylic acid has had to be stopped, owing to its injurious effects upon the subjects. One individual, however, is stated to have benefited by taking food preserved with this acid, inasmuch as the rheumatism from which he had been suffering disappeared. Food preserved with borax has also had ill effects.

In March last the Board of Health of New South Wales made certain regulations with regard to the use of preservatives in food. In consequence of representations from various industries affected by these regulations, a Select Committee of the Legislative Assembly was appointed to inquire into the question. The conclusions of the committee were as follows:—

1. That as regards butter there can be no question as to the necessity or harmlessness for the use of up to 35 grains of boracic acid to the pound, since this amount is recommended by the English departmental committee, and is the amount fixed as permissible by the regulations of the Boards of Public Health both in New South Wales and Queensland.

2. That as regards milk, if there is sufficient care in handling and rapidity in distribution, chemical preservation is unnecessary.

3. That as regards condensed milk, of which there are two varieties, sweetened and unsweetened, the use of sugar in the former and sterilization in the latter, combined with hermetically sealing in air-tight tins, renders the use of a chemical preservative unnecessary.

4. That as regards concentrated milk, which your committee recognize as a trade name applied to a further description of condensed milk, the use of 35 grains of boracic acid to the pound is necessary.

5. That as regards cream for consumption as such, for the proper maintenance, expansion, and development of the trade, and to bring this nutritious article of food within the reach of every householder at a reasonable price, the use of 18 grains of boracic acid to the pound is necessary.

6. That the use of 35 grains of boracic acid to the pound of butter, and 35 grains of boracic acid to the pound of concentrated milk, and 18 grains of boracic acid to the pound of table cream, will cause no injury to health and should be permitted.

7. That having in view the right of people to know what any food stuff consists of, vendors of these articles containing preservatives should include on the label on the package, tin, or containing vessel, and in conformity with the rest of the label, a statement setting forth the nature and quantity of the preservative contained therein; and in cases where a label is not ordinarily fixed, then a special label to that effect should be affixed.

And your committee recommend that the regulations made under the Public Health Act should be amended and brought into conformity with the above conclusions.

LAW REPORTS.

HIGH COURT OF JUSTICE.

KINGS BENCH DIVISION.

July 3rd, 1903.

BEFORE LORD ALVERSTONE, L.C.J., WILLS AND CHANNELL, J.J.

BUTT v. SNOW.

Public Health Act, 1875, ss. 4, 15, 95—Cesspool-Sewer—Nuisance—Agreement to Cleanse.

Where an owner of houses drained them by a common pipe into one cesspool, which cesspool he agreed with the local authority to maintain and cleanse, and a nuisance arose by his neglecting to cleanse the same, it was held that he could not set up as a defence to proceedings for a nuisance brought by the local authority that the pipes and cesspool were a sewer, and as such vested in the authority, and that it was their duty to cleanse and empty the cesspool. Such a cesspool was not part of a sewer.

THE appellant was the owner of certain houses in the borough of Southend-on-Sea. The respondent was the Town Clerk of the Borough. The appellant drained the said houses by a pipe with which each house was connected, and this pipe emptied into a large cesspool, or cesspit, on his own land. The works were carried out by the appellant with the consent of the Borough Council, given on his entering into an undertaking to cleanse and repair and maintain the cesspool, and it was agreed that the drains should be private property. A nuisance arose from the failure of the appellant to cleanse the cesspool, and a notice under Section 94 of the Public Health Act, 1875, was served upon the appellant as the person by whose act or default the nuisance arose, and as he made default in complying a summons was issued.

It was admitted that there was a nuisance, but it was contended that the sewer, or drain, and cesspool, constituted a sewer and things belonging thereto within the meaning of the Public Health Act, 1875, and vested in the respondents, and that the duty of keeping the same so as not to be a nuisance, and the duty of cleansing and emptying the same, were cast upon the respondents, and that the appellant could not be required to cleanse, alter, or amend the same.

The justices decided against this contention, and convicted the appellant, but stated a case.

Alex. Glen, K.C., and Morle appeared for the appellant, Macmoran, K.C., and Cuthbert Smith for the respondent.

The Court dismissed the appeal.

ALVERSTONE, L.C.J., was of opinion that this case was governed by the cases of "Meader v. West Cowes Local Board (1892), 3 Ch. 18," and "Button v. Tottenham Urban District Council, 62 J.P. 423," and that the cesspool did not vest in the local authority, but that this was the case of a man who had for his own purposes, and upon his own land, erected a cesspool which had given rise to a nuisance, and it was his duty to abate it.

WILLS, J., concurred on the same grounds.

CHANNELL, J., in concurring, said: I am also of opinion that this appeal should be dismissed. My learned brothers have come to the

conclusion, as I understand their judgments, that the cases show that this cesspool had never vested in the local authority. If that is so there is an end of the case. But I desire to say that, even if the cesspool had come within the clauses of the Public Health Act, 1875, even if the nuisance had arisen from the non-repair of the conduit—to use an ambiguous phrase—or pipe, which received the drainage of more than one house, and in consequence for certain purposes would be a sewer within the Public Health Act, 1875—and I desire to give my judgment upon that assumption—the appellant would still be the person by whose act or default this nuisance arose. Now the definition in Section 4 of the Public Health Act, 1875, that a pipe which receives the drainage of more than one house is a sewer, and, therefore, vests in the local authority, even against their will, has been applied in a great many cases. Possibly I am bound to assume that, in every case, it has been rightly applied, but often I think, so as to cause grievous injustice. There never has been a case, to the best of my belief, where as between the parties, as between the local authority on the one hand, and as between the man who has made the pipe on the other, the court has felt bound to hold that the pipe was repairable by the local authority contrary to the actual terms of the agreement under which the pipe was made. Now, in the case before the court, a pipe has been made by the appellant which the local authority could have prevented his making, and the local authority has said to him: "You may make this pipe if you like, but upon the terms as between us that it is to be deemed a private drain, and you are to repair it." The appellant contracts to make the pipe, and, as soon as he has made it, he turns round and says to the local authority: "The pipe receives the drainage of more than one house; it is a sewer. The pipe is yours, notwithstanding my agreement, and the law says you are to repair it." I am glad there is no law which compels us to assent to that contention. As between the parties in this case there is no difficulty, if difficulty there might have been had the question arisen where the rights of some third party had been involved. It may be that, in such a case, a third party would have a right to say "as between us (the third party and the local authority) you, the local authority, are responsible for this nuisance from the sewer, and you may have your remedy over against the other party, who agreed to repair the pipe." But when the question arises between the parties to such an agreement themselves, to the best of my belief there is no decision which compels us to hold that the pipe is vested in the local authority in such a way as to make them responsible for it, as between them and the person who has made it, either against their will, or wrongfully, or with their consent upon terms which he does not carry out. Therefore, I am prepared to give my judgment upon the footing that if the question had arisen between a third party and the local authority, according to the strict construction of the cases, this pipe has vested in the local authority.

November 3rd, 1903.

BEFORE WRIGHT, J.

HARRIS AND ANOTHER v. HICKMAN.

Landlord and Tenant—Covenant to pay Outgoings—Repair of Defective Drain—Liability of Yearly Tenant.

A tenant leased a house for a term of three years and agreed to pay all outgoings. After the expiry of the term he continued to occupy as a yearly tenant.

Notice as to a nuisance was given by the sanitary inspector under the Public Health (London) Act, 1891, Section 3, to the owners, who did the work and sued the tenant. It was held that the notice not being compulsory, the expense was not an outgoing, and, if it was compulsory, the payment for such work by the tenant was not within the contemplation of the parties.

THIS was an action by the lessors of a house to recover the sum of £70 1s. 6d. from the defendant, their tenant, in respect of work done in order to repair a defective drain, which work was done in pursuance of a notice which was served upon the plaintiffs. The notice was headed "Intimation," and was served under Section 3 of the Public Health (London) Act, 1891, and signed by the sanitary inspector. The plaintiffs requested the defendant to do the work, but he refused, and they did it themselves. No other notice was served upon the plaintiffs. The defendant had taken the house originally on a three years' lease, and had agreed to pay "all present and future rates, taxes, assessments, and outgoings whatsoever in respect of the said premises, whether payable by the landlord or tenant (except landlord's property tax)." For the defence it was urged that the notice was not compulsory, and therefore the expenditure by the plaintiffs was purely voluntary, and further that the covenant to pay outgoings did not include such an expenditure, which was as large as the rent.

WRIGHT, J., thought that the defendant's contentions were both sound. It was not enough to enable the plaintiffs to recover to show that they had done the work; it must be shown that they did it under an order of the sanitary authority. Such an order is contained in a notice under Section 4; but nothing less than a notice under that section will suffice. The work having been done voluntarily, the expense of doing it did not amount to an outgoing within the covenant of the lease. But, assuming this was wrong, there arose the question whether the tenant, having held over after his lease, was bound by the covenant in his lease. There is a presumption that the tenant holds over upon such of the terms of the lease as are applicable to a yearly tenancy. He thought he ought not to impute to the parties an intention to include such an expenditure in the terms of a tenancy from year to year. He thought this case was distinguishable from "Stockdale v. Ascherberg" (1903), 1 K.B. 873, but was covered by "Valpy v. St. Leonards Wharf Co., 1 L.G.R. 305.

December 9th, 1903.

BEFORE LORD ALVERSTONE, L.C.J., LAWRENCE AND KENNEDY, J.J.

MCNAIR v. BAKER.

Public Health (London) Act, 1891—Nuisance—Black Smoke—Club.

The Club house of a members' Club, with the ordinary accommodation of a Club and with bedrooms for members and the staff, is not a private dwelling house within the meaning of section 24 (b) of the Public Health (London) Act, 1891, and the secretary is liable to be convicted for failing to abate a nuisance caused by black smoke issuing from the kitchen chimney.

This was a case stated by a Metropolitan magistrate on the hearing of information by a Sanitary Inspector for the city of Westminster, which alleged that the defendant had made default in complying with a notice of the City Council requiring him to abate a nuisance arising from black smoke having been allowed to issue from a furnace chimney at his premises,

tuat and being St. James's Club. The defendant was the Secretary of the Club.

The magistrate found as facts that the respondent did not abate the nuisance or otherwise comply with the notice, and that the chimney sent forth black smoke in such quantity as to be a nuisance. But he held that the chimney was the chimney of a private dwelling house within the meaning of section 24 of the Public Health (London) Act, 1891, and dismissed the summons with costs. The plaintiff appealed. Section 24 (b) of the above Act provides that "any chimney (not being the chimney of a private dwelling house) sending forth black smoke in such quantity as to be a nuisance" shall be a nuisance liable to be dealt with summarily under the Act.

The facts stated in the case were that the Club consisted of 750 members, was managed by a Committee, had occupied the premises for thirty or forty years, previously to which they had been used as the French embassy. These premises comprised the ordinary accommodation of a West End Club, with five bedrooms for the use of members, and eight other bedrooms for the use of the staff. In the basement of the premises there were several covered-in cooking ranges, a large roasting grate, and a vertical boiler with furnace attached. The smoke from these discharged into one flue, which was the chimney complained of.

Macmoran K.C. (Joseph Hurst with him) appeared for the appellant, and relied on the case of *Queen Anne Residential Mansions and Hotel Co. v. Mayor of Westminster* 46 Sol. J., 70. *Boydell Houghton* appeared for the respondent.

LORD ALVERSTONE, L.C.J., said that the appeal must be allowed. On the facts found by the magistrate it was impossible to come to the conclusion that the premises were a private dwelling house. Having regard to the section of the Act, he thought that it was not the construction of the premises but their use that must be considered, and he was of opinion that using them as a Club was not using them as a private dwelling house. The case must therefore be sent back to the magistrate with a direction to convict.

LAWRENCE AND KENNEDY, J.J. concurred.

NOKES AND NOKES v. MAYOR, etc. OF ISLINGTON.

Public Health (London) Act, 1891—Byelaws—Validity—Waterclosets
Notice to owner.

A byelaw requiring certain acts to be done, and imposing a penalty for breach thereof, is invalid if it does not also provide for notice being given of the alleged breach to the person liable to the penalty, especially in cases where the person made liable is not the person actually committing the breach.

This was a case stated by a Metropolitan magistrate on the hearing of a complaint by a Sanitary Inspector of the Borough of Islington against the appellants, for that they being owners of a certain lodging house did not provide and maintain during a certain period one closet or privy for every twelve persons, contrary to the byelaws of the London County Council made under section 39 (1) of the Public Health (London) Act, 1891. The byelaw provides that "the landlord or owner of any lodging house shall provide and maintain in connection with such house, water-closet, earth-closet, or privy accommodation in the proportion of not less than one water-closet, earth-closet or privy for every twelve persons."

The expression "owner" is defined as the person for the time being receiving the rack-rent of the premises. It was found that the appellants were agents to let the premises and collect the rents, and that at the time in question they were occupied by sixteen persons, and that there was only one water-closet. It was shown, however, that the appellants had let the whole premises to one Gates, and that he had sublet part of them to lodgers from whom he received rents on his own account. Notices requiring the abatement of the nuisance, namely, insufficient water-closet accommodation, had been served on Gates and on the appellants by the Sanitary Inspector, and later by the Medical Officer of Health, but not by the Council. It was contended that the byelaw was invalid, but the magistrate convicted the appellants.

Woodfin and W. S. M. Knight appeared for the appellants; *Courthope Monroe* for the respondents. The Court allowed the appeal.

LORD ALVERSTONE, L.C.J. said it was a good objection to the byelaw that it did not provide for notice to the person complained against. The appellants collected the rent from Gates, and so were owners within the meaning of the Act; but Gates was the person responsible for the breach, and therefore, in justice to the appellants, some notice should be given before proceedings were begun against them. Section 37 of the Public Health (London) Act, 1891, contemplated such a notice. It was a good objection to a byelaw that imposed a penalty, that before the alleged breach, especially when the complaint was directed against persons who were not owners, although they were to be taken as being in the position of owners, it did not provide that there should be the same kind of notice as that contemplated by section 37. He thought, therefore, that the byelaw was unreasonable.

LAWRANCE AND KENNEDY J.J. concurred.

Note.—In *STILES v. GALINSKI* and *NOKES AND NOKES v. MAYOR OF ISLINGTON* (No. 2) a divisional court consisting of LORD ALVERSTONE, L.C.J., WILLS AND KENNEDY, J.J., on February 3rd, 1904, decided other byelaws to be unreasonable and invalid for the same reason. These other byelaws provided for the cleansing of lodging houses in the first week of the month of April in every year, but did not provide for notice to the owner. It was also contended that the byelaws were unreasonable because the Easter holidays often fell in that week, and it was impossible to do the work. LORD ALVERSTONE AND WILLS, J. appeared to think the byelaws were in need of altering in this respect, but the Court did not hold them to be invalid on this ground.

Sale of Food and Drugs Act, 1875—Cream of Tartar.

At Stratford Petty Sessions, on January 16th, before Mr. BURNETT TABRUM and other justices, MESSRS. PICKEN BROTHERS (Limited), of Forestgate, were summoned under Section 6 of the Food and Drugs Act, 1875, for selling a certain drug—to wit, "cream of tartar"—containing lead.

Mr. Ricketts prosecuted for the Essex County Council, and *Mr. J. Harvey Murphy*, barrister, defended, while *Mr. Beck* represented MESSRS. PANTIN, who had been served by the defendants with a notice under Section 20 of the Food and Drugs Act, 1899.

When the case was called on Mr. MURPHY intimated that he did not propose to rely under Section 25 of the Act of 1875 on the warranty given

by MESSRS. PANTIN, inasmuch as that warranty was not given at the time of the sale, but since the analyst's certificate had been given.

Mr. BECK said that his clients had been brought to the Court and ought to have their costs.

Mr. MURPHY: They were not brought here; they merely received a notice under the Act, and as the defence of "warranty" has been abandoned they have now no *locus standi*.

THE CHAIRMAN: That is so; MESSRS. PANTIN must seek their relief elsewhere.

Mr. RICKETTS said that on December 7th last the Inspector purchased two pennyworth of cream of tartar at the defendants' shop, which on analysis by Dr. BERNARD DYER, the Analyst, was found to contain lead in the proportion of at least 4 grains per pound. Lead being cumulative in its effects, such a proportion might have most serious consequences for the consumer, who generally used it for making cooling drinks or as a baking powder.

Mr. MURPHY did not dispute the accuracy of the analysis, but submitted that the certificate did not disclose any offence, owing to its vagueness, as it did not state the constituent parts of the sample ($\frac{1}{4}$ oz.) analysed, but merely certified that it contained lead in the proportion of 4 grains to the pound, and was injurious to health.

The learned counsel referred to "*Hudson v. Bridge*" (19 *The Times* L.R., 369); "*Newby v. Sims*" (1894, 1 Q.B., 478); "*Fortune v. Hanson*" (1896, 1 Q.B., 202); and "*Lee v. Bent*" and "*Barlow v. Noblett*" (1901, 2 K.B., 290). He also submitted that according to the *British Pharmacopœia* the standard for cream of tartar allowed $2\frac{1}{2}$ per cent for impurities, a far higher proportion than 4 grains per pound. Further, he submitted that by Section 6, Subsection 4, of the Act of 1875, if the drug was "unavoidably" mixed with extraneous matter in process of collection or preparation, that was a sufficient defence. In the present case it was not suggested that the lead had been "added" for any purpose, but it probably came from the leaden vessels, in which the wine lees used for making the drug were collected. The mere presence of deleterious matter did not in itself constitute an offence—"*Shortt v. Robinson*" (80 L.T., 261), "*Goulden v. Rook and Bent v. Ormerod*" (1901, 2 K.B., 290). With regard to the conduct of the defendants, he was prepared to call a number of witnesses to show that the sample sold was in the same condition as when the bulk was purchased by them, and to state the circumstances under which the warranty came to be given by MESSRS. PANTIN, from whom they had bought.

THE CHAIRMAN: There is no suggestion against the defendants' perfect honesty or *bona fides* in the matter.

Mr. RICKETTS, in reply, referred to "*Bakewell v. Davis*" (1894, 1 Q.B., 296) and "*Bridge v. Howard*" (1897, 1 Q.B., 80), and distinguished the cases cited.

The Court, after considering the matter in private, held that the certificate was sufficient to support the summons, and convicted the defendants, who were fined £10, with £7 odd costs.

The Milroy lectures before the Royal College of Physicians will be given by Dr. W. Williams on March 1st and 3rd. The subject will be "Deaths in Childbed: A Preventable Mortality."

the Society. Dr. Dudfield traced the history of the Branch from its formation in 1856, and gave some interesting particulars culled from the early minutes of the Society. After a preliminary meeting held at Dr. Ravy's house, when Drs. Ballard, Godrich, Iliff, Hillier, Letheby, Barnes, Odling, and Pavy were present, a circular was issued and a meeting held on May 13th, 1856, at the rooms of the Medical Society in George Street, Hanover Square, when about thirty were present, and it was determined "That the Medical Officers of Health here present form themselves into an Association for mutual assistance and the advancement of sanitary science." Of the original members Sir John Simon (Medical Officer to the Privy Council), Sir John Burdon Sanderson (Paddington), Odling (Lambeth), Pavy (St. Luke's), Barnes (Shoreditch), and Septimus Gibbon (Holborn) alone survive.* The oldest Fellow of the Society appears to be Dr. Woodforde, who was elected in 1866 on his appointment as Medical Officer of Health of Poplar, Dr. T. Orme Dudfield being second in seniority, having been elected 21st Oct., 1871; eventually extra metropolitans were invited to join the Society, and in 1887-88 the Birmingham and Midland, the North-Western and Yorkshire Associations joined with the Metropolitan to form one Society.

Dr. Dudfield then said he had the pleasing duty to present on behalf of the Metropolitan Branch to Dr. Groves as representing the Society, the handsome badge (of which a photograph is given in the accompanying plate). The centre is a reproduction in gold of the Seal of the Society, and is in embossed and repoussé work; the circle with the inscription is in blue enamel with gold lettering; the date at the foot is in gold on red enamel. The ornamental gold border is composed of roses, thistles, and shamrocks intertwined, embossed on a matted ground. The mural crown is emblematic of municipal authority, while the staff with intertwined snakes drinking from cups is a well-known symbol in medical heraldry. The cock was a customary sacrifice to Æsculapius. The badge is attached to a crimson ribbon, which was placed round Dr. Groves' neck by Mrs. Reginald Dudfield amid applause.

Dr. Groves in responding said: "I am directed by the Incorporated Society to receive this beautiful and costly gift on their behalf, and to tender their acknowledgements. I assure you they appreciate very highly the generous impulses which have prompted it. They desire me to say their fondest hope is that as now, so always in the aftertime of our Society, this jewel may be a symbol not only of unity in fellowship, but also of unity in earnest purpose for the public good. Mr. President, Fellows, Members, and Associates of the Metropolitan Branch, in the name of the Incorporated Society, I offer you most sincere and heart-felt thanks."

The toast of the Metropolitan Branch was proposed by Dr. T. O. Dudfield, and responded to by the President; that of the ladies by Mr. W. Defries, and responded to on their behalf by Dr. Allan. A feature of the evening was the excellent musical entertainment provided by the chairman.

Metropolitan Branch.—A meeting was held at 9, Adelphi Terrace, on Friday, Jan. 29th, 1904. Present: Drs. R. Dudfield (President), Bond, Murphy, Parkes, Davies, Allan, Roberts, Goodall, P. C. Smith,

* The list of original Metropolitan Medical Officers and further information as to the foundation of the Society, will be found in *Public Health*, vol. xiii., p. 71, Nov. 1900.



THE PRESIDENTIAL BADGE.

The Centre is a reproduction in gold of the Seal of the Society, and is in embossed and repoussé work; the Circle with the inscription is in blue enamel with gold lettering; the Date at the foot is in gold, on red enamel. The Ornamental Border is composed of roses, thistles and shamrocks intertwined, embossed on a matted ground. The Mural Crown is emblematic of municipal authority, while the Staff with intertwined snakes drinking from cups is a well-known symbol in medical heraldry. The Cock was the customary sacrifice to Æsculapius. It is to be worn as a collar-jewel suspended from a crimson ribbon. Designed and manufactured by Messrs. P. G. Dodd & Son, Ltd., of 146, Leadenhall Street, London, E.C.

Brown, and the Hon. Secretary (Dr. Priestley). Dr. T. Robinson (President of the Midland Branch) was also present.

CORRESPONDENCE :—

1. Letters were read from the Metropolitan Asylums' Board stating :—

(a) *Pseudo-diphtheria*.—That the Board's Hospitals Committee do not at present see any reason to advise the Board to take any steps for extending their powers in regard to pseudo-diphtheria cases.

(b) *Sanatoria for Consumptives*.—That, in the opinion of the Managers, the question of the proposed establishment of sanatoria for consumptive patients is one of such vital and far-reaching importance to the community at large, and the proposal one which, if adopted by the Managers, would entail so considerable an extension of their duties and responsibilities, and so large an increase in their expenditure, as to call for some authoritative expression of opinion from the L. G. B. before the Managers are asked to take any definite action in the matter.

In connection with this letter, the Branch *resolved* to petition the Local Government Board to hold an enquiry into the whole matter of the provision of sanatoria by the Asylums' Board or otherwise.

2. *Health Lectures*.—A letter from the School Board stating that they had decided to act on the lines approved by the Branch, and had arranged to extend the present number (28) of Health Lectures throughout London to 60.

3. A letter from the Incorporated Society stating that the Society had unanimously accepted the offer of the Branch, to present to the Parent Society a badge of office, in the form of a jewel or medal, to be worn by future Presidents of the Society.

REFERENCES FROM THE SOCIETY :—

1. *Teaching of Elementary Hygiene in Schools*.—The Branch decided to communicate with the Educational Department, supporting the Society's two resolutions (passed Nov. 13th, 1903) with reference to the teaching of elementary hygiene in schools being made compulsory.

2. *Bye-laws re New Streets and Buildings in Rural Districts*.—The Branch decided to take no action.

PRESIDENTIAL ADDRESS.—Dr. R. Dudfield read his Presidential Address on "Milk," and after a vote of thanks had been carried, it was decided to have the address printed, sent round to the members of the Branch, and discussed (the President giving his permission) at the next meeting of the Branch.

VOTE OF THANKS.—It was *resolved* unanimously that a vote of thanks be sent by the Hon. Sec. to Mr. A. C. Waters, of Somerset House, Strand, for the courteous and efficient way in which, for the last twenty-one years, he has prepared and sent out to the Metropolitan Medical Officers of Health, lists of institutional (outside) deaths, belonging to their respective Districts.

TABULATION OF REPORTS (WORKSHOPS, ETC.).—The President drew attention to suggested forms, which he, with the assistance and approval of the London County Medical Officer and H. M. Chief Inspector of Factories had drawn up, with a view to securing, as far as possible, uniformity amongst Metropolitan Medical Officers of Health in tabulating workshops, out-workers' premises, etc. After discussion the Branch decided to take no action as a Branch, but it was left to the President to communicate privately with the different Medical Officers of Health, enclosing copies of the forms suggested.

Home Counties Branch.—A meeting was held at the Holborn Restaurant on Friday, January 15th. Present: Drs. Sanders (President), Ashby, Brincker, Butler, Cattell, Beale Collins, Morrison, Richards, and Mr. Whitaker.

On the motion of Dr. Butler, seconded by Dr. Beale Collins, it was resolved that the sum of £50 be subscribed by the Branch to the Library Committee of the Incorporated Society of Medical Officers of Health for the purchase of books.

The reference to the Branch *re* "The teaching of elementary hygiene" was considered, and it was resolved that the Hon. Secretary be instructed to forward to the Board of Education copies of the resolutions suggested by the parent Society.

The question of Building Bye-laws in rural districts was deferred until the next meeting, when Dr. Ashby will bring up some suggestions thereon.

The President then delivered an address on "Housing."

At the special request of the President a discussion followed, in which all joined.

North-Western Branch—An ordinary meeting of the Branch was held in the Victoria Hotel on Friday, January 15th, 1904. Present: Dr. W. Berry (in the chair), Drs. Garstang, Chronnell, Sergeant, Pringle, Wilkinson, Barlow, Vacher, Cowie, Wheatley, Greenwood, Forbes, Laird, Niven, J. Marsh, Martin, and Meredith Young, with Mr. J. Gerard, H.M. Inspector of Mines for the Manchester district, as a visitor.

A letter was read from the Incorporated Society relating to "Bye-laws for new Streets and Buildings in Rural Districts." It was resolved that this matter be discussed at the next meeting of the Branch.

Dr. Chronnell then read a short paper on "The Insanitary Condition of Collieries," and a discussion followed in which Drs. Sergeant, Wheatley, and Berry, and Mr. Gerard took part.

Dr. W. Naylor Barlow then read a short paper on "Medical Officers to Education Committees," and concluded by moving the following resolution: "That in the opinion of this Branch it is very desirable that the Medical Officer to the Education Committee should be the Medical Officer of Health of the district in those districts where the Sanitary Authority is also the Education Authority, and that where it is thought necessary to obtain the services of an expert with regard to such matters as defective hearing, sight, or mental deficiency, the duties of such expert should not be made to include any now performed under statutory direction by the Medical Officer of Health."

Dr. Berry seconded the resolution, which was supported by Dr. Greenwood and unanimously carried.

It was further resolved that a copy of the resolution be forwarded to the Council of the Incorporated Society for their consideration.

Dr. Garstang reported verbally on the business transacted at the last meeting of the Council of the Society.

Yorkshire Branch.—**ANNUAL DINNER.**—The Annual Dinner of the Yorkshire Branch of the Incorporated Society of Medical Officers of Health was held at the Hotel Métropole on Wednesday evening, February 10th, 1904. The gathering, which numbered about forty, was presided over by the President (Dr. Robinson of Rotherham). The Bishop of Wakefield and the Lord Mayor of Leeds were present as the guests of the Society.

After the Royal Toasts, proposed by the President, and duly honoured, the Bishop of Wakefield gave the toast of "The Public Health Service," and described himself as an amateur among experts, but one who had long taken a genuine interest in the great work of sanitary science. Lord Beaconsfield once said that health was the foundation of the happiness of the people and the power of a country. Undoubtedly the happiness of a people must closely depend upon the prevailing condition of health, and therefore the Public Health Service, which aims at the removal of the first causes of disease, is certainly one of the most noble professions to which a man can devote his life.

His Lordship said there sometimes was a lack of appreciation of the work of public service, and he mentioned a custom which prevails in Uganda. The road-mender there is a public servant, but he is never passed by without the salutation "Many thanks—well done." It would be a good thing if we could cultivate more of that spirit in our country, for it would sweeten a good part of our public life, and help many to enter with greater sympathy into such departments of special work.

His Lordship then dwelt upon the question of national physique, and said that although he was not altogether satisfied that there was a marked amount of physical deterioration in the better classes, he had little doubt of its existence in slumdom. He would therefore strongly press for a Royal Commission on the subject, which could not fail to be of benefit to the country. If such an investigation were instituted, he hoped it would not be merely a passing movement, but that it would expand itself into a great brotherhood of special enquirers in every locality of the United Kingdom. His Lordship drew attention to infantile mortality (mentioning that one baby died in six), and to the rejections of recruits for the army, where one in every three who presented themselves is rejected, as simple and telling evidences of something being wrong. Health officers have therefore a noble work in hand. He deplored the ignorance of the populace in hygienic matters. The gospel of the body ought to be as well known as that of the soul, and the people themselves ought to do more for themselves.

The Lord Mayor of Leeds supported this toast in a very interesting and edifying speech. He also touched upon the question of national physique, and gave it as his opinion that much depended upon the question of food, and ignorance as to what constituted good and suitable foods. He congratulated the Lord Bishop upon his efforts in Wakefield, and said that if such workers could be found in every district, a great improvement in sanitation and in the physique of the people might be ultimately looked for.

The toast was responded to by Dr. Cameron, the Medical Officer of Health for Leeds, who dwelt upon the Public Health Service as a special feature of this age.

Dr. Forsyth also spoke, and urged the appointment of a Minister of Public Health, with a seat in the Cabinet.

The prosperity of the Society was proposed by Councillor E. E. Lawson of Leeds. He spoke at length upon the question of national physique. He did not take such a gloomy view of this subject as some people. In his large experience amongst the industrial classes, he could not say that there was any special deterioration amongst working boys. He referred also to the physique of the Jewish children, which might be apparently better than that of English children up to a certain age, but was firmly of opinion that whilst our own children continued to develop after adolescence, the Jewish children did not fulfil the promise of their early

childhood. As to the physique of our girls, he entirely disagreed with any suggestion of physical deterioration, and thought that there never was a time when the daughters of the people were so well grown.

Dr. Kaye responded, and gave some information with regard to the condition of the Society. He advocated the greater usefulness of the clergy in bringing home to the people the relation of the moral to their physical condition, and suggested to the Bishop the advisability of asking clergymen to devote one Sunday a year to the question.

"Our Guests" was humourously proposed by Dr. Johnstone of Ilkley, and responded to by the Bishop, who asserted that in his opinion evolution was a God-guided process.

Mr. Peter MacGregor, of Rotherham, also replied.

A very pleasant evening closed with the toast of "The President," and a vote of thanks to the honorary secretary, Dr. Kaye.

West of England and South Wales Branch.—A Meeting of the Branch was held on December 17th, 1903, at the Guildhall, Exeter. Present: Drs. J. C. Heaven (in the Chair), C. W. Vickers, J. Middleton Martin, John Meredith, D. S. Davies, W. H. Symons, Mark Farrant, C. R. Killick, and Herbert Jones.

Letters of regret at inability to be present were read from: Dr. J. Tubb-Thomas (The President), Dr. J. Howard-Jones (Hon. Sec.), Dr. E. Walford, Dr. E. C. Garland, Dr. Francis Bond, and Mr. A. P. Cotterill. It was resolved that a letter be sent to the President expressing sympathy with him in his illness.

A communication was received from the Society re the Teaching of Elementary Hygiene; after some discussion, Dr. Davies proposed, and Dr. Symons seconded, and it was resolved:

"That in the opinion of this Branch, Domestic Hygiene, Personal Hygiene, and Physical Hygiene should be a compulsory part of the training of all Teachers."

Dr. Symons proposed, and Dr. Martin seconded, and it was resolved: "That in the opinion of this Branch the teaching of Elementary Domestic Hygiene, Personal Hygiene, and Physical Training should be compulsory subjects in all elementary schools."

It was resolved to forward copies of the above resolutions to the Board of Education.

Dr. Herbert Jones proposed, and Dr. Meredith seconded, and it was resolved:

"That the following Fellows constitute the Branch Council for the current session: Drs. D. S. Davies, J. M. Martin, W. H. Symons, C. W. Vickers, E. Walford, together with the President, Treasurer, and Hon. Secretary."

The Hon Treasurer reported that there was a balance in his hands on October 1st, 1902, of £64 7s. 10d., that he had received from the Treasurer of the Society £29 7s. 6d., and that the expenditure of the Branch had been £34 11s. 7d., leaving a balance in hand on October 1st, 1903, of £61 4s. 9d.

Dr. Symons proposed, and Dr. Martin seconded, and it was resolved: "That the Treasurer's Report be received and adopted."

Dr. Heaven proposed and Dr. Vickers seconded, and it was resolved: "That Dr. J. Howard-Jones be re-elected Hon. Secretary of the Branch."

Dr. Davies proposed and Dr. Martin seconded, and it was resolved: "That Dr. J. C. Heaven be re-elected Hon. Treasurer of the Branch."

The question of the daily grooming of cows, referred to the Branch from the Council of the Society, was discussed. Dr. Heaven proposed and Dr. Vickers seconded the following resolution:

"It is desirable to take steps with a view to securing the introduction of fresh legislation to provide for the compulsory daily grooming of cows, and the careful washing of the teats of cows prior to milking."

Dr. Symons thought it was desirable, but doubted if attainable. He submitted copies of contracts made between the Bath and Somersetshire Dairy Company and farmers supplying milk, in which the latter undertake that at the time of milking the udder and teats of cows are thoroughly cleansed, that the hands of the person milking are thoroughly clean, and that the cows are frequently well brushed.

Dr. Martin doubted if it was desirable to take any steps in the direction of introducing fresh legislation.

Dr. Meredith considered the proposals were utterly impracticable.

Dr. Killick did not think that more legislation would be of much use.

Dr. Davies proposed an amendment:

"That the daily grooming of cows and the careful washing of the teats of cows is desirable, but that the time is not opportune for the introduction of fresh legislation to provide for compulsion in the matter."

Dr. Martin seconded the amendment, which was declared carried.

The amendment was then put as a substantive resolution and carried.

Dr. W. H. Symons proposed, and Dr. Martin seconded the following resolution:

"That evidence of faecal matter and of other deleterious substances in milk should be considered an offence punishable by fine or imprisonment."

Dr. Davies was of opinion that if this proposal were enforced, every milk-seller would be in gaol; and he proposed as an amendment:

"That for the present the existing regulations should be rigidly enforced,"

Dr. Meredith seconded the amendment.

Four voted for the amendment and three against, and it was declared carried.

The amendment was then put as a substantive resolution and carried.

The report of the Sub-Committee appointed at the last meeting of the Branch, to consider what steps other than isolation and notification should be included in any proposed legislation (byelaw or otherwise) to be enforced for the purpose of preventing infection from Phthisis, was then considered.

Dr. Martin proposed, and Dr. Vickers seconded, and it was resolved: "That the following points require attention"—

1. Circularization of community, of publicans, of workshops.
2. Due arrangements for bacteriological investigation.
3. Medical visitation with regard to (a) history of case; (b) condition of premises; (c) requisite disinfection; (d) associated circumstances.
4. Periodical visitation by (a) specially appointed medical officers (b) voluntary private associations; (c) specially appointed non-medical inspectors.
5. Sanitary attention—upon report of visiting medical officer or Inspectors' action in regard to ventilation, overcrowding, and other insanitary conditions.
6. Byelaws prohibiting spitting in premises, cars, etc. Notices cautioning against spitting in street. Special notices for workshops and public houses.
7. Registration of change of address, and disinfection of rooms recently occupied by phthisical patients.

8. Supervision of milk supplies.
9. Supervision of meat supplies and provision of public abattoirs.
10. Supervision of the regular disinfection of public conveyances, bar rooms, and places of public resort." 

It was resolved that the thanks of the Branch be tendered the Sub-Committee for the report.

Dr. Mark Farrant read some notes of an epidemic of Scarlet Fever in a parish of 680 inhabitants (*See* p. 360).

The question of sub-dividing the Branch was discussed, but no resolutions were passed.

It was resolved that:

"The Mayor of Exeter be thanked for his courtesy in allowing the Branch to meet in the Guildhall."

A MEETING was held on January 28th, 1904, in the Grand Jury Room, Town Hall, Cardiff. Present: Drs. Tubb-Thomas (in the Chair), Walford Thomas (Merthyr), Symons, Stolberg, Howard-Jones, and Pritchard.

Dr. Walford referred to the Sectional Meeting of the Sanitary Institute to be held at Cardiff on April 23rd, at 11 a.m., when the subject of "School Hygiene in Connection with the Duties and Responsibilities of the New Education Authorities would be discussed."

Resolved: that the Hon. Secretary be instructed to intimate to the Members of the Branch (upon receipt of an official invitation to that effect) that they are invited to the meeting by the Council of the Institute.

The President reported to the meeting what had been dealt with at the last Meetings of the Council in London.

Dr. J. Howard-Jones followed with a paper upon the Sanitary Code of the Thora and Talmud.

A visit was then paid to the New Municipal Buildings, Cardiff, and the Borough Surveyor of Cardiff, Mr. Harper, kindly conducted the party over the buildings.

BACTERIOLOGICAL DIAGNOSIS IN GLOUCESTERSHIRE.—The bacteriological examinations required by the Bristol Health Department have hitherto been carried out in the municipal laboratory, but they are now entrusted to Professor Stanley Kent of the Bristol University College, and at the last meeting of the Gloucestershire County Council it was decided to pay the college the sum of £105 annually, in return for which Medical Officers of Health in the county will be able to obtain from Professor Kent bacteriological examination of such specimens as they may send to him.

IMPROVEMENT IN STATISTICS.—An effective co-operation has been instituted between the American Medical Association, the American Public Health Association, the Conference of State Boards of Health, the United States Census Bureau, and the United States Public Health and Marine-Hospital Service, for the improvement of vital statistics. Among the objects sought are the extension of adequate methods of registration, the use of uniform and comparable tables and rates in bulletins and reports, and the improvement of the international classification of causes of death. A pamphlet on "Statistical Treatment of Causes of Death" has been issued by the United States Census Bureau, requests for which should be addressed to Mr. W. A. King, chief statistician for vital statistics, Census Bureau. It has special reference to the difficulties encountered in compiling deaths returned from several causes.

CURRENT PUBLIC HEALTH LITERATURE.

Official and Parliamentary.

Board of Agriculture: The Relationship of Woods to Domestic Water Supplies. (This memorandum summarizes the conclusions arrived at by Continental Forest Experimental Stations.)

Home Office: Special Report on Dangerous or Injurious Processes in the Enamelling and Trimming of Metals. By Miss Anderson and Dr. Legge. Extract from Report of Chief Inspectors of Factories. The Secretary of State is satisfied that the present Special Rules for the industry need amendment, and desires to receive any observations thereon before the end of March.

British Medical Journal.

(Dec. 26.) The Stage of Invasion in Measles. R. W. Marsden.

The Analysis of Whisky. (Special article.)

Physical Degeneration (continued): Personal Hygiene.

A Milk Depot by private enterprise at York.

Sudden Heart Failure, with special reference to Diphtheria and Beri-beri. A. Stanley.

(Jan. 2.) Note on the Method of Demonstrating the B. tuberculosis in the Urine. E. Trevithick.

Consumption in Lewis. C. M. Macrae.

Public Health Administration in England.

Disappearing Quarantine.

(Jan. 9.) Distribution of Cancer in Freebridge Lynn Rural District. C. B. Plowright.

(Jan. 16.) The Invasion Stage of Measles. Eustace Smith.

(Jan. 23.) The Etiology of Carcinoma. Keith H. Monsarrat. (With special plates.)

Ventilation of Factories and Workshops. (Opinion of Certifying Surgeons.)

Instruction in Hygiene and Temperance.

Physical Degeneration—Effects of Drink.

The Value of the Bacteriological Examination of Water. Report by Dr. Timbrell Bulstrode re Typhoid Fever in Bridgend, Glamorganshire. Chemical analysis was satisfactory, bacteriological unsatisfactory.

(Feb. 6.) Acute Septic Colitis due to Milk Poisoning. G. F. Vincent. (This fatal case was one of a number due to the impure milk reported upon by Dr. Pierce, M.O.H., Woking.)

(Feb. 13.) Puerperal Sepsis. Peter Horrocks.

Drug Rash complicating Enteric Fever and simulating Scarlet Fever. G. W. R. S. Kene.

The Prussian Vaccination Act, 1885. Vaccination, Isolation, and Smallpox in Germany.

The Consumptive Poor of London.

Consumption and Sanatoria. J. F. J. Sykes.

Pollution of Tidal Waters.

The Lancet (London).

- (Dec. 26.) The Diagnosis and Management of Doubtful Cases of Diphtheria. F. Foord Caiger.
- The Use of Pure Carbolic Acid in the Treatment of Smallpox. James T. Neech and J. F. Hodgson.
- Etiology of Yellow Fever. James B. Tombleson.
- (Jan. 2.) Special circumstances of cases of Lead Poisoning occurring among Workers in White Lead Factories. T. A. W. Ogg.
- (Jan. 9.) Tuberculosis of the Tonsils in Children. L. Kingsford. (1) Tuberculosis of the tonsils, especially in cases with tubercle elsewhere, is fairly common, though the disease is usually latent. (2) Tonsil tuberculosis may be primary, and, indeed, the only seat of the disease in the system, though this is rarely the case. (3) The usual method of infection is by the blood stream in children from an older focus elsewhere. (4) Infection may also occur by the sputum in children. (5) When the tonsils are tuberculous the corresponding cervical glands become affected; and, (6) Sometimes where it is probable that the infection entered through the tonsils they were quite healthy, but the adjacent cervical glands were tuberculous.)
- (Jan. 16.) On the Question of Trypanosoma Infection in Man. Prof. F. Marchand and J. C. G. Ledingham. (Illustrated.)
- Atmospheric Temperature and Smallpox. David Sivewright. (Illustrated by charts.) (A rise in the number of cases generally corresponds with a fall in temperature, and vice versa, and also bears a relation to the solar radiations in vacuo.)
- Fourth Report of the Commission on Sewage Disposal.
- Slum Life in Birmingham (Editorial).
- Triple Compulsory Vaccination in France: Effect of the new Law on Foreigners residing there.
- (Jan. 28.) The Cholera Epidemic in Syria and Mesopotamia.
- (Feb. 6.) Agglutination and Sedimentation in Human Glanders. C. Montague Heanley.
- The Revaccination Bill, 1904. (Text.) The 18th place in the ballot for private bills was secured for it by Sir J. B. Tuke, and this Bill is down for 26th April.
- Adulteration of Cod Liver Oil. E. J. Parry.
- (Feb. 13.) The Significance of the Zoological Distribution, the Nature of the Mitoses, and the Transmissibility of Cancer. E. F. Bashford and J. A. Murray. (Illustrated.)
- Filaria Perstans and the Suggestion that it belongs to the Genus Tylenchus (Bastian). George C. Low. (Illustrated.)
- Iodide Rash in a Syphilitic Patient resembling a Variolous Eruption. Ernest J. Hynes. (Illustrated.)
- Cancer in Australia: a Comparison with other Countries, together with a Specific Treatment for the Prevention and Arrest of the Disease. G. Cooke Adams.
- Public Affairs and Public Health.
- The Spread of Smallpox by Tramps.
- Brandy v. British Brandy.
- The Biological and Comparative Aspects of Cancer.
- The Midwives Act: Exemption of Poor-Law Midwives.

Tuberculosis, Vol. III., 1904.

- (No. 1., Jan.) Tuberculosis in the Post Office. C. H. Garland.
- Present Position in Ireland. A. E. Boyd.
- Occupational Phthisis and Social Habits. J. M. Cowie.
- Local Government Board Enquiry at Swindon *re* Sanatorium.

Treatment, JAN., 1904.

- The Dissemination of a Nematode Worm ("Craw-craw") by means of Milk. Introduced into this country from South Africa, cases have been mistaken for Smallpox. J. D. Whittles.
- The Application of Serum Therapeutics to Plague. Major Jennings.

Journal of the Sanitary Institute, Vol. XXIV., PART IV., JAN., 1904.

- The Colonization of Rural England as foreshadowed by the Garden-City Scheme. F. E. Fromantle.
- Cottages for Agricultural Labourers. Martin Shaw Briggs.
- The Municipal Infants' Milk Depot. G. F. McCleary.
- Suggested Amendments to Part II. of the Housing of the Working Classes Act, 1890. T. Eustace Hill.
- Administrative v. Registration Counties: The Need of Unification. Henry Handford.
- Practical Training by The Sanitary Institute for Meat Inspectors. A. Wynter Blyth.
- Provision for the Health of Women and Children in Laundries. Edith L. Maynard.
- Factory Legislation from an Employer's Point of View. W. H. Mitchell.
- The Factory and Workshop Act. Harry Smith.
- The Sanitary Control of Bakehouses. T. Foley Cass.
- The Application of the Food and Drugs Act. S. G. Moore.
- The Registration and Inspection of Nursing Homes. Miss E. Margery Homersham.
- Tramps and the part they play in the Dissemination of Smallpox. James Robert Kaye.
- The Smallpox Outbreak and its Lessons. E. Dryden Fenwick.
- Convent Joints in Drains and Drain-Testing. James G. D. Armstrong.
- A Defence of the Disconnecting Trap. William Ransom.
- The Slaughtering of Animals for Human Food. Alfred Holborn.
- The Collection, Distribution, and Contamination of Milk. J. W. Brittlebank.
- The Disposal of Dead Animals from a Sanitary Point of View. W. F. Shaw.
- Bakehouse Reform. F. J. Rowe.
- Adulteration, Ancient and Modern. F. W. Richardson.
- Smoke Abatement. William Nicholson.
- The Dual Control of House Drains: Is it Effectual? W. J. Addiscot.
- Simple House-Furnishing and Decoration. Miss Hermione Unwin.
- Household Bacteriology. Maud Curwen.
- Public Day Nurseries. Mrs. Moser.
- The Inspection of Home Workers. Miss Margaret L. Sharples.
- Amongst the Outworkers. Miss M. L. Brown.
- The Personal Hygiene of Consumptives. Miss I. M. Priestman.

- Hygiene in Elementary Schools and its bearing on Home Life. Annie Rothwell.
 Some of the Medical Problems of Public Elementary Schools. H. M. Richards.
 Individual Examinations in Elementary Schools. R. Lishman.
 The Teaching of Hygiene. Miss S. L. Beszant.
 Children and their Eyesight. Sydney Stephenson.
 The Importance of Examining the Eyes and Ears of all School Children, not only those in Board Schools. Adolph Bronner.
 Care of the Eyes of Children attending Elementary Schools. Andrew Little.
 Warming and Ventilating of Public Schools. D. M. Nesbit.

The Journal of the Royal Army Medical Corps.

- (Vol. I., No. 8.) The Bacteriology of Asylum Dysentery. Capt. R. T. Brown.
 A Comparative Study of Service Dysentery Bacilli. Lt.-Col. R. H. Firth.
 (Vol. II., No. 1.) The Germicidal Action of Alkaline Solutions. Major J. R. Forrest and R. T. Hewlett.
 The Red Light Treatment of Smallpox. Capt. F. E. Gunter.
 (No. 2.) Elementary Hygiene in the Barrack Room. Major E. C. Freeman.
 What Evidence can be adduced as to the Conveyance of Diphtheria Infection from the Lower Animals? Major F. Smith.

The Practitioner, 1904.

- (Jan.) Enteric or Typhoid Fever. William Broadbent.
 Enteric Fever, with Special Reference to Egypt. F. M. Sandwith.
 Enteric Fever in India. Andrew Duncan.
 Typhoid Fever in China. James Cantlie.
 Some Reflections on Enteric Fever Infection in Camps. H. H. Tooth.
 Channels of Typhoid Infection in London. George Newman.
 Etiology and Prevention of Enteric Fever. H. E. Leigh Canney.
 Rigors in Typhoid Fever Apart from Any Recognizable Complication. Charles Bolton.
 Anti-typhoid Inoculation. Part I. A. E. Wright.
 The Treatment of Enteric Fever. John W. Moore.
 The Treatment of Enteric Fever. Herbert P. Hawkins.
 On the Importance of an Early Diagnosis of Perforation in Typhoid Fever. Hector Mackenzie.
 The Treatment of Typhoid Fever in the Johns Hopkins Hospital. Thomas McCrae.
 "Paratyphoid" Fever. R. Tanner Hewlett.
 (Feb.) Anti-typhoid Inoculation. Part II. A. E. Wright.
 The Diagnosis of Causes of Incipient Consumption and the Cases suitable for Sanatoria. C. H. Cattle.
 Cancer Mortality and Grouping of Cancer Cases in Chelsea. Louis Parker.

Water, Vol. 6.

- (Jan. 15.) London Water Supply considered in relation with the Geology of the Thames Basin. J. C. Pannon. (Illustrated.)
 Growths in Water Mains. Erastus G. Smith.
 Double Filtration Plant at Bremen. E. Goetze.

PUBLIC HEALTH:

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APRIL, 1904.

THE DETERIORATION OF BRITISH HEALTH AND PHYSIQUE.

BY THE EARL OF MEATH.

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AMONGST earthly blessings there is none greater than the possession of physical health and strength, but how few there are that give serious thought to the subject. As soon as we become conscious that the wheels of the machinery of life are running heavily, generally through our own negligence, we rush to the professional repairer, or even to the advertising quack, and are willing to pay heavily for assistance which can only be temporary, if we neglect to alter the causes which have occasioned the evil. How much wiser would it be if, individually and collectively, we would make a study of the laws which lead to health or disease, and, as far as circumstances permit, would regulate our lives in accordance with them?

As a nation we insist, and rightly insist, that all children should be educated. We draw up codes of instruction; we appoint and pay schoolmasters and schoolmistresses to impart this knowledge; we spend thousands of pounds in order that every child, however poor, may be given an equal chance in life; and yet, how small a part of all this thought, trouble and expenditure is directed towards imparting to children knowledge, which in after years shall enable them to understand the laws of nature, and to maintain their own and their future children's bodies in health and strength.

MORE KNOWLEDGE—LESS LEARNING.

What is the good of book learning if we are ignorant of the nature of our own bodies and of those laws which were intended to make life happy, but if neglected made it a burden and a misery?

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What avails material prosperity, if either by our own fault, or that of our parents, we are unable, through ill-health, either to enjoy life or to be of use to our country or our friends?

Let us consider what are the subjects, a knowledge of which leads, if properly applied, to an increase in physical health.

Surely such as hygiene, sanitation, physiology, dietetics, cookery and housewifery. Of course it would be foolish to attempt to teach children more than the mere elements of some of these subjects, but the general principles which underlie the preservation of health might well occupy the attention of teachers and scholars for a reasonable number of hours in each year. If we look through the branches of knowledge studied by our children at school, how seldom do we come across any subjects which may be of use to them in after years in assisting them to preserve their bodies in health, and when these subjects are taught, how thinly attended are the classes. Why is this?

It is due in a large measure to lack of teachers qualified to instruct in these matters, to incapacity at headquarters to understand the real needs of the people, and in no small degree, on the part of the parents, to a misapprehension of the present conditions of life.

Parents are apt to argue, that because they never learnt these subjects, which in plain English only mean the study of how best to keep the body in health, it is unnecessary for their children to do so. They forget, however, that the most rapid transformation in the character of the British people is taking place before their eyes; that the England of their youth is not the England we know, and that the England of ten, twenty, and of thirty years hence will be entirely different from the England of to-day. The fact is that the British, from having been mainly an agricultural, are rapidly becoming an urban people. In other words, whereas formerly they lived in the country, now they live in the towns. The rapidity with which this change is taking place is hardly realized by most people. Health is not so jeopardized in the country as it is in towns, and hence men and women who have to live in cities should study more carefully how to preserve their health. In 1801 the whole population of England, Wales and Scotland was only 10,942,000, whereas now it is 36,998,181, and this addition is almost entirely urban. Twenty-five years ago only about half the population lived in urban districts; now the proportion is three-quarters; that is to say, that now three persons live in urban to one who lives in a rural district. It is a well known axiom of hygienic science, that the health of a population, other things being equal, is in inverse ratio to its density. In plain English, other things being equal, a population crowded together is more unhealthy than

one that is scattered. The British people are becoming daily more crowded together, and hence, unless some steps are taken, and that soon, to counteract the effects of undue concentration, the national health must inevitably suffer.

SOME REMEDIES.

What are the steps which can be taken? They are many and various, but we may mention a few.

1. Every effort should be made to counteract all unnecessary increase of towns, and, when possible, new factories or industries should be established in, and old ones transferred to the country.

2. Care should be taken that all towns should be furnished with a sufficient number of parks, and especially with a large number of small play-grounds, fitted with gymnastic apparatus, and under the charge of caretakers, and so placed that no workman's house should if possible be more than a quarter of a mile from such a ground.

3. Children should be taught the rudiments of hygiene, sanitation, and physiology, so as to have some slight knowledge of the causes of disease, and the means which can be taken to avoid it.

4. They should, by cookery classes in schools, be shown how to obtain the largest amount of nourishment with the smallest expenditure on food; what kind of foods are wholesome; and how food should be cooked so as to make it not only palatable, but easily digested and consequently nourishing.

5. They should be taught self-restraint, in order to learn when they grow up how to rule themselves, and how to place a bridle on their appetites and passions, and on those indulgences which are harmful to health.

6. The muscles and lungs of the children and their general bearing should be improved by physical exercise and drill, and it should be the duty of the educational authorities to see that, whilst attending school, the children are properly fed. The authorities should be empowered also to bring the parents to account if they neglect their natural duties.

7. The girls should be taught by housewifery classes how to make a home clean, wholesome, bright and attractive, and as so many have to act as nurses from their earliest years, the proper way of feeding and tending infants. The ignorance of many married women has wrecked before now the physical welfare of their offspring. It is not an uncommon thing to hear of a young mother amongst the poorer classes giving beer, whisky, and gin to infants, and feeding them on the same food as she takes herself, long before the proper time has arrived for weaning the children, with the result that a quite unnecessarily large percentage of infants die before they are three years of age. If the

home were made more attractive, and the food more palatable and nutritious, the men would not be tempted to leave it so frequently for the public-house. It cannot be too widely known that there is no nourishment in stimulants, that raw spirits destroy the digestion, and that a man who desires to retain his health will do well either to entirely abstain from stimulants, or to take them only at meals, and then with the most rigid moderation. All these things should be taught, and they would be of more real value to the children than many lessons they now learn, and which are promptly forgotten as soon as they leave school.

THE WORKING MAN'S PART.

Such matters are of the utmost importance to the working classes of Great Britain. They affect their daily lives, and their personal health, which, in the case of many, is their only capital.

Working men and women should, therefore, bestir themselves to see that these vital questions are carefully considered in their interests by Municipal and Educational authorities. Let it be once known that the working classes are alive to the necessity of their children being trained in school in such a way as to develop their bodies, to render them capable of enjoying life, of becoming useful citizens, and of producing a healthy generation to succeed them, and it will not be long before their elected servants, the members of Municipalities, County Councils, and Educational Committees will find ways of putting a stop to the lamentable drain on the vitality of the nation which is daily taking place. If it be questioned whether it be a fact that the British people are deteriorating in physique, how comes it, as has often been stated in the public press without contradiction, that during the war in South Africa—out of 11,000 men who offered themselves from Manchester for the army, only 3,000 could be accepted as recruits owing to physical defects, and that, of these 3,000, only 1,000 were found fit to be sent abroad to fight the battles of their country? How comes it that the colonel of the Birmingham Volunteers has lately stated in public that, on account of similar bodily defects, he is obliged to reject annually some 32 per cent of the men who offer themselves? Let it also be remembered that these are volunteers, and presumably therefore men who have been brought up in comparatively well-to-do homes in Birmingham. Moreover as these men would not, under ordinary circumstances, be required to serve in the field, we may reasonably suppose that the physical tests to which they would be subjected in examination would not be as severe as those which the ordinary recruit of the regular army would be required to undergo. Furthermore, from information which the writer of

this article lately obtained, it appears that some 50 per cent of the lads from certain British towns, who annually offer themselves for service in the British Navy, have to be rejected by the recruiters on the spot for similar reasons, and that the services of a further 25 per cent are declined owing to the discovery of more obscure physical disabilities when the lads have reached headquarters.

OUR RECRUITS.

It cannot be denied that these facts point to a most serious condition of affairs, threatening the very foundations of British social, commercial, and national life.

But, indeed, statistics are not necessary. We only require to go into the more crowded parts of our large towns, and to use our eyes, in order to perceive how weak, stunted, and ill-formed are many of the young men and young women who are to be found in their midst.

"It is somewhat depressing," said the *Daily Graphic*, in a recent issue, "to learn from good authority that, although the British recruit before the late war about equalled the German in height, his weight, the surer criterion of physical strength and stamina, was considerably less."

The above statement may, indeed, be characterised as "depressing"; but if it be true, it is well that we should know it, in order that we may live in no fool's paradise, but may be able without loss of time to take effective steps to bring about a condition of affairs less hurtful to our pride, and more in keeping with the popular, but at present, fallacious notion of the physical superiority of the Briton.

The Royal Commission for Scotland on Physical Training has borne important witness to the unsatisfactory physical state of the Scotch people, and has suggested remedies which it is hoped that the Government and the local authorities will not be slow in adopting, but if the condition of the people of Scotland be so bad, we may be sure that that of the people of England and Wales, of whom over 12,000,000 are crowded into forty-four cities with an average population of over 270,000 each, must be still worse.

A ROYAL COMMISSION REQUIRED.

As it is of the greatest importance that nothing should be left to conjecture in so important a matter, the Government would be well advised to follow the precedent they have set themselves in the case of Scotland, and appoint a Royal Commission to enquire into the physical condition of the people of England and Wales.

The terms of reference to the Scotch Commission might well be adopted, *mutatis mutandis*, as those under which the English Commission might be instructed to act, namely:—

To enquire into the opportunities for physical training now available in the State-aided schools and other educational institutions of Scotland, and to suggest means by which such training may be made to conduce to the welfare of the pupils, and further, how such opportunities may be increased by continuation classes and otherwise, so as to develop, in their practical application to the requirements of life, the faculties of those who have left the day schools, and thus to contribute towards the sources of national strength.

In the meantime the people of Great Britain, and especially the working classes living in our large cities, who compose that portion of our population which is the most directly interested in the subject, should bestir themselves, and use all the legitimate influence they possess to impress members of Parliament, Corporations, Town and County Councillors, Educational authorities and others, of the urgent necessity which exists to turn their most serious attention to matters appertaining to the health, strength, and physical condition of the people of this country, and to take instant steps to improve the physique of the British race.

FORMALDEHYDE-STEAM DISINFECTION.—Herzog's tests (*Cent. j. Bakt.* 34, 2, 1904) corroborate those of Esmarch, and establish that formaldehyde steam disinfection at 70 to 80 C. destroys the most resistant spores, without injuring in the slightest leathers, fur, silks and other sensitive objects exposed to its action. Comparatively little effect is experienced below the outer layers.

GLYCERINE AS A GERMICIDE.—Dr. M. J. Rosenau, director of the Hygienic Laboratory of the United States Public Health and Marine Hospital Service, has for some time been conducting investigations as to the antiseptic and germicidal properties of glycerine. It possesses a distinct, though exceedingly feeble germicidal action. His opinion is that it cannot be depended upon to purify vaccine lymph or other organic matter containing spores of tetanus.

LEAD POISONING IN HOUSE PAINTERS.—The Factory Acts do not include house painters in their control, except for the short time they are in the workshop, but in France by a recent decree definite measures have been taken. The decree provides: (1) that white lead shall not be used unless it has been previously worked up in oil, and (2) that it shall not be manipulated by hand; (3) that in processes of rubbing down and in all operations in which white lead is used, the employers shall provide overalls for the men, shall see that they are washed and kept in good repair, and that they are worn; (4) that articles necessary for insuring cleanliness are to be provided for the workers at the place at which they are working; (5) that the implements of work are to be kept clean without dry rubbing; and finally (6) it is the duty of employers to post the notice containing these regulations at the place in which the workers are engaged.

PHYSICAL CULTURE IN ELEMENTARY SCHOOLS.*

By LOCKHART E. W. STEPHENS, M.R.C.S.,
Medical Officer of Health, Warblington Urban District.

A BAD family history from the tuberculous standpoint had determined him to devote his attention to the subject of physical development, and he had come to the conclusion that what was required in his predecessors was that they should increase the factor of personal resistance. In the way of hunting the bacillus everything appeared to have been done, except to increase the personal resistance of those liable to be affected—the resistance produced by the general better working of the organs.

The question as related to the children in the schools, a question to which he had devoted some attention, seemed to increase in its interest the more one had to do with it. Its importance consisted in the fact that the educational people alone were not capable of dealing with it. They had called for assistance from the War Office in order to improve the physique of the nation, and the infantry drill book had been the model for the physical training in the elementary schools, giving altogether unsuitable, if not harmful, exercises. Now, taking the alleged physical deterioration as proved, he thought that the medical profession were alone the proper people to advise the education authorities, and he wanted to submit to that meeting that the Medical Officers should be the proper people to supervise the physical education and culture. To physical education they would have to look for a remedy for physical deterioration, which has been going on for a long while.

Many influences were now at work, but he contended that the educational authorities did not possess the requisite technical knowledge to enable them to carry out this important work to advantage. By physical culture he meant the development of the body as a whole, so that each part might reach as nearly as possible to the highest perfection. Anyone having a great deal to do with examinations of people could not help being struck by the general want of condition and good physique among the people. It was rare to see a really well-set-up man.

Various systems of physical culture had been devised of recent years—some good, some bad. He was opposed altogether to the drill sergeant, whose exercises were, first of all, intended for the

* Abstract of address to the Society of Medical Officers of Health, 9th February, 1904.

grown-up man, and not for tender children. Military instructors might implant a military spirit in the young, but they were not, for many obvious reasons, the best people to carry out the physical instruction of children.

Another system had come into vogue, viz., the Sandow system. If one could dissociate music-hall exhibitions from the idea, no doubt that system would be more generally accepted. The fact remained that, as a developing physical exercise, the system left little to be desired. The exercises were gradual, easy, and capable of being carried out by both sexes, and elaborate or expensive apparatus was quite unnecessary. The object aimed at was to concentrate the will upon the work to be done.

Now, he did not wish to suggest that the Educational Department was blind, but he urged that they should seek assistance in the shape of medical advice. In small rural schools throughout the country the physical education being carried on was a farce. A few minutes once a week were devoted to almost useless exercises in many cases. The absence of adequate playgrounds led to the use of schoolrooms, in which the air was vitiated and possibly infected from school or other gatherings. Of course, the teachers themselves would have to be properly taught. The proper physical exercises were as different from the work of the drill sergeant as could well be imagined.

He contended that the people best able to advise the educational authorities were the Medical Officers of Health, and he urged the Society to take the matter up in this light. He wanted to put the subject before them on the grounds that they accept physical deterioration as a fact; that the most important means of combating that deterioration is physical culture; that physical culture should be carried on through the Education Department, advised by medical men, and especially Medical Officers of Health; that the present scheme drawn up by the Department on the War Office model, is not the best possible for the purpose intended.

DISCUSSION.

The PRESIDENT observed that the subject had been before the Council, which had sent copies of the resolutions passed to the Board of Education. The Council had considered the subject to be one of the utmost importance, and had resolved: (1) That in the opinion of the Council of the Incorporated Society of Medical Officers of Health all public elementary school teachers should be taught the principles of personal hygiene, domestic hygiene, and physical training; and (2) That in every public elementary school personal hygiene, domestic hygiene, and physical training should be taught to the children. The British Medical Association had passed similar resolutions, viz., that it should be compulsory that every child in public elementary schools should be taught personal hygiene, including

temperance and domestic hygiene. Dr. Newsholme had suggested that something further might be done that evening, and the matter could be discussed with advantage.

Dr. H. BEALE COLLINS (Kingston-on-Thames) said that he had done his best to bring the subject before his authority. The Education Committee had sought his advice in connection with the taking over of the provided schools, and as a result of his report considerable improvements had been effected in what were the voluntary schools of the town. The question was a difficult one to deal with, because it involved considerable expense. Training of teachers meant larger demands upon the ratepayers, and therefore the matter must be approached with a considerable amount of caution. It must not be pushed too far. As time and opportunity offer they could all bring the subject before their various authorities. In his last two or three annual reports he had given certain advice, and interest had been created. The Society might approach the Government with advantage with a strong pronouncement in favour of the careful physical training of the teachers. The great thing was first to get the teachers trained, for, as Dr. Stephens had suggested, it was impossible for the children to be properly trained unless the teachers are themselves trained in the necessary exercises. The training of the children would naturally follow the training of the teachers. They had to remember, however, that a large number of the children for whom such physical training is designed are both under-fed and badly fed. Perhaps the present ills were due not so much to under-feeding as to bad feeding. Parents had to be taught how to feed their children properly. The ignorance on the subject of children's food was appalling. The whole process would be a gradual one, and the medical profession would have to do a lot of pegging away. Of course, the matter was important, and it was a deplorable thing that the reports submitted on the condition of recruits should be possible at this period of the world's civilization; it seemed astonishing that this country should not have taken more interest in the subject. He laid particular stress upon the question of food for children, and opined that young children are fed too much upon meat. A great deal more could be done with cheaper vegetable food if the poorer classes could be taught to use it properly. If reform could be effected in this direction he felt certain that good results would follow, not the least in providing the children with the stamina necessary to bear the strain of physical exercise that is indispensable for their general improvement bodily. If the meeting could pass some resolution unanimously, it might have weight with persons in authority.

Dr. J. KERR (Medical Officer to the London School Board) thought they had to thank Dr. Lockhart Stephens for bringing forward this subject, which was one that no one, as it were, knew anything about, because, like the snakes in Ireland, physical culture did not exist in most schools. He did not think they would agree with the suggestion as to the progressive physical deterioration of the country. Undoubtedly the present enquiry was bringing to light the existence of degraded conditions, but he did not think they would agree with Dr. Stephens that a general downward course was being followed by the nation. This, however, did not really affect the argument, and that aspect of the question could be left to those who are now enquiring into it. But the physical training of children was an exceedingly important matter, because hitherto educational ideals have paid very little attention to the physical condition of the children at all. The ideal of school was moulded on ancient and

out-of-date lines, and practically has not come up to modern standards. School takes the children away for many hours daily, and puts them in what is an unnatural condition. The natural condition is activity of muscles and nerves, and to a great extent children are deprived of these natural conditions by school attendance. The purpose of school should therefore be to replace artificially these natural conditions, and should supply the natural method of training muscles and nerves by movement. Physical culture is the only way by which this can be done. They could not justifiably say that any system of physical culture is the best and must be followed. Possibly the Sandow system would be very good, but it was to be remembered that children came to school at the age of three and could hardly walk. Many of them had to be taught to walk properly. For them physical training was a very different thing to similar training for the child of thirteen or fourteen. A young child was incapable of prolonged effort, or of slow and complicated movement. Exhaustion was very harmful to a child who had to grow and develop. To attempt to get out of it premature function would disturb the natural development, and probably retard some later development, preventing it from attaining due symmetrical growth. Regarded in this aspect, physical culture was twofold: There was the educational effect in training muscles and nerves, and also what Dr. Stephens had referred to, the benefit to be obtained from training the personal resistance and nutritive vigour of the child. There are certain movements which the young baby makes, which at very early stages become automatic and unconscious. The aim of physical training should be to train the movements which are used for nutritional development, and make them at an early stage as automatic as possible. In young children movement ought to be produced as unconsciously as possible, and it was useful that such movements should be designed to promote circulation, respiration, and organic functions. This should be continued through the whole life of the child, stimulating its various functions, and so developing its reserve powers, which constitute personal resistance. Any physical training which does not take this into account, and a required part worked almost every hour in the school, would be a failure, because it would fail to develop the personal resistance of the child's tissues, which is one of the most important things in its life's history. Then with regard to the other movements, the training of the nerve centres to control muscular movement; as the child gets on these become more complicated; each age must have a progressive course. The whole course should be co-ordinated movement, intended to help to develop the child's vitality and natural movements, of which it is deprived by school. Before long he thought it would be found that some such course would be adopted. The present model course referred to by Dr. Stephens has been unanimously condemned. He did not know whether it had been formally withdrawn, but he believed it was a dead letter now. The circumstances of small rural schools was an important point to be remembered by anyone establishing a system of physical culture, and there was the difficulty about the area of the schoolroom. Recently breathing exercises have been introduced. Such exercises were generally advocated by voice-trainers and people who used them empirically. Practically these exercises amount to teaching a child to breathe through its nose, deeply, correctly, and to expand the chest. These have a nutritive value in developing the circulation and chest, and as such are good. He could not see why people should say these exercises must be done out of doors; if in-door air was good enough to live in it was surely good enough to

breathe in. Anyhow, it was no reason why the respiratory powers should not be developed. The question of dust was an important one, but he did not think the contagion was a great or a serious question. The schools were not such dreadful dens as had been pictured, and he thought the question was more one of personal contagion. The mere exercising of the children in the schools would not add materially to the risks. The breathing exercises would lead to the opening of windows, and attract attention to the condition of the school generally. A great deal of the work could be done through the teachers, under expert direction, and it would be done if the inspectors required it. Unfortunately, the Education Department seemed to be like other Government Departments, managed by experts who know next to nothing of what they should have to deal with. Inspectors would speedily be brought up to the line if the Board of Education had at headquarters those who could give them medical and sanitary advice. One could only wonder under present circumstances that things are not very much worse than they are. The way to get the required training of teachers was to put pressure on the Board of Education to insist on hygienic knowledge and training in the teachers. Teachers should have direct training in physical culture; they must know what is to be obtained from the exercises. In London there were superintendents of physical exercises who visited the schools regularly, but in country schools neither teachers or children have the faintest idea why they do certain movements, some of which are perfectly wrong. All that would be remedied by having hygienic education required of the teachers, and by school inspectors who know what the subjects are that they should inspect. For this reason the Society would do very well if they did nothing else than move the Board of Education in the direction of having properly-trained, scientific inspection.

Dr. P. CALDWELL SMITH (Wandsworth) considered that the problem was not to be solved only by physical culture. They must get to the root of the whole thing. Physical deterioration exists only among a certain class—among the children of the working classes, and not among the children of the well-to-do. One of the contributory causes was unsuitable and irregular feeding. Another cause, he believed, was want of sufficient sleep, without which it was impossible for the children to grow properly. Thousands of working-class children were up early and late. These two points ought to be impressed upon parents, while many young mothers badly needed educating as to how to feed their children. He thought it was a disgrace to civilization that children as young as three should be sent to school. It ought to be made a penal offence to send a child before it was five years old, before which age it was neither physically nor mentally fit to bear the strain of school. In Scotland the percentage of children attending school before five was very small, yet the percentage of children who did well was higher there than in England. The physical condition of children in Scotland was better than in England. He thought that if Dr. Newsholme had been present he would have supported the points which had been raised.

Dr. W. BUTLER said there was no question of more importance to Medical Officers of Health than this, and no time more opportune for discussion now that the Education Act required the reorganization of the schools altogether. Education had come upon us with a rush, and society had not been able to adapt itself to the new conditions. That the last half century has brought physical deterioration was a fact, and no one more than Medical Officers could appreciate the reasons why. The wonder was the deterioration was not greater than it is. The

conditions of life in towns were such that no one could reasonably expect the rising generation to grow into healthy men and women. Both home and school conditions were opposed to progress in this direction. If Dr. Stephens had erred, it had been in placing too great an importance upon physical culture in schools as a remedy for these conditions. The question was a broader one—that we had not been able to organize to meet new conditions. The food question resolved itself into domestic inefficiency. The utter incapacity of wives to be mothers of families was the cause more than anything else of the low condition in which the children are brought up. Food, cleanliness, sleep, air space, and other things in the homes of the working classes constituted the problem, and how were these defects to be remedied? He thought that in the school the rising generation must be educated in these matters. Working-class women got no domestic training nowadays, and the girls must be taught the elements of domestic hygiene. Mr. Rowntree, at York, and Mr. Charles Booth, in London, had shown that 30 per cent of the people are under the poverty line. How was it possible under such conditions for children to be reared by healthy growth. He believed that it would come to giving proper conditions and proper food at school. His authority had placed the hygienic control of the schools under his supervision, and shortly he hoped to have a system of weighing and measuring which would give some data to act upon. Children came to school dirty, and the washing had to be discouraged because it took up too much time that should be given to learning. Considerations of this nature put physical training as advocated by Dr. Stephens in a secondary position, and the subject had to be looked at in relation to other factors in school life. They must not rush to conclusions that physical training is to be urged primarily upon the education authorities, but the larger questions indicated must be taken seriously into consideration, and medical authorities should be consulted in a way they had not been consulted in the past.

Mr. WOLF DEFRIES pointed out that one inference from the discussion was that, as the question was a highly complicated one, the solution of the problem was not likely to be simple or rapid. He also gathered that the opinion was that the function of Medical Officers of Health was not confined to the administration of the Public Health Acts, but extended to the whole scope of public health generally. There might, therefore, be some propriety in considering whether the Society was not in a position to invite its Council to consider whether something in the nature of a Standing Committee might not be appointed to consider these various questions in detail, and at greater leisure than was possible at a general meeting. They might then approach the Board of Education with more weight in their representations, and with steady and increasing pressure, persistently applied as the result of systematic study and enquiry, they might hope for some definite result in the future.

Dr. W. G. WILLOUGHBY pointed out that the immediate question before them was physical culture in schools under present conditions, and Dr. Stephens' object was not to put the other subjects in the background. He desired to deal with the children as they were brought to school to-day. As Medical Officer to a small education authority, he found that there was a report before the members at the last meeting consisting of a scheme of a drill (to be given by a sergeant holding military rank), and which was most unsuited for delicate children. He would be glad to know from Dr. Stephens if there was any particular book on the subject which could be advantageously used by Medical Officers in

his position, for not only did teachers require education on the subject, but also medical men needed some instruction.

The PRESIDENT said he understood the suggestion was that a committee should gather information in order to impress the Board of Education. They all could appreciate the difference between the physical culture suggested by Dr. Stephens and military drill practised in different parts of the country. The whole subject was a wide one. In America the elements of domestic and personal hygiene were being taught, and in British Colonies; yet in England, although there were many voluntary subjects connected with domestic hygiene, the Board of Education did not define what they meant by domestic hygiene. There were only forty schools in this country where the subject was taken. But the Board of Education did not want further information; they only did not see their way to include it among the compulsory subjects of the Code, because there were so many other subjects to be taught. The difficulty was that the matter seemed settled in the mind of the Education Board.

Dr. SIDNEY DAVIES (Woolwich) said he would be prepared to second Mr. Defries' suggestion. The chief object of the proposed committee would be to collect facts. It was doubtful whether there was a progressive physical deterioration. This might be so in the case of recruits, who used to be drawn largely from the agricultural labouring class. The collection of facts as to chest measurement, weight, and height of school children in different parts of the country would give useful information in determining the questions raised.

Dr. MEREDITH RICHARDS reminded the meeting that a Departmental Committee had been sitting for some months with regard to the alleged physical deterioration in this country. He thought, therefore, it was rather inopportune to appoint another committee with practically identical objects. It seemed to be prudent to wait for the suggested code of physical exercises to be published, and then to appoint a committee to consider those proposals. It was rather a large question for that Society to attempt to investigate. It would be a mistake to base their suggestions on the assumption that physical degeneration had taken place. They should base their recommendations upon more general principles. He was inclined to agree that the schoolroom is not the place for physical exercises.

The PRESIDENT said that he knew the Board of Education was much exercised upon the whole subject, and he gathered that the Board had been helped by the resolutions which had been submitted by that Society and the British Medical Association.

Prof. W. J. SIMPSON thought that any resolution which might be passed should contain something more definite in regard to the harmfulness of the military system which had been referred to, and of the evils of which he had early personal experience.

The PRESIDENT observed that the military system had been withdrawn by the Board of Education.

After some further discussion, it was resolved, on the motion of Mr. W. Defries, seconded by Mr. S. Davies, "That it be referred to the Council to appoint, if they think it practicable and expedient, a Standing Committee of the Society, charged with the study of questions of school hygiene, such as those raised by Dr. Lockhart Stephens' paper, and with the duty of presenting to the Society from time to time such reports as may be suggested by such material as they may obtain."

Dr. LOCKHART STEPHENS, replying to some of the points raised, said that he was very glad to hear that the military system had been abandoned,

as this showed some sort of conscience on the part of the Board of Education. He did not think that Dr. Kerr would think a schoolroom the proper place in which to carry out physical exercises if he could have known the state of some of these places after an evening's smoking concert. Voluntary school buildings and playgrounds were particularly defective. He quite agreed that there were a number of factors contributing to physical deterioration, but physical exercise such as he suggested was one means of combating the defects. He had endeavoured to bring before the Society one point, a most important point, viz., that Medical Officers of Health should come in as advisers, and not as mere administrators of the Public Health Acts. Hitherto their position had been that of one armed with an Act of Parliament. He thought they were entitled to a more honoured and confidential position—they must be taken into the national council. He thanked the members for the courtesy with which they had listened to him, for he was hardly worthy to come where so many distinguished men had preceded him, and put forward his views and experience.

The PRESIDENT observed that the rural Medical Officer of Health had perhaps more than anyone else problems of public health to solve. Incidentally he referred to the excellent arrangements at the Royal Naval School at Osborn, and suggested that these arrangements constituted a model for educational establishments.

EPIZOOTIC LYMPHANGITIS.—The Board of Agriculture calls attention to this disease, which has been imported from S. Africa. It affects horses, the symptoms being swelling and eruptions on the legs, generally the hind legs. Affected horses should be promptly isolated, and stables disinfected.

SOURCES OF INFECTION IN PHTHISIS.—Dr. B. Möllers (*Zeitsch. f. Hyg.*, xlv, 3) deals with the histories of 200 phthisical patients which were the subject of careful enquiry. In 114, or 57 per cent, the infection was acquired in the home from consumptive parents and relatives. This result agrees with the results obtained by Dr. Nivens (*vide Annual Report, Manchester*, 1902). In fifty, or 25 per cent, the source of infection appeared to be acquired in workshops from consumptive fellow-workers. In fourteen, or 7 per cent, the source of infection is put down as the "dwelling," i.e., places such as common lodging houses, infirmaries, etc., where the patient was in close contact with fellow-sufferers. In one, or .5 per cent, the source of infection was through inoculation from a tuberculous animal.

LIBRARY BOOKS AND PHTHISIS.—Dr. J. Mitutesen, of the Institute for Infectious Diseases, Berlin (*Zeitsch. f. Hyg.*, vol. xlv, part 3), has made careful bacteriological examinations in the case of ninety-seven books, 177 guinea-pigs being used for the inoculations. In those books which were in use two years and under, no tubercle bacilli could be discovered; but in those books which had been in use for from three to six years more than one-third contained tubercle bacilli, as evidenced by the inoculation on guinea-pigs. The bacilli were contained in the thick dirt of the edges of the leaves, and were no doubt due to coughing while reading, and wetting the fingers in the mouth to turn over the leaves. For prophylaxis he recommends fumigating the books with formalin for a whole day, and giving instruction to users of the books especially to avoid wetting the fingers in the mouth to turn over the leaves, since the person who does it may become himself infected or infect others.

HEALTH AND EMPIRE.*

By H. BEALE COLLINS,

Medical Officer of Health, Kingston-upon-Thames.

THE foundations of empire rest on the individual, and the permanence of an empire remains assured whilst every individual is physically and morally sound. Moral health is so inextricably interwoven with physical health, that it is hard for either to stand alone. Now, if in an empire there be moral unsoundness, national degeneration is not far away, whilst even a commercial empire may have to fight for life in the last resort, and that battle will be won by physical health.

In the old days the countryman was strong enough, and sufficiently intelligent, for the military requirements of his time. To-day we require great physical and mental alertness, not only for soldiering, but also for the industrial competition that daily grows keener between the nations.

Over 70 per cent of our population is now urban, and the worker's life being passed between the workshop and the courts and alleys of our towns, we cannot expect alertness from him unless we start him in life with a sound constitution at adult age, and give him opportunities for keeping himself in training. This is not attained in sufficiency under our present "want of" system.

Those of us whose duty it is to look after people's health have noted that there is a dangerously weak spot in our imperial system. During the late war there was no lack of would-be recruits, but 32.1 per cent of the applicants were unfit, and 3.3 per cent, in addition, broke down after one year's service. During the last five years 113,884 recruits have been rejected as unfit, and it is generally believed that the sources of recruiting were nearly exhausted. Where could we find men to fight a nation of soldiers with a bigger population than our own? Amongst the well-to-do, the recruiting sergeant could find young fellows physically fit for his purpose, but the numbers are limited. As a man rises in the social scale the size of his family seems to decrease. The calls of respectability upon the purse are very great, so the thrifty man leaves it to the improvident to supply us with the thews and sinews for the next generation. Unfortunately, the improvident are so hampered by heredity, environment, and lack of opportunity, that those of their children who survive infancy and reach adult age are physically of little use for imperial purposes.

* Presidential Address, Home Counties Branch of the Society of Medical Officers of Health.

Imperial purposes are both civil and military, and though it is from the latter standpoint that defects are most obvious, it stands to reason that industrial enterprise can be better carried on by men of good physique than by weaklings. Is not the success of Germany in commerce, in spite of the burden of military service, in no small part due to that very military service having improved the physique of her sons? The hardened muscles of the soldier prove a great advantage in commercial undertakings.

We may joke about our phantom army corps, and our ships which cannot put to sea for want of stokers, but we wish the joke were impossible. It is not because there are no idle men to fill the vacant places, but because the idle men are wastrels; partly through their own fault, no doubt, but largely because we do not take sufficient care of infant life, and because we begin to use the human machine before it is properly developed. In the industrial classes the child begins work at fourteen, or even earlier, at ages when the well-to-do children are still at school, developing physically by exercises and games in the open air, sustained by decent food, and not worked too hard mentally. If we find it economical to finish a machine of steel and brass before setting it to work, is it not at least desirable to have the same regard for human machines worked by flesh and blood?

Figures sufficient to prove the advantages under which the well-to-do develop are difficult to obtain, but sufficient for the purpose. At eighteen years of age and upwards there were 32.1 per cent of rejections amongst recruits during the last five years. During the same years the boys, at the same ages, at Epsom College below the standard were only 14.3 per cent. At the school all boys were examined; for recruits only those who considered themselves fit for military service, of whom 64 per cent were drawn from the agricultural labourer class. The figures from Epsom also show the great improvement during the later years of boyhood, for at fifteen years 27.4 per cent were below the standard for entry to naval training ships at the same age, so that an improvement of 13.1 per cent is shown in three or four years of school life. These records by Mr. S. R. Brown, of Epsom, are worth careful study.

Observations made by MacLaren some years ago showed that during these ages special training developed the chest of a well-built child from 32½ to 39½ inches, a delicate boy improving from 30½ to 34½ inches, whilst even a dwarfed and stunted child increased from 24½ to 29½ inches. Other examples could be given, but no one is likely to dispute the possibility of greater improvement under careful training during the ages from thirteen to eighteen.

Gen. Ian Hamilton, in some remarks upon the physical fitness of

men after campaigning on the high veldt, expressed the opinion that the lasting benefits of such a life could only be fully acquired by those who were fully developed before arriving in that splendid climate. This is doubtless quite true, and only emphasizes the contention that the deficit in development in early years, due to slum life, under-feeding, and similar causes, must lead to further waste owing to the inability of the under-developed to take advantage of good conditions, as well as their liability to suffer unduly from bad surroundings.

Good drainage and healthier dwellings have done something towards the physical improvement of the race; but dwellings, if not overcrowded, are mostly over-occupied, and in industrial centres there is a lack of open spaces where children can run out for a breath of fresh air. A comparison of districts like Hampstead, with its many open spaces, with St. Luke's, where there are none at all, shows that these city lungs have a very beneficial effect upon health. The death-rate for consumption in Hampstead is 0.74 per 1,000, while in St. Luke's it is 3.11. Taking 1,000 as the mortality figure for London as a whole, the figure for Hampstead is 683, while for St. Luke's it is 1,420. Even with figures such as these at our disposal, we all know how difficult it is to persuade Aldermen and Councillors that money should be spent on providing open spaces and sanitary dwellings. The ordinary representative thinks he is bound to consider the views of the fairly well-to-do shopkeeper class. This class is most active at the local elections, where the cry is usually that impossible one of "down with the rates." Once, when reporting upon the causes of infantile mortality, I heard a councillor remark, "That as a practical man he could not see of what interest such matters as the deaths of a few babies could be to the Sanitary Committee." In his view there were too many people and too much competition, but imperial health is of a greater moment than local rates. Some persons claim that though our birth-rate is declining, our death-rate is also going down, and that we are therefore steadily increasing, if at a slower rate of progress. This might be true if it could be proved that the saving was in the bringing up of more children, and not in prolonging the lives of a greater number of the unfit. That we are really effecting the latter result seems clear, for the mortality of infants under one year of age is stationary. In the ten years of 1890-99 it was 153 per 1,000, whilst in 1900 it was 154 per 1,000. This infant mortality is highest in industrial centres: Lancashire, 180; East Riding of York, 179; Staffordshire, 178; and Warwickshire, 175; against 117 in Sussex and 120 in Surrey. In my own district this mortality is almost entirely confined to the poorer members of the working classes, and may in part be due to

hereditary causes, but is chiefly due to improper conditions which might be removed. Children who succumb to improper feeding might develop into fine men and women, as is seen every day amongst the well-to-do, where children who could never have withstood the slum environment grow up into first-rate athletes. Unfortunately, the well-to-do decline to burden themselves with large families, because they feel that a large family would interfere with social enjoyments and would entail expense in putting their many children out in the world, and they decline to bring up children to fill places in a lower social position just to benefit future generations in the empire.

If this view of the social status is not greatly exaggerated, some steps must be taken to save the waste amongst the poorer working classes. In order to consider what can be done, it will be advisable to note and observe the physical development of the child from infancy to adult age, as it is and as it might be.

Of every six children born one dies. Amongst the poor it is probably one in every five. This means a dead loss of 150,000 children a year, of whom at least 50,000 might reasonably be expected to grow into strong men and women. Unfortunately, the greatest loss is amongst boys, of whom 1,143 die (under one year of age) for every 1,000 girls dying. Having survived the dangerous first year of life, the child begins school life at three or four years of age in the infants' department of the Elementary Schools. This is much too young for education; sharp children are apt to be over-excited and nervous, and all are exposed to the dangers of infectious diseases, such as measles and whooping-cough, which they carry home to younger members of the family, amongst whom the fatality may be very high on account of their tender age. In schools, too, it is very difficult to protect the clean from the dirty, so that the careful parent finds his children suffering for the sins of the careless; as the teachers, being appointed for educational purposes, and not for nursing, are only in exceptional cases able to isolate the dirty before the others become contaminated. Unfortunately, the voter has now become accustomed to have his children dry-nursed from three years of age and upwards, and would certainly express his indignation at the polls if deprived of the privilege, so that we must consider some system that would get rid of the present difficulties without interfering with the conservative prejudices of the working classes.

In New York there is an extensive crèche system managed by charitable persons under the supervision of the Board of Health. Children under six years of age can be left in these crèches at a charge of about 2½d. a day. The great objection to this system is that the

mothers could relieve themselves of their responsibilities by getting even small babies cared for, whilst they themselves were earning money and undermining their constitutions by working in factories or unsuitable trades. Woman during the years of child-bearing should have nothing more than her domestic duties to trouble her, if she is to bring healthy children into the world. Up to the beginning of the child's fourth year, at any rate, the mother should be *chained* to her child, and she should be debarred from any work away from home for at least three months after childbirth.

In place of the Infants' Department of the Elementary Schools, it would be much better to institute Communal Nurseries for children from three to six years of age. These nurseries would be managed by lieutenant-mothers, and not by schoolmistresses, and they could be utilised for teaching the bigger girls in the elementary schools, how to manage young children; how to keep them clean; how to feed them; and how to play with them. Thus the older children would learn how to suspect infectious diseases, and the advantages of isolating a patient till the doctor could give a name to the disease. They would see everyone clean in a clean house. They would learn that ringworm and lice were not diseases of the spring and autumn, and that properly treated at an early stage they could be cured without the concurrence of eczema and other complications. Costly buildings would not be necessary, as communal nurseries should be of small size and restricted to numbers that could be accommodated in a fair-sized house. In ordinary rooms lessons of household management, ventilation, warming, and so on would be so much more practical and home-like.

Infectious diseases, if recognized early, are much more amenable to isolation and treatment than is generally supposed. It is the exception rather than the rule to see disease spread, when ordinary precautions are taken, even in a six-roomed villa. It is the aggregation of patients that makes hospitals so difficult to manage. In small communal nurseries a case should be diagnosed early, and could be isolated in an upper room for treatment without danger to others. This may seem optimistic, but it is done every day in small villas in my own district without disaster.

At six years of age the children would leave the nurseries and would go to school as at present, but careful supervision should be given to their physical development. A specially-trained medical man should be given the charge of groups of schools and nurseries, and he should not only examine the eyesight and hearing, but should superintend physical exercise and keep records of growth and development; these would interest the children, and give them a zest to

self-improvement. Under such a system the effect of treatment upon growth could be accurately gauged, and delicate and backward children could be specially cared for so as to increase their chest capacity and favour general development.

To get the full value out of the child he must be properly fed and adequately clothed, and it does not seem impossible to devise some arrangement of teaching by which wholesome, cheap food might be given to children, prepared by the older girls as part of their educational course. The same system might be carried out also in regard to clothing. In other countries children are fed and clothed, and the heavens do not fall, and I doubt whether the future Briton would have less self-reliance because his school-fellows cooked his dinner and made his clothes instead of his mother. It is quite certain that the boys of Christ's Hospital and similar charitable foundations have never been proved less self-reliant, less efficient, or less enduring than those whose education has been paid for by their parents.

If the parent has his moral tone lowered by seeing his children made healthy by the State, it really doesn't matter. Such a parent could never be improved by the most severe individualistic treatment, and his moral welfare may safely be neglected if the future man or woman can be brought to a higher physical standard than at present. Give every child equality of opportunity. The State should not be asked to go beyond that, but the under-fed and poorly-clad child has not equality of opportunity in the educational course against those who are well cared for and nourished.

At thirteen the child can leave school in this country. That such should be the case is no credit to us, but a large number of parents want to make money out of their children's undeveloped bodies, and as the politician wants the parent's vote, he declines to interfere with parental authority. We also permit a system of minor torture to half-timers. These unfortunate little wretches, having earned a few pence for their parents to spend in the gin palace, are sent drowsy and tired to the schoolroom to make a pretence at learning. There is no reason why people shouldn't drink in moderation if they can afford it, but the ordinary man earning a weekly wage has not enough money to buy liquor unless he drinks at the expense of his child. Moderate drinking may in this way affect the young people, by depriving them of the nourishment necessary for full physical development. Men and women can exist without stimulants with much less danger to our empire, than is caused by setting children to work for a living before the body is ready to bear the strain.

Well-to-do children are kept at school till the age of eighteen, exercising and training their bodies as well as their minds. Eighteen

is the youngest age at which it can be said the human body is a finished machine, but if we could go on improving the bodies of the workers up to sixteen we should be making great progress. We should then have fewer breakdowns in young men, and consequently fewer recruits to swell the ranks of casual labour, and we might hope to hear no more of the cry "too old at forty," an age at which the professional man is in his prime.

Up to thirteen or fourteen years of age physical development is fairly good; it is after these ages that the children who remain at school reap the advantage of their better surroundings. The average chest girth at eighteen years is 34.19 inches, but the average amongst athletic freshmen at the University is 39 inches. The latter figure is none too high for naval or military requirements, and colonial life is quite as exacting.

Vast places in the tropics are being opened up for our sons. We are beginning a great campaign against tropical disease and are confidently looking forward to a glorious victory. We are now skirmishing with drainage works, and pouring petroleum films over the pools where the mosquito breeds. We have found how out malaria is spread, and "anopheles," the carrier of disease, is being disturbed from the dark and shady places of West African ports, and soon the campaign will be carried inland. In the West Indies we shall drive out "culex," the carrier of yellow fever, whilst in other regions scientific workers may lead the way to even greater triumphs. Thus more and more land will be opened up, and larger numbers of virile men will be wanted to do the work. A constant supply of these men of good physique is one of the requirements of the future, and must be prepared for. As has been shown, the birth-rate is decreasing owing to the decrease in the size of families. This is due to social causes, amongst others the later age at which marriage takes place.

MINORS IN MARRIAGE.

		Husbands	Wives
1871-75		81.6	223.2
1901		51	163

per 1,000 marriages.

It would seem, then, that if the needs of the empire for well-developed men and women are to be fulfilled, something must be done to make good the waste that goes on amongst us. We must save the babies who die before reaching their first birthday, and we must endeavour to avoid the waste that goes on through the child's career to manhood. There is not merely a waste from death and impairment of health by infectious diseases, but an actual monetary loss through absences from school. The State spends 1s. 2d. weekly

for each scholar upon education.* 107,315 cases of infectious diseases were notified in 1900. If two-thirds were at school-age and stayed away four weeks whilst ill, the illness entailed a direct waste of £15,000 of money provided by the taxpayers. Facts of this kind appeal more directly to people than the estimated value of a man's work to the social economy, and the loss he suffers from an impaired constitution arising from the attacks of disease and from slum life. This impaired constitution renders the individual less resistant to the attacks of disease such as phthisis and tuberculosis. In London alone (1901) the deaths from phthisis numbered 7,735, and pneumonia, bronchitis, and diseases of the circulatory system each account for about an equal number of deaths.

AGES OF PHTHISIS DEATHS.					
		Males.		Females.	
Under	years	1890-99	1900	1890-99	1900
5	"	445	350	392	298
5	"	178	181	239	198
10	"	289	184	504	417
15	"	1018	876	1829	1059
20	"	1968	1908	1674	1405
25	"	2494	2855	2064	1811
35	"	3241	3278	2241	2088
45	"	3280	3440	1698	1598
55	"	2703	2888	1296	1216
65	"	1578	1587	811	840
75 and upward		571	591	368	373

In our workhouse infirmaries about one in sixteen of the admissions are for phthisis, and about one in seven of the deaths. This means for the whole of the United Kingdom at least 65,000 admissions and 7,000 deaths from this preventable disease alone. These and many other diseases are less likely to carry off the fit than the unfit. When you see strong, healthy-looking men carried off by pneumonia, enquiry usually shows that the patient was neither a teetotaller nor a moderate drinker. In young fellows possessing a fine physique it is often sufficient to stir up pride in a man's strength, in order to keep them from the immoderate use of alcohol or tobacco, as both these sensuous poisons have an impairing effect upon an athlete's condition, and he loses form.

It must then be admitted that there is an enormous economic waste; that each child has cost a large sum to bring to maturity; and every death of an individual before he has done the amount of work necessary to pay back the capital and interest on his upbringing must be a direct loss to the State.

This state of things can hardly be described as exaggerated, and it therefore devolves upon the statesman to make suggestions for its

* Probably much more under the new Act.

improvement. In a democratic State every voter should be a statesman so far as to think out such problems as these for himself, and if he has views it is his duty to place them before those in a position to bring forward legislative measures.

In order that we should bring every member of the empire to as near physical perfection as possible, I venture to put forward three rules that must be obeyed both in letter and in spirit:—

1. Every mother during her years of child-bearing must be placed in such circumstances that she has no need to do any work beyond the duties of her own household.

2. Following on this, every man worker must be in receipt of sufficient wages to keep his wife and family without calling on them for assistance.

3. Every child must be kept clean, well fed, well clothed, and in healthy surroundings, if possible up to the age of eighteen years, but, at least, of fifteen years.

It is, of course, impossible to carry all these counsels of perfection into effect at once. The disturbance to trade would be enormous and the cost prohibitive. The present wave of imperialism, however, seems to suggest an opportunity for making a beginning in a small way with No. 3 for a limited number of boys, and as soon as the success of the experiment became evident, the nation would realize the true economy of not working the human machine till it was finished in every part and firmly fitted on its bed-plate of sound physique.

What I would suggest is that a certain number of boys at thirteen or fourteen years should be taken from every elementary school and brought up under healthy conditions free of cost to their parents, on the condition that they should give a certain number of years' service to the State as seamen, stokers, and soldiers. In this way we should be able to fill up the deficient stoker rating in the Navy, and make our Army corps actualities instead of visionary paper schemes.

The expansion of the scheme would result in something like an easy form of general military service, and would render us invulnerable in the arts of peace as well as against the invader, for the better a man's physical development, and the greater his manual training, the better would be his work and the greater his output.

At the present moment we are building sanatoria on the wild hillsides to cure people who have become ill because they have not lived sufficiently in the open air. Surely it would be wiser and cheaper to take the young people out of the crowded towns, away from the workshop and the mine, and bring them up in the open air; to make their bodies resistant against disease, instead of trying to cure them when attacked by disease.

In every district there are tracts of land hardly capable of profitable cultivation, to which it would be possible to bring a supply of pure water at small cost. On such hill sides certain appointed leaders should pitch their tents every year in early summer, taking with them companies of boys, and there, teacher and boys should set to work and build up permanent shelters as protections from rain and wind. By the autumn substantial buildings could be erected in which the boys, sheltered from the winter weather, warmly clad and well-fed, would be placed under conditions for developing their powers of resistance against disease, similar to those which are now found sufficient, not only to provide patients with resistant force against further attacks, but with expelling force to drive out disease already established in the system.

Let us treat the young machine whilst it is being built up, with that care and attention which we now give to repairs, and the final consignment to nature's dust heap. We lavish money on hospitals, infirmaries, and funerals; why not on keeping people alive and well? I doubt whether the motto of prevention better than cure is a favourite one with the public, for the advertisement columns tell us daily that the people must spend millions on trying to cure themselves. Latterly I have noticed a hopeful sign. Physical culture appears side by side with curative beans. Your muscles can be developed by correspondence as readily as your ailments can be cured by coloured pills. The physical culture systems do not seem to be other than good in themselves, but they are inexplicably mixed up with vegetarianism, anti-vaccination, and similar fads. The quack is in competition with the Medical Officer of Health, instead of with the physicians, and the health officers are largely to blame.

If physical improvement is not in the Public Health Act it ought to be put there. The general public never asked for improved drainage and removal of nuisances. The ordinary householder sits patiently and suffers anything, for fear that if he grumbles, either his rates or his rent will go up, and sometimes both. It is for those who know and understand to agitate and get people made better by Act of Parliament, for Acts of Parliament are more useful than the ordinary individualistic scoffer will admit. It should be our business to see that the tissues of every Briton should become more resistant to the perpetual bombardment of the tubercle and other noxious bacilli, than the best nickelled steel plate has ever proved itself against modern scientific artillery fire. We think too much about turning out the bacillus when it has become well lodged in the system, whereas that is the physician's business. The business of the Health Officer is to keep the bacillus out of the system altogether.

It is not intended in these health camps to train soldiers, but merely to prepare boys for the military to turn into soldiers in the shortest possible time. The training would develop in the lads many of those qualities that have been brought so prominently before our notice in the Boers in South Africa. They would in addition to the appreciation of natural phenomena, learn the accomplishments of country life; they would find out that the position of every leaf and twig may tell something to those capable of reading nature's book. As time went on they would learn to build houses, to make roads, to bring land under cultivation, to garden, and to judge distance. In such camps boys would be taken away from the vice and misery of the slum, and under judicious leadership the boys should be so taught that they would learn to be men. By camping out on the hillside and building for themselves, the system should be almost self-supporting. The only loss should be the loss of the boys' labour, and the labour of an imperfect machine cannot give economical work, except under intelligent supervision.

By beginning in this small way the effect upon trade would probably be a steadying and not an upsetting one. For many years these trained youths would go into the Army and Navy, and probably settle down in the colonies, and it would only be when this system came into general use that any effect upon trade would be felt, and as that effect would be the advent of more efficient labourers to the market, ill effects are hardly to be anticipated.

Supposing even these small beginnings to be impossible, a beginning might be made with a special class.

There are a great number of unruly boys and truants to whom this system would be a god-send, as they could be placed under good conditions and removed from the damaging influence of parents incapable of performing the duties of parentage.

These camps would provide an improved kind of public school life for the children of poor parents, where they would have an opportunity for their full physical development impossible in the workshops, the mines, or the streets. Their food would be cheap and plain, but nourishing, and their clothing simple but warm. In the preparation of food and clothes there would be an opening for girls who might be selected for training under similar conditions, and so help the institutions to be self supporting. Long holidays should not be given. Many people think they are the chief blot on our public school system, and merely perpetuated for the benefit of the teachers. Boys forget what they have learnt, and in many cases are hard put to it for employment. All that boys and girls really want is organized recreation, with an occasional short holiday for complete rest. In order to popularize

the camps the boys would be brought into the towns to compete in sports or to go through exercises on the parade ground. In this way other boys would see the greater physical development of the camp fellows, and the effect upon boys and parents would be very good. In this country we admire strength and love sports of all kinds, and any scheme that will improve our strength and increase our skill in sports is bound to be popular with the people at large. Much of the drunkenness and vice which everyone deplores, and which so many pretend to believe is inevitable, is really the result of imperfect physical development.

In a really well-ordered state premiums would be offered to the patriotic parent who brought up his children to be perfect citizens. For every child reaching a certain standard of physical health parents have denied themselves much, and given time and thought to achieve the result, yet the State gives them no more recognition than it gives the careless, the foolish, and the worthless, who in middle life have families fit only for the sanatorium, and only their wrecked selves to offer for the service of the State. Why should not the parent bringing up a child to adult perfection be given a remission of taxation for a year! In bringing up his family he has paid for better food, greater air space, and higher education, and why should he be treated in the same way as the careless liver, or the selfish bachelor, who contributes no effective units towards the continuance of the Empire.

Amongst the working classes well-ordered devotion to children is a great virtue. When the workman, handicapped by his imperfect development, comes home over-tired, it is a great temptation to escape from the worry of noisy children to the comfort of the inn or the club; but in a nation of athletes the workmen would have learnt that drinking would soon take the athleticism out of them, and they would demand airy dwellings where family life would be possible with comfort. An airy workroom, and air-space round his home for healthy exercise where he could train his children in the games and exercises necessary for their development into athletes, would be the minimum of his demands.

Garden cities would naturally absorb much country around towns, but such places need not be the depressing areas many suburban districts have become under the individualistic invasion of the jerry builder.

There would be a levelling up and a levelling down in society. The rich would lose some of what they now consider their pleasures, but hunting and sports demand a good physique, and if the rich will not bring up large families of fully developed men and women for the work of the Empire, they must pay for pleasure in other ways. As our

Empire has expanded people have grown richer, and have become accustomed to pleasures their ancestors never dreamed of, and now the time has come for something to be sacrificed to maintain that empire, unless it is to decay as other empires have decayed in the past. Our colonies are turning out men of fine physique, and we can turn out men just as good if we determine to organize our forces, and make it the duty and pride of every town in the land to strive with its neighbour for that physical glory which, kept within bounds, conduces to that morality without which no empire can endure.

ANTHROPOMETRIC SURVEY.—Professor D. J. Cunningham, the President, and Mr. J. Gray, the Secretary of the Anthropometric Committee of the British Association, recently laid a scheme before the Physical Deterioration Committee, now sitting at the Privy Council Office. They pointed out that there are at present no satisfactory data with regard to the height, weight, and other physical conditions of the children of this country. The Council of the Royal College of Surgeons has now expressed its opinion that the adoption by Government of a scheme for an anthropometric survey of the United Kingdom, such as that proposed by Professor Cunningham, would be well calculated to elicit those facts, a knowledge of which is essential to the formation of any sound opinion as to the physical improvement or deterioration of the race. It is, however, important that the enquiries should become part of a regular permanent system.

DUST COLLECTING IN GERMANY.—It seems that the cholera epidemic of 1892 was a blessing in disguise to Germany, for it set people to devising better methods of collecting dust and other refuse which might convey the germs of infection, and in consequence this is a part of municipal work which is now better done in Germany than in England. The municipal regulations of Berlin insist that refuse, ashes, and all that is generally though inaccurately summarized by the term "dust" should be carried through the streets in air-tight receptacles. This has set ingenuity to work in the inventing of both dust-bins and dust-carts, and by means of suitable arrangements in the latter, it has been found possible to take away household refuse without defiling the streets with either the offensive smells or the infectious dust from which we suffer here. More perfect than any dust-cart is the "substitution system." By this plan each householder has two dustbins, of which, however, only one is in his actual possession at a time. This, when full, is carried away bodily in the dust-cart, in which has been brought back the empty one for use until the cart calls again. The disadvantage of this otherwise admirable system is that the extra weight and bulk of the dustbins involves the employment of a larger number of carts than would otherwise be necessary. To avoid this trouble, bags have been used instead of bins. These bags are made of asbestos, to avoid any risk of burning from hot cinders. Unfortunately they are not only expensive, but soon wear out. However, if motor instead of horse traction were used the objection both to the substitution system and to the employment of heavy but air-tight dust-carts might be to some extent obviated. In any case, the attempt of the German authorities to improve methods of dust removal is a thing which our municipalities might do well to study and to imitate.—*The Hospital*, Feb. 13th, 1904.

MEDICAL OFFICERS OF HEALTH AND ELEMENTARY SCHOOLS.*

By J. H. CROCKER, M.D., D.P.H.,
Medical Officer of Health, Borough of Richmond, (Surrey).

As Medical Officer of Health for this Borough I am desirous that the Education Committee should consider the question of appointing a Medical Officer for the inspection of scholars attending the Elementary Schools, and for the performance of other duties in connection with the Education Act of 1902.

My views on the advisability of such an appointment were expressed in the Annual Report of the Medical Officer of Health for Richmond, 1901. That Report was written before the new Act of Parliament was considered, and some doubts as to the legal position therein expressed have been removed by the Act of 1902.

Briefly put, the statements referred to were to the effect that as children are compelled to attend elementary schools, reasonable precautions should be taken to ensure that infectious cases are excluded from such schools. In the past, where the schools have been "voluntary," the School Attendance Committee of a local authority, whilst compelling children to attend such schools, have had no powers for the medical inspection of scholars, and the managers of the schools considered they had fulfilled their duties by complying with the requirements of the Board of Education. The result of this was that the teachers had no authority to obtain a medical opinion as to the condition of any child whom they may have suspected was suffering from an infectious or contagious complaint whilst attending school.

The position of the Medical Officer of Health as regards these schools has not been altered by the Act of 1902, and his powers are as follows:—

1. With the consent of two members of the Corporation he can close a school, where he considers such a procedure would tend to prevent the spread of infectious disease.
2. He can exclude any scholar for a similar reason.

The latter means that where he is informed by notification or otherwise that a child is suffering from some infectious disease, this child, together with any other scholars of the household, can be excluded from school for a certain period. It is not the duty of the Medical Officer of Health to inspect or examine any of the children, and therefore he cannot act in this matter until receiving a notification.

* A report presented to the Richmond Education Committee.

It is evident that prompt action in dealing with the first cases may often avoid the more serious consequence of closure of the whole school, but heretofore the Medical Officer of Health has experienced great difficulty in obtaining the information necessary.

The following is an example of the benefit of medical inspection of scholars. Last year several cases of scarlet fever were notified about the same period, and upon investigation many of these patients were found to be scholars of one elementary school. Information was sent to the head teacher, and a suggestion made to him that he should inspect the children as to whether any of them were "peeling" about the hands or neck, but, notwithstanding this, other cases kept arising in connection with this school. The Medical Officer of Health then visited the school, and, with the consent of the managers, inspected the children. He discovered one child had been at home for a week some time previously, supposed to have had a cold and sore throat. The Medical Officer of Health interviewed the mother of the child, and concluded that the child had really been suffering from a mild attack of scarlet fever. The child was isolated, and as a result no other cases arose in connection with the scholars of that school, and thus the closure of the school was avoided. I would point out that the procedure described above is no part of the duty of the Medical Officer of Health, and, strictly speaking, his legal position under the circumstances was to close the school.

On several occasions the Medical Officer of Health has inspected the children in various schools, at the request of the managers, with beneficial results, as described in the Annual Reports, 1901 and 1902.

Many of the teachers of the various schools have complained to the Medical Officer of Health of the unsatisfactory position they are in if they notice a scholar is ailing. In the event of the child being sent home, in many instances no medical man is called in, and they have to re-admit the child to school without any medical certificate.

From conversation with various managers and teachers of the elementary schools, I am convinced they would appreciate any arrangement by which they could have a medical opinion under such circumstances, and would readily acquiesce in the periodic inspection of the scholars.

In addition to the diseases scheduled under the Infectious Diseases (Notification) Act, which must legally be notified to the Medical Officer of Health by the parents or medical practitioner, there are other non-notifiable diseases which may assume an epidemic character and thus lead to closure of a school, such as measles, whooping cough, chicken-pox, mumps, ringworm, ophthalmia, scabies, etc.

By inspection of scholars a medical man can often recognize whether

a child is suffering from far, or near-sightedness, a condition of the eyes which, if treated at an early age, can be remedied by spectacles, but if neglected may lead to irremediable consequences.

A hint from the teacher that a scholar is backward in his lessons may lead to the discovery that the child is intellectually deficient, which may necessitate his being sent to a special school under the Defective and Epileptic Children's Act, the administration of which is now thrown upon the Education Committee.

Where no medical practitioner is in attendance upon a scholar reported to the Attendance Officer as being absent through sickness, or affected with some infectious or contagious complaint, the Medical Officer of Schools could visit the home and give advice as to when the child would be in a fit condition to resume school duties.

The above matters are intimately connected with the public health, and such inspections as suggested can be carried out with a minimum of interference with the school lessons, by a mutual arrangement between the teachers and Medical Officer of Schools.

There are other matters, not connected with public health, in which a Medical Officer would be of service to the Education Committee, and no doubt your legal adviser will direct your attention to them.

Several Education Authorities have already appointed Medical Officers, amongst them being Croydon and Dorking in this county. The Education Committee of the County (Surrey) has also made arrangements in many places for the visiting of scholars at their homes, and are making arrangements for the inspection of scholars at the schools.

At Croydon, where one-third of the schools are "non-provided," the following is a list of the duties of the Medical Officer of Schools as adopted by the Education Committee this year. These duties extend to the non-provided schools as well as to the provided ones.

(a) To visit each school at least once a year, and report in writing as to the sanitary condition of the premises and the general health of the scholars, and to attend, when required, any meetings of the Education Committees or Sub-Committees.

(b) To examine blind, deaf, and defective children; to decide whether they are suitable cases to be dealt with under the Act, and to give the necessary certificates (? Blind and Deaf Children Act).

(c) When required, to examine any plans for new buildings or alteration of existing buildings, and to report as to their sanitary arrangements, ventilation, lighting, etc.

(d) When required by the Committee, to examine medically all candidates selected for appointment under the Committee, pupil teachers or employees, and to make out certificates.

(e) To examine truant children before their dispatch to truant schools.

(f) To visit, when required by the Committee, any employee who is absent from duty on account of illness, and to report in writing.

(g) To examine, when required by the Committee, any child who is stated to be physically unfit to attend school, and to make out a certificate.

(h) To give the Committee the benefit of his advice on special occasions when required.

In addition to the Medical Officer, the Education Committee at Croydon have appointed an Ophthalmic Surgeon to examine the eyes of the scholars.

The list of duties prescribed by the County Borough of Salford is somewhat similar to the above, but contains in addition the following:

1. To examine any children in the Borough reported to the Committee to be defective or feeble-minded, and to decide whether they shall be instructed at a special centre.

2. To advise the Committee as to the course of study, etc., of the children at the centres for defective children (Note—Not applicable to Richmond).

7. To make arrangements for the periodical examination of the eyesight and hearing (and if thought desirable, of the teeth) of the children in schools.

In the exercise of these duties the Medical Officer himself is responsible to, and will take his instructions from the Education Committee or its Sub-Committee, and will make his reports to such Committee.

SMOKE ABATEMENT.—The city council of Philadelphia has approved an ordinance to abate the soft coal smoke nuisance. This also provides that no sulphurous fumes or noxious odours shall be permitted to escape from any chimney or smoke-stack within the city limits. A penalty of \$50 is fixed for each violation. The question of legality is to be determined by smoked glass of such a degree of darkness that any smoke visible through the glass is of illegal darkness in colour.

IMMIGRATION AND TUBERCULOSIS.—Hy. Shively points out (*New York Med. Jour.*, Feb. 7, 1903) the undesirable character of many immigrants into the United States as regards disease, especially those that smuggle themselves through from Canada. He remarks that the Jews, who are said to be specially immune to tuberculosis, are not showing their immunity among the immigrants in New York. The immigrant Jew generally follows an unhealthy, sedentary occupation, and this also favours the spread of consumption. Other nationalities, of course, are undesirable in the same way. He thinks the privilege of American citizenship is too cheap, and there should be quarantine against tuberculosis.

THE TUBERCULOSIS (ANIMALS) COMPENSATION BILL.*

By ANDREW J. LAIRD, M.D., D.P.H.,
Medical Officer of Health, Borough of Crewe.

THE Tuberculosis (Animals) Compensation Bill, which as you are aware is to be introduced during the present session of Parliament, is being promoted in order to provide for payment of compensation to the owners of carcasses of animals condemned after slaughter, and destroyed by order of a magistrate on account of tuberculosis.

It is backed by ten members of Parliament, and 120 other members have definitely promised it their support in the House of Commons.

The Bill has been framed to some extent upon the lines suggested in the recommendation of the Chairman and other two members of the Royal Commission, who in their Memorandum which was issued along with the Report, dissociated themselves from their colleagues on the question of compensation. Its main provisions are :—

1. Where a tuberculous carcass has been destroyed by order of a magistrate the owner shall be fully compensated for such loss, when before slaughter the animal was apparently in a sound and healthy condition.

2. Compensation shall be paid by the Council of the County or County Borough within which the animal is slaughtered.

3. The Board of Agriculture shall fix by order from time to time the minimum and maximum prices within which compensation shall be paid.

An endeavour is being made to obtain for this Bill the support of local authorities, who are being asked to pass resolutions in its favour.

The trades concerned seem to be fully alive to the benefits which they would derive from the passing of such a measure, and it now seems an opportune time for us to consider whether any benefit would accrue to the public. I would therefore ask you to consider :—

1. Whether in the interest of public health such compensation as is proposed is desirable.

2. If considered desirable, by whom should such compensation be paid, and

3. To what extent should compensation be paid.

I.—The principal argument in favour of compensation is that whatever is done for the public good should be paid for by public money.

* Read at meeting of the North Western Branch Feb. 19 1904.

In favour of this view it may be said that butchers will more readily co-operate with local authorities in the matter of meat inspection, and that even in private slaughter-houses animals will be slaughtered under conditions which will ensure their inspection. It is not at present compulsory for owners of cattle which shown signs of tuberculosis to take any steps to confirm their suspicion or to notify the Local Authority of the existence of such disease. Undoubtedly the public would benefit by such notification, but the Bill is not primarily intended for the protection of the public; it is for the benefit of the meat trade, and also of farmers. Why therefore should they not also pay for their share of the benefits? This is already done in many towns, chiefly by a system of mutual insurance, a certain sum being paid on the purchase price. In Paisley, for example, I believe that the auctioneer in the public market collects a small sum both from purchaser and seller and contributes a like amount himself, the amount being, I think, 6d. each for a bullock and 1s. each for a cow, and in the case of a carcass being seized he pays to the purchaser three-fourths of the purchase money. Some such system of mutual insurance has also worked very well in Newcastle, Carlisle, and in other towns. There is, it must be admitted, some hardship entailed when a carcass is seized, when a good price has been paid for an animal exhibiting no signs of disease; but on the other hand this is an issue which butchers must always have in mind, and to be fully compensated for a risk incidental to the trade, and for not being allowed to sell what may be valueless and dangerous to health, out of local rates, removes both from the seller and purchaser a wholesome stimulus to greater effort in the prevention of tuberculosis.

In his evidence before the Royal Commission the Secretary of the Board of Agriculture said: "My own view is that as a matter of fact the risk of seizure is a trade risk which is taken into account by all concerned, and I should be sorry to admit that because the seizure is made from the butcher, therefore the butcher is the man who bears the loss, and that the farmer does not bear it."

Full compensation would almost certainly increase the number of seizures, but would not by any means tend to decrease the amount of tuberculosis in cattle. It would become a matter of indifference to a farmer whether his cattle became tuberculous, and might even lead to profit.

There is also a certain danger of creating a speculative trade in the poorer grades of cattle, on the chance that they may be free from disease, or that by careful trimming they may escape detection. These will then be sold at the same price as meat for which a fair sum has been paid. I do not insinuate anything against the butchers'

trade, but there are black sheep in it as in every other trade or profession. Such a business could be carried on with profit and in comparative safety, for the seizure of the carcase would entail no loss, provided the price paid (or said to have been paid) did not go below a certain minimum.

II.—Compensation is to be paid by the Councils of Counties or County Boroughs in which the animals are slaughtered. Cities and towns with large markets will therefore pay a very large proportion of the compensation, while the district from which the animals come will escape any such burden. We know that tuberculosis is a preventable disease, and there is no reason why Local Authorities should not insist upon cattle breeders and dairy farmers taking every precaution to eliminate the disease from their herds or to prevent its introduction. This can be done by more stringent observance of the lighting, ventilation, and cleanliness of cowsheds, by frequent veterinary inspection, and by the use of the tuberculin test. To prevent any element of unfairness in apportioning compensation, the basis should be a much larger one, and should, I think, be provided by Government. In the Memorandum of the Minority of the Royal Commission on Tuberculosis it is stated that "ten witnesses advocated compensation from Imperial funds, six out of local rates, and one a division of the burden."

III.—The Bill provides for compensation to the extent of the full value of the animal, provided the price given is within certain limits to be fixed by the Board of Agriculture, and the amount to be paid is to be determined by the magistrate ordering the destruction of the carcase. It would seem from this that butchers are willing to reap the full benefit to be derived from such compensation, and are not by any means so willing to contribute towards the fund from which compensation is to be derived. Difficulties created by farmers or butchers who refuse to contribute to an insurance fund seem to be not insurmountable. The success of the system in Newcastle, Paisley, and other towns is proof of this.

The proportion of the value fixed by Government is said in Belgium to be one-half the value, and in Australia I have been informed one-fourth of the value is paid.

In the Crewe district members of the Butchers' Association pay a small sum for each animal bought into a common fund, and from this one-half the purchase price is paid for any carcase condemned. To pay full compensation would entirely relieve the person whose fault, neglect, or ignorance contributes to the occurrence of disease in his herd, and would also remove any stimulus for butchers to deal only in the better class of cattle and with men whose interest is known to be the breeding of tubercle-free cattle.

Tuberculosis is a preventable disease, and agriculturists do not seem to be exerting themselves as strongly as they might to eradicate it. Good would undoubtedly result from some system of compensation, but the fund from which the money is to be derived should, I think, be a mutual insurance fund raised by contribution from both seller and buyer, and should be augmented by an imperial grant.

The Bill is open to criticism in other respects, such for example as the omission of any mention of voluntary surrender, partial seizures, etc.

From the evidence given by Mr. Elliot, then Secretary to the Board of Agriculture, before the Royal Commission on Tuberculosis, it would seem that the grievance which the Bill is expected to remedy is not of any great magnitude, and it was stated by the same witness that it is for experts in the "administration of the Public Health Acts to state whether it (compensation) would be practicable, and whether it would be of any advantage in the interests of the public health to give persons inadvertently becoming possessed of tuberculous carcasses unfit for sale as food, some measure of relief for their loss."

"Dr. J. F. J. Sykes, Medical Officer of Health for the Metropolitan Borough of St. Pancras, has been nominated for the office of President of the Society for 1904-5."

DERMATITIS COCCIDIODES.—Though the moulds so commonly found in jams, ink, etc., are harmless, there are others which are far from being so, and among them is the producer of a remarkable disease, of which happily only six cases have so far been recorded. In 1890 Wernicke reported in the *Centralblatt für Bakteriologie* a case in which a skin affection resembling *Mycosis fungoides* was combined with rapid and fatal internal ulceration, which he attributed to coccidia. This occurred in South America, but in 1896 Rixford and Gilchrist reported a similar case from California. They also attributed the case to a Protozoan—*Coccidioides immitis pyogenes*. In the following year Posadas found a like case in South America which he described as "infectious generalized Psorospermiosis." In 1900 Ophiels and Moffit recorded a second Californian case in the *Philadelphia Medical Journal*, and expressed an opinion that the germ was not a Protozoan, but "a new pathogenic mould." Since then Dr. Montgomery has examined and described two cases of the disease in North America, and sent cultures of the microbe and sections of the diseased parts to Berlin, where they were examined in the University laboratory by Dr. Cohn. His results are published in the *Hygienische Rundschau* (2). He finds that the germ is undoubtedly a mould which causes fatal results with production of "nodules" and abscesses in guinea-pigs, mice, and rabbits. Nearly all the persons affected were connected with woods or wood-cutting, and the author considers that the infection probably has its origin in a mould growing on rotten wood, though happily one of a very rare kind.—*Medical Magazine*, March, 1904.

TYPHUS FEVER IN BERMONDSEY.*

By R. K. BROWN, M.D., D.P.H.,
Medical Officer of Health for the Borough of Bermondsey.

BERMONDSEY, and what were originally the neighbouring Vestries and Districts, have always been liable to outbreaks of typhus fever.

The latest occurred in 1899, in connection with houses in Minto and Western Streets, and amounted to ten cases, nine of which belonged to Bermondsey. Special reference to this and other outbreaks in London since then will be found in the Annual Reports of the Medical Officer of the London County Council for this and subsequent years.

Only one case occurred in Bermondsey since 1899, viz., in Rothsay Street, at the south-west end of the Borough, till the outbreak of which this paper is a record commenced in January, 1903. For convenience I have tabulated all the cases which occurred, with short notes of the source of infection, etc., in the last column. I shall refer to the cases by their numbers in column 1. I also append a temperature chart to illustrate my remarks on the course of the disease. For the notes on which these are based I am indebted to the Medical Superintendents of the South Eastern and Brook Hospitals, where the cases were treated.

CASE 1 occurred on January 20th, 1903, in Jamaica Road, at a fish shop, close to the neighbourhood where the majority of the cases occurred, but I was unable to discover any connection between this and the subsequent cases, since a cross-examination of the patients and their friends failed to elicit that there had been any dealings between them and the occupiers of the shop where the first case occurred. The patient was a fish porter, and may have contracted the disease at Billingsgate.

CASE 2 occurred fourteen days later, on February 4th, in Stevens Street, about a mile and a quarter from the first one. There was no traceable connection between the two. I wrote to the Medical Officer of Health for the City of London, where the lad worked, but he could suggest no source of infection. In both these cases the families were clean, in good circumstances, and not over-crowded.

CASE 3 occurred on February 22nd, after an interval of eighteen days from the last case, in Warford Place, quite close to Case 1, though the connection, if any, could not be traced. This patient before removal was seen by several doctors, one of whom was an old resident in one of the M. A. B. Hospitals. This gentleman informed me that

* Read at the meeting of the Metropolitan Branch.

the rash was scarlatiniform, and so like scarlet fever, that he made up his mind to discard the history of the late appearance of the rash, and notify it as scarlet fever. She was removed to hospital on February 28th, and died on March 8th. The diagnosis of scarlet fever was not confirmed, but typhus was suspected, though the evidence of its existence (viz., "so very faint a rash that a positive diagnosis was out of the question"), as stated by the medical superintendent was very slight, and the *post-mortem* showed only pneumonia.

Cases 1 and 2 seem to have been sporadic and accidental, since beyond the fact that Case 1 occurred in the neighbourhood of Case 3, there seems no other ground for suggestion of a connection between them and the subsequent cases.

CASE 4 was a little girl of nine years; she fell ill on March 3rd, nine days after the last. Her residence was about three quarters of a mile from Cases 1 and 3, and the only thing in common between her and the last was that they attended the same school, which was situated about midway between their homes. Case 3 was at school during the early stage of her attack, for the teacher described her as "sitting shivering by the fire, and vomiting once or twice." They were not in the same class, but had opportunities of meeting out of class hours in the play-ground and class-rooms.

CASE 5 is not so clear; she fell ill five days after the last, viz. on March 8th. She was married, and lived in a small street just round the corner—certainly not more than fifty yards—from case 4. This latter occurred in an annexe to a beer-house, with which it communicated directly, where Case 5 frequently went for beer. Her children went to a different school from the last two cases, and situated in a different direction, but do not seem to have been personally acquainted with Case 4, though owing to the proximity of their respective houses I do not see how they could have failed to play with one another occasionally in the street, without necessarily knowing one another's names. The onset of the illness in this case was so close, in point of time, to that of Case 4, that unless a very short incubation period is assumed, it seems difficult to establish a direct connection.

CASES 6 and 7 were sisters, and CASE 8 a brother of Case 3, and arose from her by direct contagion, twenty days after her removal to hospital, proving that Case 3 was typhus.

CASE 9 was brother to the last three, and was infected directly by them after an incubation period of about a fortnight.

CASE 10 was a very well-marked typical one, but presents great difficulties as to its origin; she fell ill on March 29th, nine days after Cases 6, 7 and 8, and twenty days after Case 5. It occurred in one of the best residential houses in the Borough. Her friends were

well-to-do. The patient assisted her mother in house work, had not been visiting anywhere the previous month, and had only occasionally gone into the street, and then not in the immediate neighbourhood of the previous cases. The house is in the main road, and about a quarter of a mile from Warford Place, where Cases 3, 6, 7, and 8 occurred. Her father and brothers, however, have a wood-yard at the back of, but not communicating directly with Warford Place, and her sister, who had had influenza a couple of weeks before *she* developed typhus, and was attended by the medical man who notified the latter, did office work in this yard. I was informed that none of the inhabitants of 14, Warford Place had worked in this wood-yard during the last ten years, and that the sister who worked in the office did not come in contact with the hands except when paying them once a week through a small window.

CASE 11 occurred on March 31st. In this case children from the same house and family attended the Paradise Street school, in connection with which were cases 3, 5, 6 and 7. An illness in a young brother of this patient, which occurred between March 16th and 21st, may possibly have been the connecting link between this and the other cases which attended the school.

CASE 12 occurred on April 1st in a street in the same neighbourhood, but the only traceable connection with previous ones was that a sister and young brother attended the Paradise Street School, there being in addition a history of the young brother having been ill on or about March 6th with diarrhoea.

The remaining cases require no special comment, since they were all infected directly by the cases mentioned above. In all the seventeen cases, with the exception of 1, 2, 5, and 10, the only meeting-place common to all where they might have acquired infection was the St. Joseph's Schools, Paradise Street. Of the thirteen cases which had this school in common, eleven were scholars, and the remaining cases, 11 and 12 in the table, though they did not attend the school, had brothers or sisters who did, and in both cases there was a history of some indefinite illness among these scholars previous to the case of typhus. It is hard to ascertain the nature of the illnesses in the members of the families of 10, 11, and 12, which preceded the typhus; but in one case at least, that of S. R., *æt.* eight years, brother to Case 11, the illness was described as febricula, and was of sufficient duration to be compatible with an anomalous attack of typhus. He was sent to the Infirmary, and the Medical Superintendent, who had seen a good deal of typhus in Ireland, stated that he had no symptoms suggesting this complaint. It is just possible that as our knowledge of infectious disease becomes fuller, these indefinite illnesses in families

which precede the case of typhus may be classed as "latent" or "masked" typhus, in which the virus after "passage" through one or more human beings becomes more virulent, or getting into more favourable soil culminates in a typical attack of typhus fever.

That similar mild cases occur in other infectious diseases has been shown in the case of diphtheria by the late Sir Thorne Thorne in the Milroy Lectures for 1891; by Koch in his description of the suppression of endemic typhoid in a group of German villages in the district of Trier; and more recently in the case of scarlet fever by Caziot, who describes an outbreak of nineteen cases in a school which originated in the so-called "latent" or "masked" cases. The mildness of typhus in children, coupled with the not infrequent absence of or poor development of the rash, has long been known, and from one or two of the cases I saw, I can quite understand the disease being overlooked when not associated with more typical cases.

In no other way does it seem possible to account for cases appearing suddenly where there were no previous ones, unless an extraordinary vitality of the virus in houses and clothes is assumed. As regards the general surroundings of the patients, in the cases 1, 2, and 10, the people were clean, in comfortable circumstances, and not overcrowded, and in the absence of an outbreak one would not have thought of looking for typhus.

In the remaining cases, though the people were poor, they were by no means destitute. One or two families were dirty, but taken on the average they were by no means the worst in the Borough; and employing as a standard of cubic space the figures of the bye-laws for houses let in lodgings, viz., 400 c. f. for living and sleeping, and 300 for sleeping only, and half these figures for children, they were not overcrowded.

Coming to the question of diagnosis, the cases with the exception of the first three and last were examined by me prior to removal to the M. A. B. hospitals. Here the diagnosis was confirmed with the one exception mentioned (Case 3). Among the diagnostic points common to the large majority of the cases, I may mention: (1) The sudden onset; (2) The late appearance and character of the rash; (3) The sudden rise of temperature to the maximum in those cases where it could be observed; and (4) The dulling of the faculties.

1. *Sudden onset.*—Almost every patient was quite decided as to the day of onset of the disease, and some went even so far as to state the hour of the day on which it occurred; one stating that she left work for dinner and was attacked during this interval; and another that she took ill just as she was putting on her hat to go out. Murchison draws attention to this characteristic.

No.	Date of Onset of illness.	Date of Rash.	Initials of Patient.	Sex.	Age.	Address.
1	Jan. 20th 1903	Jan. 25th ...	C. D.	M.	25	211, Jamaica Road ...
2	Feb. 4th	Feb. 7th ...	S. E.	M.	16	11, Stevens Street ...
3	Feb. 22nd	Feb. 27th ...	E. M.	F.	9	14, Warford Place ...
4	March 8th	March 8th ...	N. C.	F.	9	29, Neptune Street ...
5	March 8th	March 12th	S. L.	F.	29	7, Aylton Street ...
6	March 20th	About March 25th or 26th	M. M.	F.	2	14, Warford Place ...
7	March 20th	Do.	E. M.	F.	7	14, Warford Place ...
8	March 21st	Do.	I. M.	M.	11	14, Warford Place ...
9	April 8th (said to be)	April 8th ...	E. M.	F.	35	New Cottage Row Shelter
10	March 29th	April 2nd ...	E. E.	F.	88	127, Jamaica Road ...
11	March 31st.	April 4th ...	W. R.	M.	28	5, Donne Place ...
12	April 1st	April 6th to 7th	R. D.	M.	18	8, Salisbury Street ...
13	April 6th	April 10th ...	J. D.	F.	15	New Cottage Row Shelter
14	April 8th	April 10th ...	M. A. D.	F.	44	New Cottage Row Shelter
15	April 10th	April 14th ...	E. M. R.	F.	5	New Cottage Row Shelter
16	April 14th	April 19th ...	W. M.	M.	6	New Cottage Row Shelter
17	April 20th (about)	April 25th ...	S. R.	M.	15	5, Donne Place ...

Removed.	Remarks.
Jan. 31st	Ill first with blood poisoning. Removed as enteric fever. Worked all day at Billingsgate Market, and had his meals at Thames Steps.
Feb. 12th	Notified as enteric. Worked at tailor's in Cheapside as messenger and porter.
Feb. 28th	Notified as scarlet fever. Died March 8th with diagnosis of pneumonia. Attended St. Joseph's Schools, Paradise Street. 3rd standard. Was last there on February 28th. This is not far from No. 1, but there seems to have been no dealings between the families at any time.
March 12th	Attended St. Joseph's Schools, Paradise Street. 1st standard. Last there March 2nd. Took ill 8 days after February 28th. Not in same class as No. 3.
March 14th	Lives near No. 4. Children attend Albion Street Board School and Clarence Street Church School. Unknown to No. 8. Patient a trousers finisher for a Jew, East End, but had no work for fortnight previous to illness. Died March 19th.
March 30th	Attended St. Joseph's Infants. Last there February 26th. Source of infection, No. 8.
March 30th	Attended St. Joseph's Infants. Last there February 26th. Source of infection, No. 8.
March 30th	Attended Dockhead School. Absent March 2nd to March 18th, and from March 20th onward. Source of infection, No. 8.
April 3rd	Source of infection, Nos. 6, 7 and 8.
April 5th	Sister, aged 29, had an illness, said to be influenza, lasting from March 15th to March 22nd. Works in father's office in James Place. No one from No. 14, Warford Place works in this business place. The patient assists her mother in house work, and has not been near any known source of infection.
April 7th	Casual labourer at the Docks, and not acquainted with the families in which any of the previous cases occurred. Two children in family and two downstairs attend St. Joseph's School. Died April 10th. S.R., brother, 8 years, attended St. Joseph's School—ill between March 16th and 21st.
April 7th	Van guard for Pink's, Staple Street. Was at work on April 1st. Sister attends St. Joseph's School. 4th standard, and T.H., on same landing, also attends that school. Visited within the fortnight previous to his taking ill, many country districts in the immediate neighbourhood of London. Brother, J.D., 8 years, attended St. Joseph's School—ill about March 6th with diarrhoea.
April 10th	Source of infection, No. 12—is sister of this patient.
April 10th	Mother of No. 12. Same source of infection.
April 10th	Sister of No. 11, by whom she was infected.
April 19th	Source of infection, Case 9.
April 29th	Source of infection, Case 11.

be inferred that it was gradual and prolonged, like that of enteric. It was usually short as stated above, and began about the 14th and 15th day. The chart on previous page shows the temperature in such a case. In the cases in which it was prolonged beyond this, it was due to complications. That the cases were infectious admits of no doubt, but the disease was exceedingly capricious in the victims it selected for attack. Several cases occurred within two or three weeks from the removal of a previous case in the family; but the danger of infection does not appear to have been very great to casual visitors, or even to many of those whose contact with the patient was very close. It was rare for the nurse in attendance upon the patient previous to removal to be attacked. Of the two families which suffered most, in one the father and in the other the mother escaped, though both were in very close attendance. No doubt had the disease gained a firmer footing at first, and occurred at the beginning of winter instead of towards the end, the virulence of the poison would have become exalted, especially if the usual predisposing conditions of over-crowding and poverty existed in the neighbourhood attacked.

PREVENTION.

The usual methods were adopted to stamp out the outbreak, viz., isolation in hospital, disinfection, and keeping contacts under observation. This latter was done in the case of three families several members of which were attacked, by keeping them in quarantine during the period of incubation in the Council's shelters. The advantage of this is shown by a reference to the table, which shows that four cases occurred in these dwellings. Under ordinary circumstances the last case would have occurred here also, but the existence of this contact was unknown until he became a victim of typhus.

Another preventive method which I took was the closing of St. Joseph's Schools, Paradise Street. This was done on April 20th, for a period of fourteen days, which brought it up to the Easter Holidays. The reasons given to the Council for this action were as follow:—

"1. With the exception of the first two cases in the Borough, the earliest discoverable case, viz., No. 3, occurred among children attending that school and was unrecognized, and a number of other cases are apparently connected with this."

"2. Several of the families where adults have been attacked have had children attending this school, and in two cases at least there has been a previous history in the family of some indefinite form of illness, which may have been an unrecognized attack of typhus."

"3. Judging from the mild form which the disease takes among children, I am inclined to think that some unrecognized case or cases

have been infecting the school, and it is therefore advisable to have it closed for a period to prevent the spread of the disease."

That this action was justified, appears from the fact that no fresh cases occurred among the children in the neighbourhood, and the outbreak very speedily came to an end. This outbreak was instructive, inasmuch as it showed how typhus may be kept up by mild, unrecognized cases among children, analogous to "masked" or latent scarlet fever; and also that the origin of the first case was as obscure and difficult to trace as when Murchison propounded his theory that it arose *de novo*.

Failing the "masked" or "latent typhus" theory, the only other feasible suggestion is that the poison is harboured for long periods in old second-hand clothes which find their way from certain endemic centres to London, and—given favourable soil—start the disease.

ARE PRIVY MIDDENS A NUISANCE.—This question was discussed recently before a bench of magistrates at Macclesfield. The defendant was a well-to-do person, but had an "honest conviction" that privy middens were better than water closets, and that no nuisance was caused by them. The magistrates upheld the contention of the Health Department of the Corporation, and made the necessary order.

IMMUNITY OF ANIMALS DURING PREGNANCY AND THE PUERPERIUM IN RESPECT TO INFECTION AND INTOXICATION.—All agree that various factors like cold, loss of blood, etc., increase the susceptibility to infection. In order to determine whether pregnancy is also such a factor, Bossi, of Genoa (*Archiv. f. Gynäkologie* 68.1) has experimented on seventy-nine rabbits and guinea-pigs, some pregnant and some non-pregnant, injecting under the skin or into the veins cultures of the bacilli coli, diphtheriæ, tuberculosis, etc., as well as streptococci and staphylococci. His conclusions from these observations, which he regards as only preliminary, are as follows:—

1. After infection with mixed cultures of streptococci and staphylococci, or streptococci and diphtheria bacilli, the number of acute infections was much greater with pregnant than with non-pregnant animals. Also the number of deaths was much greater with pregnant animals when equal amounts of the germs were injected under similar conditions. 2. The further advanced the pregnancy, the greater were the effects of the injection. 3. The temperature was higher after experimental infection in pregnant animals than in the control animals. 4. Abortion was common after experimental infection. Opposite results were obtained after experimental infection with *Bacilli diphtheriæ*: the pregnant animals possessed the greater immunity. 5. Frequently pathogenic bacteria were found in the placenta and less often in the foetal blood. 6. Diphtheria toxin had less effect on pregnant animals. 7. Puerperal animals showed no great susceptibility to experimental infection. 8. Injected micro organisms were found in the milk secretion.

The important clinical conclusion is drawn that artificial interruption of pregnancy is indicated in cases of infectious disease like tuberculosis:

AN EXPERIENCE OF THE TREATMENT OF SMALL-POX BY RED LIGHT.*

By HERBERT PECK, M.D., D.P.H.,
Medical Officer of Health, Chesterfield.

My experience of the red-light treatment of small-pox is very limited, and I am only too well aware that the number of cases upon which I have made observations is too small for a decided opinion to be based upon it, but at this early stage of the inquiry as to the efficacy of the treatment, any number of figures, however small, must be of more interest than a larger number at a later time, when the question may have been thoroughly threshed out.

I commenced the treatment before I saw it advocated by Professor Finsen, and my action was induced by two reasons. The first was that the Russian peasantry (I am sorry that I cannot give you my authority, but I have certainly read it in a credible work), always treat their small-pox patients under red light when they can, and in darkness when they cannot, and are said to obtain very good results. The second was the oft-quoted treatment of the son of Henry VII, by John of Gaddesden, who wrapped his patient in red cloth, and "made everything about his bed red." I read this a good many years ago, but reading it again brought the Russian red-light treatment to my mind. These may appear trivial reasons, especially as many look upon John of Gaddesden and his contemporaries who used the treatment as rank quacks, but considering that there is often more than a grain of truth in popular beliefs, and that the cost of the experiment was trifling and no harm was likely to result, I resolved to make it. Before this two tramps had been admitted to the Spital Hospital, near Chesterfield, the property of the North Derbyshire Hospital Committee. The windows of the wards are of ordinary glass, but fitted with red blinds and curtains in such wise that when they are in proper position, none but red light can enter the wards. In the case of the first two patients, no attention was paid to red light as a curative agent, and the blinds and curtains were only used to exclude any annoying excess of light. The first patient was upwards of forty years of age, and had two marks, with an area of a quarter of an inch, from vaccination in infancy. He died of confluent small-pox on the eleventh day of the rash. The second, aged thirty, with three marks of an area of ten sixteenths of an inch, from vaccination in infancy, died forty-eight hours after admission from nephritis and uræmia, consequent on sleeping out and "catching cold." I say so much about these, as I do not include them among the cases treated with red light.

* Read before the North Western Branch of the Society of Medical Officers of Health, December 18th, 1933.

The Spital Hospital was not used again for six months, but when it was the blinds and curtains were systematically used to prevent the entrance of any but red rays, and forty-one patients were treated in it.

The Newbold Hospital, belonging to the Chesterfield Joint Hospital Committee, was opened in May for the reception of patients, and the Morton Hospital, the property of the North Derbyshire Hospital Committee, in October, and immediately upon this I had all the windows covered with ruby paper, such as is used by photographers, and treated all my patients as though they were so many undeveloped negatives. Six patients were treated in one, and thirty-eight in the other, so that the total number of cases considered in the following table is eighty-five. The table shows the number of vaccination marks, the age-periods of the patients, the character of the rash, and some percentages.

CHESTERFIELD JOINT AND NORTH DERBYSHIRE HOSPITAL COMMITTEES.

SMALLPOX PATIENTS TREATED WITH RED LIGHT, 1902-3.

No. of vaccination marks.	Age period.	Scanty or very discrete.	Discrete.	Copious to semi-confluent.	Confluent.	Total.	Mortality per cent.	Mr. Marson's figures per cent.
None	Under 2		1	1		14	8.8 (excluding 2 mentioned in text).	85½
	2 to 5		1	1				
	5 to 15	1	1		8			
	15 to 25			2				
One	25 to 45		1	8		14	nil	7½
	5 to 15			1				
	15 to 25		1	1				
	25 to 45	2	8	1	1			
Two	45 and upwards		2	2		17	6	4½
	1 to 5		1					
	5 to 15	1						
	15 to 25	8	2					
Three	25 to 45	1	8	2	1	28	nil	1¾
	45 and upwards		2		1			
	15 to 25	8	2					
	25 to 45	8	10	2	4			
Four	45 and upwards	1	2			12	nil	¾
	15 to 25	1	1					
	25 to 45	2	5	1				
	45 and upwards	1		1				
		19	87	18	11	85	2.85	17.87

The one patient in the table described as being unvaccinated and having a very scanty rash, was vaccinated in some degree, for she underwent the operation on October 11th, and developed the rash of small-pox on the 20th. One of the three vaccinated persons, who had a discrete rash, was brother to the last, and after vaccination on the 11th, developed the rash on the 21st. I think these cases should be eliminated from the number of unvaccinated, as vaccination undoubtedly protected them, though their vesicles never attained maturity. Another of the three unvaccinated, with a discrete rash, was a child vaccinated on February 26th, who developed the rash on March 4th; and the third a woman of seventy-six.

A case deserving of mention is that of a man who lived in a common lodging-house, and who had been repeatedly exposed to infection. He had a remarkably well-developed initial rash, but never developed the typical, or even a modified small-pox rash. I was somewhat disturbed at this, especially as I had placed him in a ward with eight or ten men in all stages of the complaint, and I therefore had him revaccinated, but unsuccessfully. He had four good marks from primary vaccination in India in 1887. I do not know whether the treatment had anything to do with the non-appearance of the rash, for such cases happen under ordinary circumstances. The table is intended to explain the other cases.

Results under the Treatment.—There were two deaths, equal to a case mortality of 2.35 per cent, as compared with Dr. Gayton's 17.4 in 10,403 cases. One of these, that of an unvaccinated child of seven years, was equal to a case mortality of 8.3 per cent among the unvaccinated, as compared with Dr. Gayton's experience of 43 per cent in 2,169 unvaccinated cases. The other was that of a debilitated tramp upwards of fifty years of age, and was equal to a mortality among the vaccinated of 1.3 per cent, as compared with Dr. Gayton's rate of 10.5 per cent, including persons said to be vaccinated but bearing no evidence of vaccination, or 6.3 with these deducted.

The mortality among the vaccinated with two marks was at the rate of 6 per cent, and nil in the case of other marks. Mr. Marson's rates are: unvaccinated 35½ per cent, stated to be vaccinated but showing no mark 21½ per cent, having 1 cicatrix 7½ per cent, having 2 cicatrices 4½ per cent, having 3 cicatrices 1½ per cent, having 4 or more ¾ per cent.

I have no figures on which to base an estimate of the amount of disfigurement, but I confidently assert that, whether the red rays had anything to do with it or not, it was less than usual, and even confluent cases resulted in comparatively little. I am of opinion that the character of the rash was modified for the better and that it was

less marked and ran its course more quickly than under ordinary circumstances.

I have recently heard that cerebral symptoms are frequently developed under red light, but my small experience has not shown that delirium is more common under the red light than under the ordinary treatment, but rather the reverse. This is no more than one would expect *a priori* if it be admitted that red rays prevent or minimise suppuration, and thus some degree of sapræmia. I might as well point out in passing that this is the antithesis of the theory of John of Gaddesden and his fellows, who hoped "that by the sight of the red cloth the blood may be led to the exterior, and so be kept at no excessive heat, according to the tenour of the sixth canon." (Valescus de Tharanta, as quoted by Dr. Creighton).

Though the number of cases submitted for your consideration is so small, I am sure they point to the advisability of a more extended trial of the treatment. With this view the Chesterfield Joint Hospital Committee has, at my request, had ruby glass fixed over the ordinary glass in the windows of one ward at Newbold Hospital in place of the paper, and all future patients will be placed there until the scabs are well advanced in dessication. The treatment will also be followed in the hospitals of the North Derbyshire Hospital Committee. I am only waiting for material.

THE SANITARY INSTITUTE CONGRESS.

THE following officers will preside over meetings of the next Congress of the Sanitary Institute to be held in Glasgow from July 25th-30th.

President of the Congress: The Right Hon. Lord Blythswood, L.L.D., D.L., J.P. Sanitary Science and Preventive Medicine: Prof. J. Glaister, M.D. Engineering and Architecture: Prof. H. Robinson, M.Inst. C.E. Physics, Chemistry and Biology: Prof. Clowes, D.Sc.

Conferences: Of Municipal Representatives: Councillor W. F. Anderson; Of Industrial Hygiene: Councillor J. Steele; Of Medical Officers of Health: Sir Chas. A. Cameron, C.B., M.D.; Of Engineers and Surveyors to County and other Sanitary Authorities: Wm. Weaver, M.Inst. C.E.; Of Veterinary Inspectors: Prof. James McCall; Of Sanitary Inspectors: T. F. Strutt; Of Women on Hygiene: Her Grace the Duchess of Montrose; Of Hygiene of School Life: Prof. J. Edgar.

The Lecture to Congress will be given by Sir Richard Douglas Powell, Bart., on "The Prevention of Consumption."

Dr. James Crauford Dunlop has been appointed Superintendent of Statistics in the office of the Registrar-General for Scotland, in place of the late Dr. Blair Cunyngham.

LAW REPORTS.

IN THE COURT OF APPEAL.

February 8th, 1904.

BEFORE COLLINS, M.R., ROMER AND MATHEW, L.JJ.

STOCKDALE v. ASCHERBERG.

Landlord and Tenant—Agreement to Pay Outgoings—Remedy of Sanitary Defect—Liability of Tenant.

A tenant who takes a house on a three-year's tenancy and agrees to pay all outgoing is liable to repay to the landlord the cost of reconstructing the drainage system executed under an order of the Sanitary Authority.

This was an appeal from a judgment of WRIGHT, J., reported in *Public Health*, xvi, 166, where the facts are set out. *Finl* appeared for the appellant, *Hohler* for respondent.

The Court dismissed the appeal.

COLLINS, M.R., said it was clearly established by the decisions that the word "outgoings" in such a covenant covered expenditure of the kind here in question. It was impossible to regard the alteration of the drains as outside the contemplation of the parties. That being so, if a tenant makes an agreement in perfectly clear and unambiguous terms that he will bear all outgoing, I do not see how we can throw aside the plain meaning of the language used, and introduce some limitation of that meaning which would be difficult to define.

ROMER and MATHEW, L.JJ., concurred.

CHANCERY DIVISION.

February 17th, 1904.

BEFORE MR. JUSTICE FARWELL.

THE ATTORNEY GENERAL v. MAYOR, ETC., OF NOTTINGHAM.

Small-pox Hospital—Injunction—Risk of Nuisance—Infection.
The Court will not grant an injunction to restrain the use of premises as a Small-pox Hospital unless it is shown that the probability of a nuisance is so great as almost to amount to a moral certainty. Evidence of infection caused by other such hospitals is not sufficient proof.

This was an action by the Attorney-General on the relation of several owners and occupiers of land and collieries in the parish of Bestwood, and by the same owners and occupiers as plaintiffs against the Mayor and Corporation of Nottingham to restrain them from using a building lately erected, and for the last six months used as a small-pox hospital, from so using it, on the ground that it is a nuisance, necessarily causing serious danger to the public health and special damage to the plaintiffs. The building was situated close to a public road in about 4½ acres of ground, and there were 204 residents within a quarter of a mile of the building and 510 within half a mile. Although it had been in use for about six months, it had not caused, in fact, any nuisance or the spread of infection.

Uppohn, K.C., and *Lewelyn Davies* appeared for the plaintiffs, and called evidence to show what had occurred in the vicinity of other small-pox

hospitals in order to prove that there was a reasonable apprehension of serious danger. Among the witnesses called for this purpose were: Dr. Thresh, Medical Officer of Health to the Essex County Council; Dr. Chalmers, Medical Officer of Health for Glasgow; Dr. Evans, Medical Officer of Health for Bradford; Dr. Priestley, Medical Officer of Health for Lambeth and formerly for Leicester; and Dr. McVail, an eminent Scotch physician. The latter witness was strongly of opinion that infection could be, and was, spread by aerial dissemination. Dr. Fletcher, Medical Inspector of the Local Government Board, was also called, but stated that he had received instructions from the Board not to give opinions, and not to produce the report he had made upon the hospital, on the ground that to do so would be injurious to the public service.

Asquith, K.C., *Macmoran, K.C.*, and *R. J. Parker* appeared for the defence, and called evidence to show that a small-pox hospital, properly conducted, was not necessarily a source of danger to the neighbourhood. Dr. Boobyer, Medical Officer of Health for Nottingham, said that the site of the hospital was selected as the most suitable for the purpose, and with a view to observing the regulations of the Local Government Board. The largest number of cases at one time in the hospital had been thirty-six, of which one-third were acute, and there had been no case of infection even within a half-mile radius. So long as the hospital was properly conducted there would be no danger. Dr. Mutch, Chairman of the Nottingham Health Committee; Dr. Neilson, Public Vaccinator for Nottingham; Dr. Hope, Medical Officer of Health for Liverpool; Col. Notter, R.A.M.C.; and Dr. Collingridge, Medical Officer of Health for the City of London, confirmed Dr. Boobyer's views.

FARWELL, J., in a lengthy judgment, said no actual case of injury has arisen in this case; and the action is *quia timet*. In order to succeed in such an action the plaintiffs must show a strong case of probability that the apprehended mischief will in fact arise ("Attorney-General v. Manchester Corporation," 1893, 2 Ch., 87), or to quote Lord Justice FitzGibbon in "Attorney-General v. Rathmines, etc." (unreported), "to sustain the injunction the law requires proof by the plaintiffs of a well-founded apprehension of injury—proof of actual and real danger—a strong probability almost amounting to moral certainty that if the hospital be established it will be an actionable nuisance. A sentiment of danger and dislike, however natural and justified, certainty that the hospital will be disagreeable or inconvenient, proof that it will abridge a man's pleasure or make him anxious, the inability of the Court to say that no danger will arise, none of these accompanied by depreciation of property will discharge the burden of proof which rests on the plaintiffs, or justify a merely precautionary injunction restraining an owner's use of his own land upon the ground of apprehended nuisance to his neighbours." Further, the defendants are entitled, in my opinion, to ask the Court to assume that the hospital will be properly managed, and that all the precautions that scientific skill and knowledge usually require will be taken, and they are entitled in the present case to the benefit of the observation that the hospital has been open and has received patients for the last six months, during the last half of which it has been full, and that no mischief has at present arisen therefrom. After describing the situation of the hospital, he proceeded: Having regard to the impossibility of stamping out small-pox under the existing laws, and to the practical impossibility of isolating an outbreak in crowded areas, the Court ought not to come to any conclusion that would result in closing the majority of the small-pox hospitals in the kingdom, unless the expert testimony

is really conclusive. Now, it is clear from the evidence that I have heard in this case that the medical profession are divided into two camps on this question, each containing persons of eminence and experience. The first point of difference is on the theory of aerial convection for any considerable distance—say, for more than 50 feet. This is a purely scientific question, and I gratefully adopt Lord Bowen's statement in "*Fleet v. Metropolitan Asylums Board*," that "it would be most dangerous to form an independent opinion on a scientific question from the smatterings of science that might be picked up during the hearing of a case." The plaintiffs do not contend that there is a consensus of expert opinion on the point, and it is enough for me to say that it is therefore not proven, and that I am not competent to form an opinion of my own on the question. If the fact of a public nuisance were established, it would of course be no answer to the private owners to say that the hospital must be placed somewhere (see *per* Lord Blackburn in "*Hill v. Metropolitan Asylum District*," 6 App. Cas., 207), but where the question is whether the nuisance exists or not, all the circumstances must be taken into consideration; and, after all, the owners and occupiers of the adjacent lands have a far more effective prophylactic provided for them by medical science than any injunction of any Court. I respectfully agree with the following passage in Lord Justice Fitz-Gibbon's judgment in the Rathmines case: "It seems probable that the dread of small-pox is to a great extent the result of tradition. That scourge of the eighteenth century retains its terrors for those who do not realize that it has been deprived of most of its dangers. Vaccination is not only a preventive, but it also modifies the disease. The evidence even of Dr. Thresh is that vaccination and re-vaccination at proper intervals confer practical immunity. In applying the maxim *sic utere tuo ut alienum non laedas*, the duty of reasonable precaution for one's own protection is not to be ignored. An isolation hospital reduces the risk for every inhabitant of the district. It is, in fact, a necessity, and though the individual must be protected the public advantage should not be forbidden unless the danger and injury to the individual are clearly proved." In the present case I find as the result of the evidence that the site of the defendant's hospital was carefully chosen, is in a proper situation, and constitutes no appreciable danger to the public health and no nuisance to the relator plaintiff's property, and therefore dismiss the action with costs.

KINGS BENCH DIVISION.

December 11th, 1903.

BEFORE LORD ALVERSTONE, L.C.J., LAWRENCE AND KENNEDY, JJ.

METROPOLITAN INDUSTRIAL DWELLINGS CO. v. LONG.

Metropolis Management Act, 1855, s. 202—Bye-laws—Application to old Buildings—Water-closet.

In order that an act or omission may be deemed an offence under a bye-law it must appear that the bye-law in clear and plain language makes it so. The repair of the pan and trap of a water-closet is not "a reconstruction of a water-closet" within the meaning of a bye-law which requires a ventilating pipe to be affixed on such reconstruction.

This was a case stated by a Metropolitan Magistrate in the matter of thirty-three summonses taken out on behalf of the Southwark Borough Council against the appellants as owners of a block of industrial dwellings. The summonses were taken out under the London County Council

Bye-laws of 1901. The buildings had been erected before these bye-laws came into force, but after such coming into force the appellants had substituted an iron drain in place of an earthenware one, and in the course of doing so they had broken thirty-three pans and traps of water-closets, which they replaced. They were required by the local authority in accordance with bye-law 17 of the said bye-laws to fit these new traps with anti-syphonage pipes, because by bye-law 21 the bye-laws were made applicable to new work in old buildings as far as practicable. It was proved that the soil pipes were so large that the evils of syphonage could not possibly occur, and it was contended that the expense was so great that the application of the bye-law was not reasonably practicable. The appellants also contended that the bye-law was *ultra vires*. The magistrate decided that the bye-laws were valid and applied to the circumstances, and he convicted the appellants.

Danckwerts, K.C., and *Courthope-Munroe* appeared for the appellants, *Avory, K.C.*, and *F. Dodd* for the respondents. The Court allowed the appeal.

LORD ALVERSTONE, L.C.J., in giving judgment, said the bye-laws were not invalid. The bye-laws were made under section 202 of the Metropolis Management Act, 1855, and were not *ultra vires* nor unreasonable. They, however, inflicted penalties, and there should be as much clearness and certainty in bye-laws as in statutes imposing penalties. A person who had to make up his mind what his duties and liabilities would be was entitled to be told in reasonably plain language what he was to do, particularly in the case of existing buildings. In this case, if the local authority meant to say that putting in a new trap was the construction of a water-closet, or that the doing of repairs which had been rendered necessary by some part of the closet being broken when some other work was being done, brought bye-law 17 into operation, they ought to have said so in plain words. They had not done so, and what was done in this case did not therefore fall within the bye-law.

LAWRENCE AND KENNEDY, J.J., concurred.

IN THE HIGH COURT OF JUSTICIARY, (SCOTLAND).

December 18th, 1903.

BEFORE THE LORD JUSTICE CLERK MACDONALD, LORDS TRAYNER AND MONCREIFF.

WILSON AND M'PHEE v. WILSON.

Sale of Food and Drugs Act, 1875, s. 6—Brandy—Standard—Proof of Adulteration—Prejudice.

Where there is no fixed standard for an article, the Court, on a proceeding under the Sale of Food and Drugs Acts, is entitled, on the evidence, to determine what is the true standard. A Sheriff Substitute is therefore justified in finding that an offence has been committed when, on a sale of brandy, it is proved that the liquor sold was not a distillation of wine or grape spirit, but contained a large proportion of either grain or beetroot spirit.

This was a case stated by the Sheriff Substitute for Lanarkshire on the hearing of a complaint under section 6 of the Sale of Food and Drugs Act, 1875, for selling brandy not of the nature, substance and quality demanded. It was proved that the brandy sold was not a distillation from wine or

grapes, but that 65 per cent of the spirit was derived from other sources, as from grain or beetroot. It was set up as a defence that such a mixture was nevertheless brandy and properly so-called. It was also contended that the inspector, in purchasing the brandy, was told the nature of the brandy he was purchasing. The facts will be found more fully set out in a note of the case when before the Sheriff Substitute, at *Public Health*, xv, p. 728. The Sheriff Substitute convicted, and on a case stated the Court of Justiciary affirmed the conviction.

Salvesen, K.C., and *McClure* appeared for the appellants, *Guthrie* for the respondent.

LORD TRAYNER said: Two facts are found proved: (1) That the inspector, MacAra, asked for a bottle of brandy; and (2) That what he got was not of the nature, substance, and quality of brandy. These facts lead to the conclusion that the offence charged had been committed. Were there nothing more in the case than this, I should have no hesitation in finding that the Sheriff was right; but a difficulty is created by the fact, also found proved by the Sheriff, that MacAra asked the appellant's servant what kinds of brandy he was selling. The answer he got was that they were selling "Tricoche's" brandy. MacAra apparently did not catch or did not understand what was said, but had he there and then asked for a "bottle," or a "bottle of it," namely, that which the seller said he was dealing in, I think there would have been some force in the contention that the seller was entitled to assume that the buyer understood what he was getting. The circumstances, however, are different. On getting the answer that it was "Tricoche's" brandy that was being sold, MacAra left the booth, and returned in about ten minutes. He did not then ask for any particular kind of brandy, but simply for a bottle of brandy. What he got, the Sheriff has held not to be brandy, nor was there any warning on the label, because it bore that the liquor in the bottle was brandy—"Old Brandy, Tricoche & Co., Cognac ***." In these circumstances I do not see my way to alter the judgment of the Sheriff.

LORD MONCRIEFF concurred and said: It is complained that the Sheriff Substitute has made a standard for brandy for himself. I do not see how he could avoid that. He has taken the evidence of skilled witnesses, and has come to a conclusion. It may be wrong, but we must take it as a matter of fact.

THE LORD JUSTICE-CLERK: On the first two questions I agree. If a man goes into a shop, asks for brandy, and gets something which is not brandy, the seller has committed an offence and should be convicted. Further, I think the Sheriff Substitute was right in the method he adopted for testing whether the liquor sold was brandy or not. In default of a fixed standard, the Sheriff Substitute was bound to proceed on the standard set up by the evidence led before him.

On the other matter I cannot concur. If the seller states what the substance is he is selling, I think there is no fraud. Though this case is not well stated, it appears that the inspector was told what kind of brandy was being sold. It may be that he did not hear or understand, but I think the seller was entitled to assume that the purchaser was aware of what he was getting, he having stated what it was, and the person inquiring not indicating that he did not hear what was said.

REVIEWS.

"WHO'S WHO" for 1904; price 7s. 6d. "WHO'S WHO" YEAR-BOOK, 1904; price 1s. THE ENGLISHWOMAN'S YEAR-BOOK AND DIRECTORY. Edited by Emily Janes; price 2s. 6d. London: Adam and Charles Black, Soho Square, W.

These are an exceedingly useful series of books. The first two used to be combined, but the Year-book information has gradually been squeezed out by the increasing number of biographies, until now the publishers have resolved to issue it separately. "Who's Who" is now purely what it professes to be—a biographical annual. The present issue contains over 17,000 biographies, each of which has the merit of having been submitted for personal revision.

"Who's Who" Year-book contains a vast amount of varied information in tabular form; it contains all that anyone ordinarily wants of the information found in the various year-books; Parliamentary Annals; the Foreign Office, Colonial, and Indian Lists. Among the contents are tables of Pseudonyms, Peculiarly Pronounced Proper Names, Professors, Societies, Academic Degrees, Government Officials, and many others. The book, in short, combines in itself the gist of the information given in many other publications.

The *Englishwoman's Year-book and Directory* is in its sixth year of new issue, and has been revised, enlarged, and entirely remodelled. Although it is intended for women specially, it will be found a valuable reference book by men engaged in public work, and by medical men in practice who are asked to give information on various forms of work for women. No other book covers the same ground as this does, and it contains information on matters of which it is difficult to obtain exact knowledge except by tedious search.

LUFTVERUNREINIGUNG UND VENTILATION—MIT BESONDERER RUCKSICHT AUF INDUSTRIE UND GEWERBE (Pollution of Air and Ventilation—with special regard to Industry and Trade). By Dr. Josef Rambousek. Price 7m, 50pf.

This book deals with the subject of ventilation very fully and scientifically. It is divided into two parts. Part I, comprising the first 85 pages, deals with the theory of ventilation and the methods of estimating the impurities produced by human exhalation. This is followed by a description of what the author calls the technique of ordinary ventilation, i.e., the different methods of ventilating rooms and buildings.

Part II comprises the remaining two-thirds of the book, and is entirely concerned with trade impurities, and the best methods of dealing with them. There is an excellent classification of practically all trade impurities which vitiate the air of places where work is carried on. Dusts, gases of all kinds, chemicals, moisture, etc., all are most fully dealt with. The author seems to have gone to great trouble in gathering material for his book, and visited Wiesbaden, Düsseldorf, Mülhausen, München, Basel, Vienna, etc. He states that he does not intend it to be a popular work in the ordinary sense, but for the great circle of technical interests of the professionally educated public.

CITY OF LIVERPOOL: HANDBOOK COMPILED FOR THE CONGRESS OF THE ROYAL INSTITUTE OF PUBLIC HEALTH. Pp. 330. Issued by the Local Executive Committee. Edited by E. W. Hope, M.D., D.Sc. Edin., Honorary General Secretary of the Liverpool Congress. Liverpool: Lee and Nightingale. 1903.

This handbook, compiled for the Congress of the Royal Institute of Public Health in regard to the Liverpool meeting of July, 1903, is really a record of the public undertakings carried out by the city of Liverpool. The Local Executive Committee desired that the handbook which it has been customary to issue upon the occasion of the visit of the Institute, should be so amplified as to give an account of the establishments and undertakings of the Committees of the Corporation. It was also felt that some account of the institutions of the city, as well as the special features of the city and its port, would add to the interest of the volume. Each branch of the city's work is fully described by an expert on the particular subject, and complete information is given of all municipal enterprises. Wherever plates or maps are required they are inserted, and altogether it is probably the finest and most useful work of the kind which has ever been issued.

THE PREVENTION OF CONSUMPTION. By Alfred Hillier, M.D., C.M., B.A. Revised by Professor R. Koch. Crown 8vo, pp. 226. 5s. London Longmans, Green & Co. 1903.

Practically Prof. Koch has reviewed this work in a letter which prefaces its contents. In the course of it he says:—

"Good popular works, in which the nature of tuberculosis and the means and methods of its prevention are explained, are therefore indispensable in the fight against tuberculosis.

"Unfortunately, works of this description, or even such as would satisfy the most moderate requirements, are almost entirely wanting, and I have therefore gladly complied with Dr. A. Hillier's desire to discuss with him the contents of a popular work on tuberculosis, and to revise such a book written by him.

"Accordingly, after having read carefully through his book, I believe I can say that Dr. Hillier has admirably accomplished the task he has set himself.

"His book in all respects represents the latest scientific views, which are so clearly expounded that every intelligent reader can derive reliable instruction from them.

"A special merit of the author is that in dealing with points still matters of controversy in the science of tuberculosis, he handles them with such skill that the true value of varying opinions is shown."

It may seem presumptuous in the face of this, to say we are not so satisfied with the work as is Prof. Koch. Necessarily, in a work intended for the public the style must be more dogmatic than had it been for the profession alone, but we think undue emphasis is laid on some matters, such as Flüge's cough spray theory, while others of more importance have been lightly passed over. The appendix, which forms 60 pp., contains leaflets issued by the National Association for the Prevention of Consumption, and information as to sanatoria, homes for advanced cases, etc.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED, 1888. INCORPORATED, 1891.

A MEETING of the Society was held at No. 9, Adelphi Terrace, London, W.C., on Friday, March 11th, 1904. Present: The President (Dr. J. Groves, J.P.), in the chair, Drs. W. G. Willoughby, H. Meredith Richards, D. L. Thomas, J. T. C. Nash, J. A. H. Brincker, W. H. Symons, Shirley F. Murphy, H. W. G. McLeod, G. Newman, E. F. Willoughby, L. T. F. Bryett, H. E. Armstrong, A. Bostock Hill, Chas. Sanders, W. C. Wanklyn, J. Hembrough, C. Killick Millard, R. A. Dunn, A. Kidd, A. W. J. McFadden, A. Newsholme, P. J. Wilkinson, W. W. E. Fletcher, R. J. Reece, H. Kenwood, F. L. Dodd, W. A. Bond, E. W. Goodall, F. G. Crookshank, J. Sandison, and Herbert Jones (members); and Mrs. Garrett Anderson (visitor).

CORRESPONDENCE.

Apologies.—Letters apologising for absence were read from Drs. Lockhart Stephens, J. Priestley, F. J. Allan, H. Beale Collins, and Hubert Biss.

Census, 1906.—The Hon. Secretary read a letter from Dr. Ginsberg, Secretary of the Royal Statistical Society, intimating that the Society proposed to approach the Government urging the desirability of a census being taken in the United Kingdom in 1906, and stating that they would in due course invite the co-operation of the Incorporated Society in the matter.

Resolved that the Branches be invited to express their views on the matter, and that the subject be referred to the Council for consideration.

ELECTIONS.

The Society proceeded to ballot for the election of candidates, and the President declared the following to be unanimously elected:—

AS FELLOWS:—

Dickie, Hugh, M.A., M.D., Wood House, Morpeth, M.O.H. Borough of Morpeth.
Elkington, J. S. C., L.R.C.P., D.P.H., Government Offices, Hobart, Tasmania, Chief Medical Officer of Health, Tasmania.
Hope, George, L.R.C.P., M.R.C.S., D.P.H., Beaconsfield House, Hanwell, M.O.H. Hanwell, and Greenford U.D.C.S.
Phillip, Andrew, M.D., D.P.H., Tighnaleigh, Alyth, Perthshire, M.O.H. Burghs of Alyth and Rattray.
Price, David Rees, M.B., C.M., The Laurels, Ammanford, Carmarthenshire, M.O.H. Ammanford U.D.C.

AS MEMBERS:—

Armer, Alfred, M.B., D.P.H., East Dispensary, Richmond Row, Liverpool.
Beard, Joseph, F.R.C.S.E., D.P.H., Corporation Infectious Hospital, Bootle.
Owen, John, M.B., D.P.H., North Dispensary, Vauxhall Road, Liverpool.

NOMINATIONS.

Several candidates were then nominated for election at the next meeting.

A paper was then read by Dr. H. KILICK MILLARD on "The Leicester Method of dealing with Small-pox."

A discussion ensued, in which Mrs. Garrett Anderson, the President, Drs. E. F. Willoughby, Shirley F. Murphy, A. Newsholme, H. A. Armstrong, A. Bostock Hill, Hy. Kenwood, R. J. Reece, W. W. E. Fletcher, J. Hembrough, W. A. Bond, S. Davies, and W. M. C. Wanklyn took part, and Dr. Millard replied.

Metropolitan Branch.—An ordinary meeting of the Branch was held at the Offices of the Society, 9 Adelphi Terrace, on Thursday, March 24th. Present: Drs. R. Dudfield (President), Brown, Allan, Sykes, Field, Annis, Davies, A. E. Thomas, H. W. Roberts, and Priestley (Hon. Sec.).

A discussion took place on the Milk Supply of the Metropolis (arising out of the President's Address, delivered January 29th, and printed in the March number of *Public Health*), and the following resolutions were carried *unanimously*.

(1) That the Local Government Board be respectfully urged to consider the advisability of carrying out its statutory powers under Section 28 of the Public Health (London) Act, 1891, by virtue of which the Board may make such general or special Orders, as the Board may think fit, dealing with (a) The Registration of Dairymen; (b) The Inspection of Cattle in Dairies; (c) The Lighting, Ventilation, Cleanliness, etc., of Dairies; (d) The Securing of the Cleanliness of Milk Vessels; (e) The Prescribing of Precautions to be taken for Protecting Milk against infection, or contamination; and (f) The Authorising of the County Council to make Byelaws for the purposes aforesaid, or any of them.

(2) That the Local Government Board be respectfully urged to bring in the necessary legislation, with a view to giving effect to the recommendations contained in the 1901 Report of the Departmental Committee of the Board *re* Food Preservatives and Colouring Matters; and that a copy of this resolution be sent to the Council of the Society.

(3) That the Council of the Incorporated Society be asked to consider the advisability of the Warranty Sections, of the Food and Drugs (Sale of) Acts, 1875 to 1899, being amended, so as to prevent any defence of warranty being allowed under such Acts in regard to Milk.

(4) That, having regard to the large amount of milk (over 90 per cent.) that is introduced into the Metropolis from outside, the Local Government Board be asked to take such steps as will ensure the Dairies, Cowsheds and Milkshops Orders of 1885, 1886, and 1899, being efficiently carried out by all sanitary authorities (more especially in Rural Districts), and, further, that, outside the Metropolis, provision be made whereby the carrying out of such Orders be transferred to the respective County Councils, wherever default is persistently made by the Sanitary Authorities concerned, as provided for in the case of the Metropolis, by Sections 100-101 of the Public Health (London) Act, 1891; and that a copy of this resolution be sent to the Council of the Society.

Re-Vaccination Bill, 1904.—The Branch decided *unanimously* to petition in favour of the Bill, 1904.

North-Western Branch.—A meeting of the Branch was held at the Victoria Hotel on February 19th. Present: Dr. James Wheatley (in the chair), Drs. Laird, Garstang, Pringle, Owen, Barlow, Greenwood, Wilkinson, Forbes, Cowie, Edlin, Sergeant, Chronnell, Niven, and Meredith Young.

Dr. T. W. H. Garstang opened a discussion on "The Application of the Local Government Board Model Bye-laws relating to New Streets and Buildings to Rural Districts."

The following recommendations were adopted by the Branch and ordered to be sent up to the Council of the Society:—

1. That the bye-law with respect to the sufficiency of the open space in front of new buildings be framed in such a manner as to prevent the

front of new buildings being brought to a less distance than 18 feet from the centre of any roadway upon which they abut.

2. That in the bye-law having reference to the concreting of the site of domestic buildings the words "where the dampness of the soil or surroundings render it necessary" should be omitted, so that the bye-law should read, "that in the case of every domestic building the whole of the site should be covered with asphalt or concrete" irrespective of dampness of soil or surroundings.

3. That 150 square feet as the minimum air space at the rear of buildings is not sufficient, and should be increased, say to 200 square feet.

4. That a bye-law should be included in the series of model bye-laws applicable to rural districts, to ensure the provision of secondary means of access for the purpose of refuse removal, etc.

5. That a bye-law should also be introduced to fix the minimum height of habitable rooms.

6. That a bye-law should be introduced to provide for ventilation of the space between the lowest floor where this is boarded.

7. That a bye-law should be introduced providing that in the case of all alterations and extensions of buildings it should be necessary to submit plans for approval prior to executing the work.

Dr. Laird then read a short paper on "The Tuberculous Animals Compensation Bill,"* and on the conclusion of the paper the following resolution was proposed by Dr. Laird, seconded by Dr. Meredith Young, and carried unanimously: "That in the opinion of this Branch the passing of such a Bill as that proposed to provide compensation in the case of seizure of carcasses affected with tuberculosis would be detrimental to the public health, inasmuch as it would largely tend to hinder the carrying out of the requisite measures for the prevention of the disease."

Votes of thanks were accorded to Drs. Garstang and Laird.

Scottish Branch.—A meeting of this Branch was held in Edinburgh on Saturday, February 20th. There were present: Dr. Maxwell Ross (President) in the chair, Professor Matthew Hay, Drs. Bruce, Oliver, Somerville, and Robertson.

The meeting had been called to continue the discussion on the medical inspection of schools. Dr. Bruce recapitulated some of the views advanced by him in a paper already read before the branch, and among other points insisted that the Medical Officer of Health must be the guiding spirit in any scheme which might be devised to inspect schools and scholars. The Scottish Education Department is known to be interesting itself in the question, so that chief interest centred in how far the department was likely to go in ensuring medical inspection, the teaching of hygiene, etc., in schools. In that connection it was decided to approach the Scottish Education Department regarding the two resolutions transmitted by the Society, viz.:—

1. "That in the opinion of the Incorporated Society of Medical Officers of Health, Domestic Hygiene, Personal Hygiene, and Physical Training should be a compulsory part of the training of all teachers."

2. "That, in the opinion of the Incorporated Society of Medical Officers of Health, the teaching of Elementary Domestic Hygiene, Personal Hygiene, and Physical Training should be compulsory subjects in all Elementary Schools."

* See p. 418.

CURRENT PUBLIC HEALTH LITERATURE.

La Presse Médicale.

- (Jan. 27.) Serum Therapy in Plague. Victor Godinbo.
 Hearing and Ear Disease in School Children. M. Duhar.
 (Jan. 30.) The Main Drainage of Paris and the Disposal of the Sewage.
 (Feb. 18.) Reform of the Consultative Committee of Hygiene—to be made more representative.
 (Feb. 27.) The Milk Question from a Zootechnical point of view. P. Diffloth, Prof. of Agriculture. (Discusses the alterations produced in milk by various diets—the effect on digestibility.)
 (March 9.) The Provision of Special Hospitals in Paris for Consumptives. Text of Decree, with maps. 3776 beds are set aside for them, and two dispensaries are to be opened.

La Semaine Médicale, Vol. XXIV.

- (Nos. 3 and 4.) Text of the International Sanitary Convention's Report, with rules for the prevention of the spread of plague and cholera.

Bulletin du Service de Santé et de l'Hygiène Publique, Belgium, 1903.

- (Nov.) Smallpox and Vaccination, during 1902. (Absence of Smallpox had led to a neglect of vaccination, with the usual result).
 Tuberculosis in Belgium. (Details of proposed sanatorium at Alsemberg.)
 (Dec.) Official Report on Workmen's Dwellings in Belgium. (Work done in 1902.)
 Report on the Destruction of Refuse by Fire.
 Report on the Purification of Sewage.

Centralblatt f. Bakteriologie, Vol. XXXIV.

- (No. 2.) The Flagella of the Tetanus Bacillus. S. de Grandi.
 The Pathology of Paratyphoid. F. Lucksch.
 Successful Inoculation of Cancer in Mice. C. O. Jensen.
 Anthrax Immunity. O. Bail and A. Petterson.
 Experiments with Formaldehyde.—Steam disinfection. H. Herzog.
 Modification of the Romanowsky Stain. H. F. Harris.
 (No. 3.) Action of Bacteria on various kinds of Sugar. A. Segin.
 Acid-fast Bacilli in a Python. Von Hausemann.
 Bacterium muris. L. Zupnik.
 A Rat Disease caused by an Acid-fast Bacillus. G. Deon.
 (No. 4.) The Biology and Pathogenicity of *B. prodigiosus*. E. Bertarelli.
B. coli, the Active Constituent of. A. Carega.
 An Infectious Disease in the Genus Turdus. A. Maggiora and G. L. Valenti.
 The Influence of Diphtheritic and Tetanus Toxins on the Hæmoglobin. H. Kucharzewski.
 (No. 5.) An Epidemic of Dysentery (118 cases) with *B. Shiga*. R. Doerr.
 Immunization with Diphtheria Bacilli. A. Lipstein.

- The Relation of Rats to Typhoid Fever. E. Wiener. (Typhoid bacilli are liable to remain alive in rats for a month after typhoid dejecta have been eaten by the animals. By their dejecta in turn they are liable to infect articles of food and drinking water.)
 Attempt to Explain the Mode of Action of Immune Bodies by Physical Properties. H. Zangger.
 Artificial Immunity to Staphylococci. Pröscher.
 The Differential Diagnosis between *B. coli* and *B. typhosus* on the Basis of Acid Formation. R. Zielleczky.
 (No. 6.) The Virulence of Tubercle Bacilli. R. Kraus.
 Invasion of Ankylostomum by way of the Skin. G. Pieri.
 An Attempt to Explain the Rabbit's Susceptibility to Anthrax. O. Bail and Petterson.
 Cholera Immune Bodies. E. P. Pick.
 The Cultural Differences of Dysentery Bacilli. H. Hetsch.
 Cholera Diagnosis. Hirschbruch and Schwer.
 Vaillard's method of Disinfecting Water with Iodine—results do not corroborate. G. Obermaier.
 Apparatus for Cultivating Organisms in a Continually Flowing Medium. E. Wiener.
 Cultivation of Anaërobic Bacteria. O. Strong.
 The Behaviour of Löffler Mouse-Typhus Bacillus on certain media. C. Siebert.
 (No. 7.) *Diplococcus Weichselbaum* in the Nose. F. T. Lord.
 Attenuation of Mammalian Tubercle Bacillus by passages through Cold-blooded Animals (frogs). H. Herzog.
 To make and keep Silk Threads impregnated with Spores for Tests of Disinfection. K. Kokubo.
 Behaviour of Löffler Mouse-Typhus Bacillus on the V. Drigalski-Conradi Culture Medium. Siebert.
 Simple Method of making Collodium Sacs for Bacteriological Work. W. D. Frost.
 (No. 8.) Relations of Lactic Acid Bacteria to *Streptococcus lanceolatus*. Kruse.
 Adaptation of Bacteria to the Defensive Powers of the Infected Organism (*Pyocyanus*, *B. typhosus*). P. Eisenberg.
 Intracellular constituents of the Typhoid Bacillus. A. Macfadyen and S. Rowland.
 The Turtle Bacillus; Its Cultivation, Biology, and Pathogenicity. F. F. Friedmann. (The tubercle bacillus derived from a turtle has proved very effective in Friedmann's hands as a means of immunization against human and bovine tuberculosis. He describes experiments with it inoculated into other cold-blooded animals. It invariably induced a rapidly fatal tuberculosis in them, but in mammals it behaved differently.)
 Antitoxic Sera. F. Wechsberg. (The aim of serum therapy is the production of serums as polyvalent as possible, for use against the various partial toxins of the disease germs. The results of tests on animals can not always be applied to man without reserve.)

Deutsche Medicinische Wochenschrift, Vol. XXIX.

- (No. 50.) Is Rabies Toxin Filterable? A. Celli and D. de Biasi.
 Agglutinations and Precipitations. R. Paltauf.

Immunization against Tuberculosis. F. F. Friedmann. (He has succeeded in rendering guinea-pigs and other animals immune to virulent doses of human and bovine bacilli by previous injection of tubercle bacilli derived from a large turtle which had succumbed to spontaneous tuberculosis. Animals treated with cultures of the turtle bacilli respond with a local infiltration, but it soon heals, leaving scarcely a trace, and the animals remain in the best of health, while they tolerate without reaction otherwise fatal doses of human and bovine infection. When killed after three months, the guinea-pigs showed no traces of infection except scattered, occasional, minute nodules similar to those described by von Behring and others in their immunized animals. No bacilli could be found in any of them, and in time they would probably entirely retrogress.)

(No. 51.) Marmorek's Tuberculosis Serum. J. Goldschmidt.

The Injection of Diphtheria Antitoxin in the Exanthemata. Oberwinter.

Sterilization of Milk by Heating. Tjaden.

VOL. XXX.

(No. 2.) The Production of Specific Substances from Bacteria. M. Mayer.

(No. 5.) Ubiquity of Tubercle and Disposition to Phthisis. C. Pfitzger. (He does not think it is as ubiquitous as has been represented, except in the immediate neighbourhood of careless phthisical patients. He does not accept Behring's recent announcements, pointing out fatal objections thereto.)

Active Immunization against Tuberculosis. F. F. Friedmann. (See above, No. 50, and also *Centr. f. Bakt.*, No. 8.)

Münchener Med. Wochenschrift, VOL. L.

(No. 49.) "Enriching" Method of Cultivating Typhoid and Paratyphoid Bacilli. O. Lentz and J. Tietz. (By the technique described scanty bacilli were induced to multiply 850-fold, and enabled the correct diagnosis to be made in 8 out of 20 positive cases in which it would have been impossible by any other known means. These were the results of 180 single examinations of stools or urine, the other members of the family being always examined with the patient. The technique for the typhoid bacillus is stated to be the simplest and best yet offered, and ideal for the paratyphoid bacillus. The stool is mixed with twice the amount of salt solution, and 1 to 2 c.c. are distributed with a glass spatula over a malachite-green agar plate. The spatula is then transferred to a litmus-lactose agar plate as with the Drigalski-Conradi technique. After twenty hours in the incubator the blue plates are examined first. If no typhoid colonies agglutinating with typhoid serum are discovered on them, or on the green plate, about 2 c.c. of bouillon or salt solution are poured over the plate, and a loop with four or five of the most suspicious looking colonies is transferred to two large litmus agar plates. They are then examined again for typhoid and paratyphoid bacilli after a sojourn of sixteen to twenty hours in the incubator. No other bacteria grow on 1/1000 or 1/10000 malachite green so vigorously as the paratyphoid bacilli. The agglutinability is somewhat reduced by this technique, but it is regained after transference to the blue plate. The malachite green inhibits or retards the growth of all other bacteria except the dewdrop colonies of alkali-forming bacilli, and these are readily differentiated.)

(No. 52.) Importance of Normal Intestinal Bacteria for Man. J. Strasburger. (They are held to be necessary for the breaking up of the cellulose cover of certain articles of food, and for the prevention of putrefaction; but they must be maintained in normal proportions.)

Toxin and Antitoxin. P. Ehrlich; also article on same by M. Gruber.

VOL. LI.

(No. 2.) Histology and Technique for demonstrating the *B. typhosus* in the Blood and various organs. E. Fränkel.

Zeitschrift für Hygiene und Infektionskrankheiten. VOL. XLV. HEFT I. 1903.

Contributions to the Doctrine of Natural Immunity. Karl Kisskalt (Giessen). On the Immunization of Typhoid Bacilli against the Bacterioid Powers of Serum. Erich Colin (Halle).

On the Nature of Agglutination and a New Method (freezing) of observing it quickly. N. Asakawa (Tokyo).

Contribution on the Question of Nitrogen Assimilation by the *Bacillus Ellenbachensis* a Caron. Dr. E. Jacobitz (Halle).

Formol as a means of enquiry on the Liquidation of Gelatine by Microbes. (Contribution to the Study of Liquifying Diastases.) A. Mavrojannis (Athens).

Studies on *Bacillus coli*. K. Totsuka (Tokyo).

On the Workings of some Chemical Disinfectants. D. Schumburg. (Hanover).

His conclusions are:

1. Bromine in the strength of 0.08 in 1000 as a rule completely kills cholera and typhoid bacilli in water. There were some exceptions. The few surviving bacteria would not grow on solid media.
2. Sterilization by heat, possibly also by ozone, is, therefore, to be preferred to that by bromine. If these methods cannot be employed (as in expeditions, quick marches, and short rests) then bromine finds its place.
3. The bromine, as such, is to be melted down, and in every case bromine water is to be made.
4. Sublimate 1-1000 or carbolic acid 5% are more uncertain than bromine. After 1/4 hour in these, some cholera and typhoid bacilli and staphylococci were still found alive.
5. This justifies the suspicion that by these disinfectants, which are the strongest we possess, we cannot completely rid water of disease-producing bacteria in a short time (up to 1/2 hour).

The Bacillus of the Düsseldorf Meat Poisoning, and the related Bacteria of the Paratyphoid Group. H. Trautmann (Bonn).

HEFT II. 1903.

On the Influence of Higher Pressures on Micro-organisms. G. W. Chlopin and G. Tammann (Odessa and Göttingen).

Enquiries on Formaldehyde Disinfection after the Breslau Method—referring specially to the Disinfection of Uniforms. Axel Jörgensen (Laboratory of the Danish Army).

On the Mechanism of Biological Self-purification of Ice.—Experimental enquiry. Prof. F. Abba (Turin). (It has long been known that water in passing from the liquid to the solid state tends to return to the condition

of distilled water, by expelling all foreign substances, both in solution and in suspension. Thus salt water becomes more or less fresh, and fresh water loses much of its hardness, &c. In the manufacture of artificial ice, the outside of the block is the clearest and purest, and the centre is opaque (schneeige or snowy) due to innumerable small bubbles. This portion is the last to freeze, and the impurities of the water are found concentrated here; since being in a small vessel they cannot be expelled externally. Taking advantage of this property, Prof. Abba diluted water with known quantities of various micro-organisms, and found as he anticipated that the ice in the centre of the block contained by far the largest number (in 56 experiments 10 to 100 times as many).

His conclusions and recommendations are:

1. That the biological self-purification of ice occurs in the same manner as the chemical.
2. That in freezing, the molecules of water endeavour to squeeze out dissolved salts, and all substances which do not take part in their composition.
3. In the preparation of artificial ice for eating and drinking, where distilled or boiled water cannot be got, before it completely solidifies the central water, containing all the impurities, should be removed (by aspiration) and replaced by pure drinking water.
4. In the employment of ice for food, and especially in the case of invalids, clear crystal ice is to be preferred, since it contains either none or a very much smaller number of bacteria than the cloudy (schneeige).

On Chronic Glanders in Men. Karl Zieler. (Breslau)

HEFT III. 1903.

Malaria in Turkestan—Pathological—Clinical Studies. Serg. Marc, St. Petersburg.

Report on the work of the expedition sent to combat Malaria in German East Africa. Ollwig.

Plague-like Bacteria, which are pathogenic to Rats. R. O. Neumann (Hamburg).

Ætiology and Serum Therapeutics of Whooping-Cough. M. Manicadeo (Jutschrift).

(This interesting paper is based on the results of the bacteriological examination of the sputum of 82 cases of whooping-cough. In all but 5 cases he succeeded in isolating an influenza-like bacillus called the Bacillus Z. Although experiments with this bacillus were unsuccessful in producing the symptoms of whooping-cough, nevertheless he managed to produce an antitoxic serum by immunizing 8 sheep and 2 horses. Of 89 cases on which this serum was tried, 86 were cured and 58 improved. His conclusions are: "That the serum cures those cases which are not more than 12 to 15 days old, in 2 to 12 days. The older cases are usually very much improved, but the cure follows after several days.")

Centralblatt für allgemeine Gesundheitspflege, 23ter Jahrgang. 1 AND 2 HEFT, BONN, 1904.

Report on the General Assembly of the Lower Rhenish Public Health Union, held in Cologne (Gürzenich) on November 7th, 1903.

The care of Infants, dealing especially with Illegitimacy. Dr. Kraulwig, of Cologne.

The Artificial Lighting of Schoolrooms. Dr. A. Proebsting, of Cologne.

German Public Health Quarterly, Brunswick, 1904,
1st PART, VOL. 86.

Report of the 28th Congress of the German Public Health Association, held at Dresden, Sept. 16th, 17th and 18th, 1903.

In what direction do our present measures for stamping out Tuberculosis need supplementing?

(I.) The unmistakable fall in the death-rate from Phthisis, shews that in adopting our present measures for stamping out Tuberculosis we are on the right track. They should be supplemented in the following directions:—

1. Public laboratories should be established in greater numbers, so that Medical Practitioners in town and country may gratuitously have secretions examined for tubercle bacilli. The transmission of samples should be facilitated as much as possible.
2. Notification to a limited extent by practitioners, extending at least to—
 - (a) Every death from Pulmonary or Laryngeal Tuberculosis.
 - (b) Every change of residence of a person suffering from the above named diseases, or his removal to a hospital.
 - (c) Every case where a person suffering from the above named diseases renders his surroundings highly dangerous on account of the conditions of his house or unwholesome mode of life.
3. Disinfection in the cases under (2a) and (2b). For poorer persons this should be done at the public expense.
4. In cases under (2c) persons should fall in with such directions as are considered suitable in order to prevent the spread of the disease.
5. When the sick live in unhealthy dwellings and according to unwholesome modes of life, the best means of preventing the spread of the disease, is to remove the sick person to a hospital. Especially should there be provided a larger number of "homestead" asylums, or special wards in the general hospitals, where those phthisical patients not fitted for the former institutions should be treated, the poor gratuitously, others for a small fee.
6. Where in the cases mentioned under (2c) the separation of the sick from the healthy is not possible, the removal of the healthy should be aimed at. Homes for infants and children should be provided, because of their greater liability to tubercular infection.
7. Tuberculous persons should not take up those occupations which specially seem to favour the transmission of the disease, e.g., as sailors, in dust-producing occupations, in provision stores, etc.

Discussion was introduced by Prof. Gaffky. The following took part in the discussion—Dr. Pshuschky (Dantzic), Herr Lehwald (Duisberg), Dr. Altschul (Prague), etc.

Hygienic Regulations for Inns and Drinking Places. Dr. Bornträger.

1. Inns and drinking places, useful and necessary institutions for public intercourse, necessarily from their nature are liable to certain hygienic dangers to the guests, to the staff, and to a wider circle of people (transmission of infective diseases, origination of ordinary illnesses, dangers to health, nuisances and injuries to mind and body).
 2. Sanitary regulations, therefore, are appropriate, viz.:—
 - (a) A proper water supply, pure, germ-free, copious, for all purposes for guests and staff.
 - (b) Measures for the necessary removal of all excreta in a harmless manner so as not to cause a nuisance.
 - (c) Suitable and healthy sites, buildings, and arrangements for the whole hotel.
 - (d) Management carried out in a clean, hygienic manner.
 - (e) Dietary healthy, with no compulsion to drink.
 - (f) Hygienic care for the staff.
 - (g) Proper attention for cases of sickness arising on the premises, especially of infectious diseases.
 - (h) Regulations against certain off-shoots incident to hotel life, on moral and social hygienic grounds.
 3. Many of these regulations are prescribed, many are here and there spontaneously introduced by intelligent hotel-keepers: as a rule a greater practical interest in this pressing matter is much to be wished for, and careful frequenters of hotels and drinking places should see, for their health's sake, that there are such private hygienic regulations.
 4. The great importance of hygienic regulations in hotels and drinking places, together with the multiplicity of interests involved and the numerous divisions of the subject, justify the establishment of a special section of "Hotel Hygiene."
- The Hygienic Supervision of the Milk Trade. Prof. Dunbar, Hamburg.
1. The present conditions of the milk supply of towns do not satisfy hygienic requirements.
 2. One fact alone, that in the German Empire every year about 150,000 artificially fed infants die from being fed on decomposed milk, goes to show us that the improvement in the milk is of an importance second to no other problem of town hygiene.
 3. On account of the high development of technical work in the dairy, it is possible to provide a hygienic milk supply for towns, specially suitable for infants, at the same price as the ordinary milk of commerce at present.
 4. That this possibility is not now converted into a reality, is due to the ignorance and indifference of the consumers in towns, as well as to the fact that town authorities possess no control over the production or carriage of milk.
 5. The ordinary supervision of the milk trade is not enough. The analysis of samples taken in transit, has the value of detecting a lessening of its nutritive value, or the addition of some preservative material. In judging the quality of a milk the analysis of such a sample only has the value that an analysis of an added sample of well water would have. This would afford no sufficient hygienic foundation for the determination of a casual dangerousness of the well from which

- the sample came. Little also does the chemical or bacteriological analysis of a sample of trade milk give us sufficient information as to casual danger from infection at the place of origin of the milk.
6. The difficulty in the way of a uniform supervision of the whole production of, carriage of, and trade in milk destined to be used in town, should be removed by an Imperial law.
 7. This supervision would be regulated by the appointment of Commissions in which members of District Councils, Chambers of Agriculture, and representatives of towns will take part. An agriculturist, a veterinary surgeon, and a physician would be attached to the Commission. They would have the control of Licenses for dealing in milk.
 8. Until the problems numbered 6 and 7 are settled, the town authorities should make it their business to see that for all infants artificially brought up, at least, a hygienically unobjectionable milk should be procurable at the present price of trade milk.
- Dr. Schlossmann (Dresden), Dr. A. Baginsky (Berlin), Dr. Fischer (Kiel), Dr. Meinert (Dresden), Dr. Altschul (Prague), Dr. Pelruschky (Dresden), and others took part in the discussion.
- The Purification of Drinking Water by Ozone. Dr. Ohlmüller, of Berlin.
- The Regulation of Buildings from a Public Health point of view. Dr. Rumpell, Dresden, and Herr Stubben.
- Journal of Infectious Diseases, Chicago, Vol. I.**
- (Jan. 2.) Cultivation of *Trypanosoma Brucei*. Frederick C. Novy and Ward J. McNeal.
- Studies in *Pyroplasmosis Hominis*. ("Spotted Fever" or "Tick Fever" of the Rocky Mountains.) Louis B. Wilson and William M. Chowning.
- Report on Two Cases of a Peculiar Form of Hand Infection due to an Organism Resembling the Koch-Weeks Bacillus. John R. McDill and William B. Wherry.
- The Pathologic Anatomy of "Paratyphoid Fever." Report of a Fatal Case with Bacteriologic Findings. H. Gideon Wells and Lee O. Scott.
- Agglutination of Streptococci, especially Those Cultivated from Cases of Scarlatina, by Human Sera. George H. Weaver.
- The Effects on Streptococci of Sera of Cold-blooded Animals. Gustav F. Rüdiger.
- The Action of Certain Salts on the Complement in Immune Serum. Wilfred H. Manwaring.
- Experimental Study of Thyrotoxic Serum. Milton M. Portis.
- Contribution to the Casuistry of Placental and Congenital Tuberculosis. Aldred Scott Warthin and David M. Cowie.
- Changes in the Bacterial Flora of Sewage During Storage. C. E. A. Winslow and D. M. Belcher.
- Some Cultural Relations and Antagonisms of *Bacillus Coli* and Houston's Sewage Streptococci; with a Method for the Detection and Separation of these Micro-organisms in Polluted Water. S. C. Prescott and S. K. Baker.
- The American Journal of the Medical Sciences,**
- (Feb., 1904.) Cases of Typhoid Fever presenting an Arterial Complication. W. R. Steiner.
- Ludwig's Angina. Report of cases.

The Journal of the American Medical Association,
Vol. XLII., 1904.

- (No. 1.) Tuberculosis in Prisons. (The late attention of prison authorities to this subject. The facts in New York. Prisons in other states compared, especially Joliet and Chester, Illinois.)
- The Cause of Scarlet Fever. (The failure of the streptococcus findings to meet the requirements. F. B. Mallory's recent announcement of protozoa as a probable cause. He found them in the epithelial cells of the epidermis, between them, in the lymph spaces, and in the spaces of the corium.)
- Report of the French Yellow Fever Commission. (The French Commission and its confirmation of the findings of Reed, Carroll and Agramonte. The stegomyia the sole carrier of the disease.)
- (No. 2.) Typhoid Fever: Some Unconsidered Hindrances in its Prophylaxis. John S. Fulton. (Distribution of typhoid throughout the country in the various grand divisions. Typhoid mortality in urban and rural districts. Many cases undiagnosed. Much "malaria" is in reality typhoid fever. Discussion by Drs. Musser, Rochester, Krauss, Warner, Hurty, Sewall, Roberts, Adams, Tyson, Walsh, Shropshire and Happel.)
- (No. 3.) Sources of Plague. W. J. Calvert.
- The Prophylaxis of Plague. J. J. Kinyoun. (The importance of diagnosis and prophylaxis in plague. Variations in symptoms and type of disease. Climatic conditions. Race habit. Disinfection. Classification of suspects. Extermination of vermin.)
- The Results and Prospects of Tenement House Reform Abroad. The victories over the slums in English and continental cities. Difficulties of the problem in New York. Rapid and cheap transportation as an aid in its solution.)
- (No. 4.) Oysters and Typhoid Fever. (Prevalence of typhoid in certain New Jersey towns and its causes. Oysters as a cause of typhoid. Their contamination in the process of fattening in fresh water.)
- Inherited Tuberculosis. (Recent studies of Warthin and Cowie, suggesting that placental tuberculosis is not rare—*Journal of Infectious Diseases*, 2nd Jan. Their facts and arguments. Conclusion that latent congenital tuberculosis is possibly a more frequent condition than has been hitherto supposed.)
- (No. 5.) The Control of Prostitution and the Prevention of the Spread of Venereal Diseases. M. L. Heidingsfeld. (Venereal disease and prostitution inseparable. Failure of regulation. Its causes. Evidence from private practice. Other and better measures. Education of the public.)
- A Case of Diphtheria at Seventy-Six Years of Age. A Belcham Keyes.
- Pure Milk in Infant Feeding. The investigation of Drs. Park and Holt on the use of pure and impure milk among tenement children in New York. (Special aspects of infant feeding brought out by the report. Conclusive demonstration of the dangers of raw milk for summer diet. Difference between cool and hot weather in this respect. Indications for reform measures.)
- The Albany Diphtheria Statistics. (Diphtheria statistics for the past three years. Advantages of the antitoxin treatment. The question of withholding it in mild cases.)
- (No. 6.) The Need of a Uniform Standard for Departments of Health. (Divergencies in practice as regards report of contagious and infectious disease, isolation, disinfection, etc.)

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EDITORIAL.

THE BACTERIOLOGICAL EXAMINATION OF WATER.

THE paper by Drs. Thresh and Sowden on the Bacteriological Examination of Water, read at the last meeting of the Home Counties Branch, and the subsequent discussion, raise many points of interest. It is true much of the paper and of the discussion dealt with technique concerning which only those who are actively engaged in the bacteriological examination of water can be expected to speak with any certain voice. But while few have opportunity or necessity for doing laboratory work of so specialized a character, it is essential that every Medical Officer of Health should clearly understand what a bacteriological report on a given water supply may fairly be expected to indicate, how such a report should be interpreted, and what assistance can be rendered by the bacteriologist in estimating the safety of a given water supply. To this end both the paper and discussion may be studied with profit, as also may the kindred papers of which reprints appear in the current number. Those who are "sick for certainties" will no doubt suffer disappointment, because there is at any rate no immediate prospect that the onerous task of advising one's authority as to the safety of a given water supply can be achieved by collecting a few cubic centimetres of water in a sterile bottle and forwarding it to the nearest bacteriological expert.

A generation ago reliance was almost universally placed on the chemical examination of water, but as epidemiology progressed it became apparent that this reliance was misplaced, and it is now generally recognized (except perhaps by a few chemists) that chemistry tells only "of impurity and hazard, but not of purity and safety." No one has contributed more than Dr. Thresh to the popularization

of this view, and it was therefore with special interest that we read his pronouncement on the interpretation of bacteriological results.

Before criticizing his verdict, it is necessary to clearly understand what the epidemiologist would like the chemist or bacteriologist to tell him. Omitting for the moment such simple matters as an excess of chlorides and calcium salts, and a tendency to act on lead, one would like the chemist or the bacteriologist to give substantial help in solving the extremely difficult and important problem whether a given water supply is or is not likely to distribute typhoid fever to those who drink it.

It is, of course, generally recognized that chemical analysis alone, and especially the chemical analysis of isolated samples, can only give the broadest indications of "impurity and hazard." Practically the chemist bases his opinion on the amount of nitrogenous compounds which the water has taken up since it was distilled in the form of rain, and certain empirical standards have been set up whereby samples of water could be classified as "pure," "usable," "suspicious," or "impure." Cholera and typhoid, however, are not due to the absorption of minute traces of ammonia compounds, but of living particulate matter; which, fortunately, is usually absent even from "impure water," and equally unfortunately has frequently been proved by epidemiologists to have found its way into water of great chemical purity; and few sanitarians would now rely on the chemical examination of isolated samples of water, except for the detection of gross contamination.

Systematic chemical examination, on the other hand, is on an entirely different footing. Chemical instability is usually regarded with the greatest concern, and is of the first importance in calling attention to the risk of pollution, though it is by the pedigree of the water rather than by its chemical composition that the Medical Officer of Health must commonly be guided.

Bacteriological examination, on the other hand, can and does estimate the quantity (and to some extent the quality) of living particulate matter present in samples of water submitted for examination, and as far as it does so the methods of a bacteriologist are more direct than those of the chemist. As Dr. Thresh shows in his paper, they are also more delicate, and an amount of pollution which might be missed by the chemist would at once arouse the suspicion of the biologist. When, however, the results have to be interpreted in terms of "hazard," the bacteriologist, like the chemist, is for all useful purposes limited to mere inference, and the very delicacy of his methods makes it essential that these inferences should be carefully examined. Should the specimens of water prove sterile, he is

naturally on safe ground, at any rate so far as the particular sample is concerned. If, however, it is not sterile, he must determine the number and, if possible, the species of bacteria in a measured quantity, and more especially the presence or absence of bacteria commonly present in sewage and faeces, such as *B. coli communis*, *B. enteritidis sporogenes*, and streptococci. Now all three of these organisms are common inhabitants of the human intestine, and if they are certainly absent from a specimen of water it is at least extremely improbable that cholera or typhoid organisms could be present. What, on the other hand, is to be inferred from the presence of these organisms "of intestinal type," about the distribution of which there is still much to be learnt? The answer of the majority of bacteriologists appears to be, "pollution." This, of course, can readily be agreed to, if by "pollution" it is simply meant to express the fact that the water is no longer sterile. If, on the other hand, "pollution" connotes contamination with intestinal matter of human origin, with possible or probable risk of infection with the specific organisms of disease, then we must confess to some hesitation in adopting so sweeping a hypothesis. Dr. Thresh obviously appreciates this, and apparently would not condemn a water on bacteriological evidence alone unless it contained both true *B. coli* and spores of *B. enteritidis sporogenes*, though either of these organisms alone may be found in water above reproach. This is a hard saying, and at first sight suggests an experimental proof of the grammarian's axiom that two negatives make an affirmative.

Such a standard could only be justified in two ways: It must either be shown that these two organisms do not exist as messmates in nature except in sewage, or that these organisms are never found together in other than dangerous waters. Now, concerning the natural habitat of both *B. coli* and of *B. enteritidis sporogenes*, there is too much divergence of opinion for the former proposition to be accepted without demur, and we are unaware of any sufficient body of evidence supporting the latter.

What assistance, then, can the pure bacteriologist render? This we believe must vary with the source of the water. In the case of upland waters from satisfactory gathering grounds, nothing can or should take the place of systematic inspection of the watershed, and frequent bacteriological examination hardly appears worth the time and trouble involved. In the case of filtered water the careful enumeration of the bacteria present in the filtrate is extremely valuable, and it is not improbable that Koch's empirical standard is sufficiently stringent for all practical purposes, though here again there is room for enquiry on the largest possible scale.

With regard to deep well water, on the other hand, there is very great difficulty in coming to any conclusion. On *a priori* grounds one would hope and expect that all such waters should be practically sterile, but in certain geological formations this is far from being the case, especially, perhaps, in years of excessive rainfall. Should all such waters be condemned if they persistently contain *B. coli* or *B. enteritidis*, or both? For reasons already given, such a decision would probably carry us further than the facts would warrant. Nor does it seem clear that the species of bacteria present are of much assistance, for a source of contamination that allows the entry of any member of the coli group to-day, may afford passage for other members to-morrow. In other words, if contamination at the well head can be excluded, any considerable departure from sterility must betoken surface connections of some sort. Something no doubt is to be said for a provisional numerical standard such as Koch introduced for filtered river water, and it might be argued that after all deep well water is only filtered rainwater, and need not be submitted to more stringent tests than are usual in the case of artificial filter beds. Obviously, however, the two conditions are not strictly comparable, and the matter is one which cannot be decided offhand from the experience of one or two observers. What is wanted is the collation of chemical, bacteriological, topographical, and epidemiological facts concerning well waters in different parts of the country, and the Committee suggested by the Home Counties Branch will do valuable work if they initiate such an enquiry.

In the meantime we can assert that the routine examination of colonies is extremely valuable if conducted at frequent, regular intervals. By this means we ascertain the usual bacteria content of a water, and have the earliest indication of any deviation from the local standard. Bacteriological instability, betokened by considerable variations in the number of colonies, would then lead to thorough investigation of all possible sources of pollution at the earliest moment.

Possibly, and in our opinion probably, we may some day be obliged to go a good deal further, and to suggest that all well water should be filtered if it is not approximately sterile, but for the moment we are in accord with the recent conclusion of Dr. Houston, that "there may be some danger of hastily condemning water and other materials without a wider knowledge of comparative bacteriology, and of the correlation of bacteriology and epidemiology, than is at present available."

THE BACTERIOLOGICAL EXAMINATION OF WATER.

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DURING recent years great attention has been given by bacteriologists to the examination of water, it having been recognized that chemical analyses could not detect slight degrees of pollution by sewage or manurial matter. The limit of such analyses appears to be the detection of about 1 part of an average sewage in 1,000 parts of water. A public water supply of say one million gallons daily might receive 1,000 galls. of crude sewage without the chemist being definitely able to certify that it was sewage-polluted. This can be demonstrated by a simple calculation, or by actual experiment. A single example will suffice.

A sample of crude clarified sewage submitted to examination gave the following results:—

Free Ammonia	..	..	..	3.5 per 100,000
Organic Ammonia	..	..	..	.51 "
Oxygen absorbed	..	..	..	5.35 "

The water supply to the same town gave the following results:—

Free Ammonia	..	..	..	.002 per 100,000
Organic Ammonia	..	..	..	.000 "
Oxygen absorbed	..	..	..	.019 "

If to this water .1 per cent of the sewage is added the effect upon the analytical results can easily be calculated. These are given below and compared with the results of the actual analysis:—

CALCULATED RESULTS.				ANALYTICAL RESULTS.
Free Ammonia	..	.0055	..	.005
Organic Ammonia	..	.00051	..	.0005
Oxygen absorbed	..	.02435	..	.0291

One gram of tea was added to ten litres of the town's water, and the infusion gave on analysis:—

Free Ammonia	..	..	..	.006
Organic Ammonia	..	..	..	.065
Oxygen absorbed	..	..	..	1.744

Any analyst examining these two waters, one containing .1 per cent of sewage and the other containing .01 per cent of tea, would have reported the latter as being the worse water. Probably the former would be characterized as of great organic purity, and the latter as of a very doubtful character.

We have introduced this example, because it is even yet very difficult to convince some Medical Officers of Health and some aspirants for Public Health qualifications, that chemical analysis is of very little use for the detection of sewage pollution.

This fact has, however, long been recognized by all those who have had the opportunity of examining samples of water from sources with which they were well acquainted, and who have studied the analyses made by themselves or others of waters which have caused serious outbreaks of disease. Consequently the aid of bacteriology has been sought, for the detection of pollution not sufficiently gross to be detected by chemical methods.

At first it was assumed that a polluted water would contain a larger number of bacteria than an unpolluted water, and attempts were made to set up standards on this basis. Experience soon showed that this was a most fallacious test; different observers set up different standards, and it is now admitted that, save in certain circumstances, the mere enumeration of the bacteria in a water is a waste of time. It is still commonly practised, however, as part of a routine bacteriological analysis, consequently we must make reference to the great discrepancies between the results obtained by different observers examining the same waters. The results are often so different, that we do not wonder at engineers and water authorities doubting whether bacteriological results are as reliable as chemical results. The cause is usually attributed to the difference in the media used, especially in its reaction to litmus, but we are inclined to think it is due chiefly to the method of counting. It is a very simple matter to make a gelatin plate cultivation, and to incubate it, but it is a difficult matter, very often, to say how many bacteria are growing in or upon it. Assuming the absence of a sufficient number of liquefying colonies to prevent the counting, the number of colonies continues to increase day after day, and many of these may never become sufficiently large to be counted by the unaided eye. The mere statement "number of bacteria per cubic centimetre" is most unscientific, as it is not the expression of a fact. No bacteriologist can say how many bacteria are contained in a cubic centimetre of any natural water. He may ascertain how many colonies can be counted, with the unaided eye or by means of a lens, growing upon a medium of a certain kind, at the end of a given number of hours; and if this is what is meant by the "number of bacteria per

c.c." why not say so, and at the same time give some indication of the nature of the medium, of its reaction, of the period and temperature of incubation, and the method of counting? When this is done results obtained in different laboratories may be comparable, or if not comparable, the reason why they are not will be known.

As little or no stress can be laid on this enumeration of colonies as an aid in the detection of sewage pollution, the difficulties attending an accurate counting may appear unworthy of mention, but there is one particular purpose for which this process must continue to be used, until a better is devised, and that is the testing of the efficiency of processes of filtration. We do not purpose referring further to this subject, save to observe that it may ultimately be found more reliable to dilute the filtered water with a sterile water, and inoculate broth with quantities of the dilutions representing $\frac{1}{10}$, $\frac{1}{100}$, $\frac{1}{1000}$ and $\frac{1}{10000}$, etc., of a cubic centimetre respectively of the original sample, and to judge of the efficiency of the filtration by the results obtained. We may have more to say on this subject at a future time.

When faith was lost in colony-counting for the detection of pollution, some held that whilst the total number of organisms was of no significance, the enumeration of the organisms which liquefied gelatin was all important. Still later, when it was recognized that this in itself was also fallacious as a test, it was urged that the number of different species of bacteria was most important as an index of the degree of pollution, pure waters containing but few different species, whilst sewage-polluted waters contained many. Assuming this to be correct, the knowledge is of little service to us, as the enumeration of all the different species found in a sample of water is impracticable, if not impossible.

Other bacteriologists, arguing that natural waters contain few bacteria capable of growing at a temperature of 98° F., whilst sewage swarms with such organisms, make surface cultivations on agar plates at this temperature, and count the number of colonies produced. Unfortunately the results, taken alone, have little if any value, since many organisms occur in water above the suspicion of pollution, which will grow under the above conditions, and to fix a numerical standard would only be to perpetrate another absurdity. An excessive number of colonies growing at this temperature would indicate the probability of pollution; but this is the utmost which could be said, and as there are simpler and more reliable methods of ascertaining this probability, the method is of no further interest.

During the last few years bacteriologists have been chiefly engaged in devising processes for isolating definite organisms, more or less characteristic of sewage or of manurial matter, the presence of which,

either alone or in association, in a sample of water, would indicate pollution. Other bacteriologists have been searching for some simple test which can be directly applied to a water without the trouble involved in the isolation and identification of organisms.

We purpose dealing with some of these simple tests first, since their ease of application is likely to cause them to be widely used, and unless a note of warning is raised in time the results will be disastrous, as none of them are reliable, though one of them may possess a great advantage as a kind of preliminary test. All these tests were based originally on some reaction produced by the *bacillus coli communis*, and if a water gave the reaction, it was assumed that this organism was present. This conclusion has so often been found to be erroneous, that the more careful and conscientious observers will now go no further than to assert that a positive reaction indicates the presence of organisms of intestinal type.

The tests to which we refer are :—

1. Growth in phenolated broth.
2. Production of fluorescence in broth or other medium coloured with neutral red.
3. Production of gas bubbles in a shake gelatine culture.
4. Production of acid and gas in a bile salt broth.

In applying these tests to quantities of water exceeding 1 or 2 c.c., either bacterial concentration must be effected by the use of suitable filtering arrangements, or concentrated media must be prepared, so that by adding the proper proportions to the water to be examined a definite strength is obtained. We much prefer the latter method whenever possible.

No. 1.—The phenolated broth test is now probably little used. If a uniform turbidity is produced in twenty-four hours (at 98° F.) in a broth containing .05 per cent of phenol, a suspicion of pollution is raised; whereas if no growth occurs or if the growth only produces local effects, there is no indication of pollution in the quantity of water examined. This test is not so delicate as No. 4, and as the growth produced may be due to organisms other than those of intestinal origin, we do not think it worth the trouble of applying.

No. 2.—The use of neutral red as a test for sewage pollution has been strongly advocated, and whole series of papers have been published to prove that it is a valuable test for the presence of the *bacillus coli communis*. It was first introduced as a test for distinguishing between this bacillus and the *B. typhosus*, then Dr. Makgill as the result of a series of experiments announced that neutral red media afforded a rapid and very delicate test of the presence of the *B. coli communis* in water. Still later Dr. Savage published the results of his experience

with these media, in which he appears to have obtained the peculiar fluorescent appearance due to its reduction with all waters which he considered "bad," and with a large proportion of those he considered good. Apparently assuming that in all cases this reduction was due to the presence of the one organism, the *B. coli communis*, he says, "The results are somewhat surprising, and tend to make one reconsider the significance of the *bacillus coli* in water." Our experience tends to prove that there are many organisms which reduce neutral red besides the *bacillus coli*, some of them acting even more powerfully than the *B. coli*, and that such organisms are frequently met with in water. Moreover, many organisms will reduce the neutral red when grown anaerobically which have no effect when grown aerobically. For example, using an agar medium, fluorescence may be produced toward the bottom of the tube, but not near the top, and the same organism when introduced into a neutral red broth exercises no visible reducing effect, unless a small test tube is inverted and inserted in the broth (the small tube being filled with broth), when fluorescence may make its appearance in this inner tube. The amount of neutral red present may also affect the results, no perceptible fluorescence being apparent if the media contains too little or too much of the dye.

This so-called "rapid and very delicate test" is in our opinion, taken by itself, absolutely valueless, and anyone depending upon it must be led into most serious errors. A study of the table at the end of this paper will show that many organisms which apparently belong to the *coli* group do not reduce neutral red in an agar medium, whilst others which do not belong to this group are capable of reducing it. As a preliminary test even, we regard it as utterly useless.

3.—The shake gelatine test so strongly recommended by Houston is based upon the fact that in sewage there is found an immense number of bacteria which when grown in a glucose gelatine medium (gelatin shake-culture) produce after twenty-four hours incubation at 20° C. bubbles of gas within the mass of jelly, whereas in pure waters such organisms are rarely found. The application of the test necessitates the bacterial concentration of the water to be examined, as not more than 1 c.c. of liquid can be added to each tube of jelly. The utmost that Dr. Houston claims for this test is that a positive reaction affords presumptive evidence of pollution, but that a negative reaction does not prove the absence of polluting matter in small amount. For certain purposes in connection with the examination of sewage effluents the test is of great value, but as a test for the presence of sewage in water, if not exactly useless, it is, as we shall show, unnecessary, and used alone it certainly is unreliable.

4.—The last of the simple tests to which we shall refer entails the use

of a special medium in a special manner. The medium used is generally associated with the name of Dr. MacConkey, and is a solution of bile salt, peptone, and glucose in water, tinted with neutral litmus. This solution or broth is placed in wide test tubes, within each of which there is a much smaller tube. During the sterilizing process all the air is driven out of the inner tube, and when ready for use this smaller tube is quite full of the broth. By using concentrated broths any quantity of water from 1 to 25 c.c. can be examined. The mixture is incubated for from twenty-four to forty-eight hours at 37° C. (MacConkey prefers 42° C.), and the result noted. Any growth occurring, may (1) be associated with the formation of acid and gas, or (2) by the formation of acid but no gas, or (3) neither acid nor gas may be produced. So far as we are aware no organism usually found in sewage, or rather which is characteristic of sewage, occurs in group 3, so that this need not be further considered. On the other hand groups 1 and 2 consist mostly of organisms of "intestinal type," nearly all those in group 1 being of faecal origin, and most of those in group 2.

GROUP 1.	GROUP 2.
<i>Bacillus coli communis</i>	<i>Bacillus typhosus</i>
" <i>acidi lactici</i>	" <i>pyogenes foetidus</i>
" <i>lactis aerogenes</i>	" <i>cholerae</i>
" <i>enteritidis</i> (Gaertner)	" <i>prodigiosus</i>
" <i>paracolon</i>	<i>Staphylococcus aureus</i>
" <i>cavicola</i>	" <i>albus</i>
" <i>neapolitanus</i>	" <i>citreus</i>
" <i>icteroides</i>	
" <i>pneumoniae</i>	
<i>Proteus vulgaris</i>	

MacConkey concluded that if a water contained organisms belonging to either of these groups it was probably faecally contaminated, whereas if it contained no such organisms faecal contamination was absent. He experimented with about 300 samples of water, and in his report thereon he asserts that in every case in which the result of the above test was positive, further investigation showed the presence of the *bacillus coli communis* in the water.

These results seemed so striking and encouraging, that we at once commenced the use of MacConkey's medium in our routine examination of all waters, but we soon discovered that whilst a negative reaction could be depended upon to show the absence of polluting matter, a positive reaction was utterly unreliable. In fact, the test would have caused us to condemn some of the largest and most important supplies in the country, and many which we knew were free from the risk of faecal contamination. Another thing was absolutely certain:

that many waters gave the reaction even of group 1, which contained neither the *B. coli communis* nor any organism closely allied to it. We communicated with Dr. MacConkey, and found that he acknowledged that the test was not such a positive indicator of pollution as he at first supposed, and also that he had found that waters giving the reaction of group 1 did not always contain the *bacillus coli communis*.

So far as it goes, however, this test is of the utmost value. If, upon using a reasonable quantity of water, acid and gas are not produced, further examination is unnecessary; the water cannot contain any appreciable amount of polluting matter of faecal origin. This we have demonstrated again and again by adding 1 part of sewage (from most diverse sources) to 1,000,000 parts of sterile water. In every case the dilution could be made to yield a positive reaction. With stale sewage or sewage effluents the delicacy is not so great, but almost invariably an admixture of 1 part of such polluting liquid to 100,000 parts of water could be detected, using from 1 to 25 c.c. of water for the experiment. As a preliminary test it is the only one in which we have any real confidence. It is in our opinion more delicate than phenolated broth, and more selective in its action, and the growth in the medium can be subsequently utilized for the isolation of individual organisms. The delicacy of the test as compared with the phenolated broth test is shown in the results of the two typical experiments recorded below. In each case the incubation was for twenty-four hours.

WATER A.

1 c.c. in phenol broth	..	No growth
2 c.c.	..	No growth
2 c.c. MacConkey's fluid	..	Acid and gas produced

WATER B.

1 cc. in phenol broth	..	No growth
2 c.c.	..	"
5 c.c.	..	Uniform turbidity
1 c.c. MacConkey's fluid	..	No definite reaction
2 c.c.	..	Acid and gas produced

In both these waters subsequent examination showed the presence of the organism we regard as the *bacillus coli communis*.

Whilst a negative result with this medium proves that a further examination of a water is unnecessary, we are of opinion that the production of acid only may also be ignored, since no organism of intestinal type belonging to the second group could be present in a sewage-polluted water without being associated with a far greater number of organisms belonging to the first group. Our experimental results entirely confirm this conclusion, and we therefore deem it unnecessary to examine any further for sewage pollution if the water,

when incubated with MacConkey's medium, does not produce both acid and gas. On occasions the amount of gas produced is very small in amount compared with that from waters known to contain even a minimal quantity of pollution. At present we further examine such waters, but so far the results do not show that this is necessary.

Assuming that acid and gas have been produced, further examination is necessary, and this examination must be directed towards the isolation and identification of some organism, and for this purpose only one has ever been seriously suggested, the bacillus coli communis. Most unfortunately, no two bacteriologists appear to agree as to the characteristics of this organism, and whatever definition is accepted, it can be shown that this includes many different varieties, if not distinct species. A very great deal that has been written about this organism has no importance, since the observers either failed to define accurately the characteristics of the bacillus to which they gave this name, or the description given shows beyond doubt that more than one organism has been regarded as the true coli. Some bacteriologists cannot find more than a few thousand of *B. coli* in a cubic centimetre of sewage, whilst others can demonstrate the presence of hundreds of thousands. Moreover, there are certainly several types of bacillus coli, and whilst some regard them all as varieties of the bacillus coli communis, others regard them as distinct species and restrict the name to one particular form.

Klein and Houston apparently define the *B. coli communis* as a motile, non-spore-bearing bacillus, possessing a limited number of flagella, capable of fermenting glucose and lactose, of curdling milk with the production of acid, of forming indol in broth culture, reducing neutral red with the production of a green fluorescence, producing gas bubbles in nutrient jelly, of forming a more or less brownish growth on-steamed potato, and of producing on the surface of gelatin a dry, translucent growth which does not liquefy the gelatin. The bacilli, under the microscope, appears as cylindrical rods, showing more or less pronounced motility, and they do not stain by the method of Gram.

Other bacteriologists do not consider many of these characteristics as being either constant or essential. Boyce and others define the *B. coli communis* as a group of organisms with the following characteristics:—

1. They are non-sporing and non-liquefying.
2. They rarely stain by Gram's method.
3. They produce both acid and gas with both glucose and lactose, and may do so with saccharose.
4. They produce acid in milk, and usually also coagulate it.

5. They produce acid and gas in bile salt glucose broth.
6. They grow well at a temperature of 42° C.

It will be observed that they lay no stress on the motility or otherwise of the bacillus, nor on the production of fluorescence in neutral red media, nor on the production of indol, nor on the formation of clot in milk.

The two definitions given show to what an extent bacteriologists differ, and the serious nature of the difference and its effect in the interpretation of the results of the bacterioscopic examination of water is very evident, if we accept as correct the following opinion expressed by Klein (*Brit. Med. Jour.*, Feb. 21, 1903—"The Bacterioscopic Diagnosis of Sewage Pollution of Shell-fish"). In this paper Dr. Klein says:—

"The detection, therefore, of the presence of coli-like bacilli bearing no near resemblance to *B. coli communis* does not permit any definite expression of opinion as to the probable or even possible derivation from sewage, or as to probable pollution with filth, of the material from which such microbe has been isolated. It is different, however, with the microbe above referred to in detail as *B. coli communis*—that is, the typical *B. coli*. As to this micro-organism, it is known for certain that its common habitat is the bowels of man and of the higher animals, and that domestic sewage and excremental matter and everything directly or indirectly polluted with these matters contains the *B. coli communis*—that is, the typical *B. coli*. In domestic sewage this microbe is present to the extent of 100,000 to 800,000 per 1 c.c. of the sewage, and Dr. Houston and myself have shown that sewage added to sterile water in such small quantities as to defy chemical analysis, is readily detected by the bacterioscopic test—namely, the detection of *B. coli communis*.

"To summarize, then, the foregoing, the following propositions hold good:—

"1. The circumstance that a microbe shows the characters common to all groups of the coli tribe does not suffice to identify it for useful purposes. For proof that it is *B. coli communis*, or that it belongs to the group of *B. Gaertner* or *B. typhosus* group, it has to comply with the several tests agreed by all observers as characteristic of one or other of these groups.

"2. The fact that a microbe, owing to insufficient response to certain presented tests, can only be described as a coli-like microbe, is at present of indeterminate value in making a definite diagnosis of sewage or other pollution.

"3. *B. coli communis* is a microbe which has its habitat in bowel discharges, that is, excremental matters, and is contained therein

in enormous numbers; its presence, therefore, in any material in appreciable and relatively large amounts is highly suggestive of sewage and excremental pollution."

Obviously, therefore, Klein would not consider all the organisms included in Dr. Boyce's definition as being the typical *B. coli*, and to him the presence of such in a water would be without significance. Moreover, it will be observed that Klein does not regard the mere detection of the *B. coli* communis, as defined by himself, as being absolute proof of contamination; he merely asserts that its presence in "appreciable and relatively large amounts" is "highly suggestive of sewage and excremental pollution." This is a most important qualification, and ignorance of it, or a disbelief in its truth, has led many analysts to condemn waters free from any trace of sewage pollution.

Whilst bacteriologists differ amongst themselves as to what organism they regard as the *B. coli* communis, and again as to the conclusion to be drawn from its presence, it is not likely that anyone aware of these facts can have much confidence in opinions based merely upon the detection of some organism said to be the *B. coli* communis, even if in the opinion of the analyst they are "present in appreciable and relatively large amounts." The latter phrase means the introduction of a standard, and to regard a water with two bacilli in a given quantity as unpolluted, and one with three bacilli in the same quantity as polluted, is utterly absurd.

We must confess that in our opinion little stress can be laid upon the detection of the *B. coli* alone; to be of any definite significance it must be associated with other organisms of intestinal type, and especially with some other organism fairly easily recognizable. We regard the bacillus enteritidis sporogenes of Klein as being such an organism, and our scheme of examination involves: (1) The detection of the presence of organisms of intestinal type; (2) The isolation and identification of the *B. coli* communis (as defined below); (3) The detection of the presence of the spores of the *B. enteritidis* sporogenes.

We believe that this is the minimum amount of information which will enable anyone to say positively that a water is faecally contaminated. Much less, as we have seen, will enable him to say that a water is free from any signs of such pollution. The bacteriological examination of water is not the simple thing some people imagine: it is a tedious and laborious process, yet in the present state of our knowledge it cannot be shirked by any man with a conscience. The processes we adopt are as follows:—

1. Bile salt broth cultures are made with 1, 5, 10, and 20 c.c. respectively of the water to be examined. After twenty-four hours

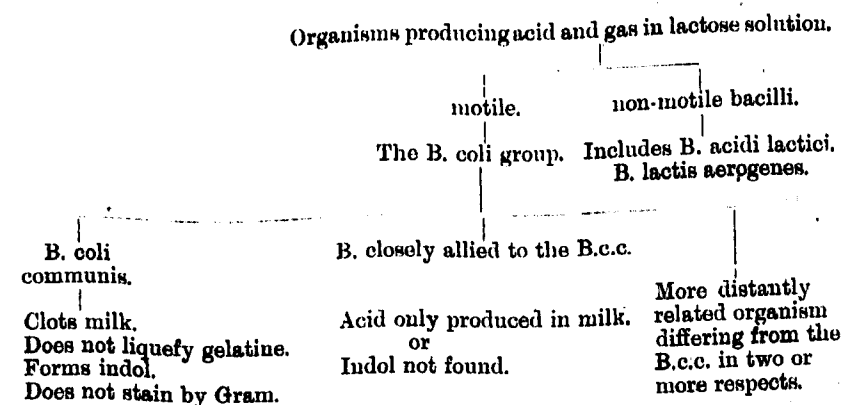
the tube containing the smallest quantity of water showing acid and gas formation is selected for further examination. If after forty-eight hours there is no production of gas no further examination is made.

2. Two or three loopfuls of No. 1 are added to 10 c.c. of sterilized water, and a loopful of the dilution is spread over a plate of bile salt lactose peptone agar containing neutral red and made faintly alkaline to litmus. This plate is incubated for twenty-four hours at 37° C, and the colonies produced examined. As the *B. coli* communis ferments lactose with the production of acid, any colonies of this organism will be of a red colour and be surrounded by a haze, formed by the precipitation of the bile acids. As this haze may not be apparent at the end of twenty-four hours, we select types of all the red colonies for the further examination.

3. Each colony so selected is used to inoculate a tube of lactose, peptone, litmus solution, and after twenty-four hours' incubation the growth, if acid and gas is produced, is examined microscopically to ascertain if the bacillus is motile or not (or spore-bearing), and it is then treated by Gram's method to ascertain whether it retains the stain. The results being recorded,

4. The turbid fluid is used to inoculate: (a) Litmus milk, for acid and clotting; (b) Glucose neutral red agar, for gas and fluorescence; (c) Gelatin (stab or streak), for absence of liquefaction; (d) Peptone solution, for indol.

If the bacillus coli communis is present, all the reactions indicated, with the possible exception of the production of fluorescence, will be produced by one or more of the colonies selected. The steps in this process are indicated on the following chart:—



Whilst this examination is being proceeded with the water is also being examined for the detection of the spores of the *B. enteritidis* sporogenes of Klein. Our routine method is to pass 500 c.c. through

a small porcelain filter* and divide the concentrated bacterial contents (contained in from 3 to 5 c.c. of the water) into two portions, one representing approximately 150 c.c. of the water, and the other 350 c.c., and introduce these into tubes of recently boiled and cooled milk. These are then heated to 80° for fifteen minutes, a little melted sterile vaseline poured over the surface, quickly cooled, and placed in the incubator. If, after twenty-four, forty-eight, or at the most seventy-two hours, the characteristic reaction described by Klein is produced, the *B. enteritidis sporogenes* of Klein is regarded as being present. If no reaction is produced, or if the clotting, gas production, etc. is not characteristic, this organism is not regarded as being present. Klein has described three anaerobic organisms commonly present in the intestines of man and other animals, and of these two, the *B. enteritidis sporogenes* and the *B. butyricus*, give identical reactions with milk, whilst the third, the *B. cadaveris sporogenes*, only slowly decomposes the milk, with the production of much gas, with a putrid odour, and rapid formation of spores. We have not met with the latter organism in any sample of water, polluted or unpolluted, and the differentiation of the two former is of no consequence, since both are common to intestinal contents.

Finally, we come to the interpretation of the results of the examinations. These results may be classified as under:—

1. Waters showing the absence of organisms capable of fermenting glucose, and of the *B. enteritidis sporogenes*. These we regard as being free from any evidence of pollution.
2. Waters showing the absence of organisms capable of fermenting glucose, but containing the *B. enteritidis sporogenes* or its near ally. In the few cases of this kind which have come under our observation we have inferred the absence of sewage pollution, but the possible presence of water derived from fertile soil. The correctness of this inference has been verified on more than one occasion.
3. Waters containing organisms capable of fermenting glucose, but not lactose, but free from the spores of the *B. enteritidis sporogenes*. These we regard as unpolluted.
4. Waters differing from No. 3 only in containing spores of the *B. enteritidis sporogenes*. These we regard as free from sewage pollution, but as probably containing soil washings.
5. Waters containing lactose fermenters, none of which belong to the bacillus coli group, and free from the spores of the *B. enteritidis sporogenes*. These we regard as not being sewage-polluted, but as containing surface water or subsoil washings.
6. Waters resembling No. 5, but containing the spores of the

* Under certain circumstances 1 litre is used.

B. enteritidis sporogenes. These waters might be from a source requiring careful watching, manurial matter probably being used on the collecting area.

7. Waters containing organisms of the coli group other than the *B. coli communis*, but no spores of the *B. enteritidis sporogenes*. These we do not regard as dangerously polluted, but as probably coming from a source such as that referred to under No. 6.

8. Waters containing organisms of the *B. coli* group other than the *B. coli communis*, and also spores of the *B. enteritidis sporogenes*. Pollution indicated, but possibly from a cause not close at hand. The necessity for frequent examination necessary, especially after heavy rains, as such waters usually, sooner or later, show more serious signs of pollution.

9. Waters containing the true *B. coli communis*, but no spores of the *B. enteritidis sporogenes*. Such waters are occasionally met with. No opinion can be expressed without an intimate knowledge of the source. We have had such water from a source absolutely free from the possibility of contamination, but usually the proximity of manured soil is indicated, and subsequent examination may reveal the presence of the spores of the *B. enteritidis sporogenes*.

10. Waters containing the true *B. coli communis* and spores of the *B. enteritidis sporogenes*. These we regard as being decidedly contaminated with faecal matter of recent origin.

It is obvious from what has just been said that, except in cases 1 and 10, an intimate knowledge of the source of the water is required before a reliable opinion can be given on the character of a water, or of the source from which it is derived; nay, even in the first case, although the water is free from any signs of pollution, it may be derived from a source seriously liable to dangerous contamination.

The result of a bacteriological examination of a water to which a certain amount of sewage has been added varies with the time which elapses between the act of pollution and the actual examination. There is a tendency for the *B. coli communis* to disappear; either it has died out, or in the successive generations it has lost its characteristic properties, and no one can say how long after pollution a water ceases to be dangerous. We are convinced, however, that when the contamination is recent the true *B. coli communis* can be discovered, hence we do not see the necessity, as advocated by Houston, of searching for streptococci. We have found them in stale sewage in which the true *B. coli communis* could not be detected, thus corroborating the results of others; but as we have made no systematic search for these organisms either in sewage or in waters, we can say nothing beyond expressing the opinion that there is no

evidence at present showing that such an examination as is necessary for their detection could aid in any way in the interpretation of the results of a bacteriological examination.

We append a table showing the characteristics of certain organisms taken from the red colonies on the bile salt, lactose agar plates, referred to in our scheme of examination. These were obtained from nine different samples of sewage and thirty-six different samples of potable water. Time will not permit of our discussing it, but we may direct attention to the fact that the organisms giving all the reactions of the *B. coli communis* must include several varieties, since by growing them in broths containing different sugars marked differences are observed. These differences may in the near future be proved to be fundamental, and indicating something more than a variety of species.

It is of the utmost importance that some conclusion should be arrived at as to the characteristics of the organism to which the name of bacillus coli communis should be given, and this can only be done by multiplying the records of the results of examinations of organisms derived from sewage and from sewage-polluted waters, and comparing them with those obtained from uncontaminated waters. So far as our experience enables us to form an opinion, the majority of the bacteria found in sewage which are capable of fermenting lactose in the presence of bile salt are motile, curdle milk, and produce indol, but do not liquefy gelatin (Table I). These organisms can also be found in all waters subject to recent sewage contamination. About half the number will produce fluorescence in neutral red agar media; we therefore do not consider the production of fluorescence as an essential characteristic of the *B. coli communis*. The next most numerous class of lactose-fermenting organisms found in sewage and sewage-polluted waters, differs from the above only in being non-motile (Table III), but as the motile forms are much more abundant, we prefer, at present, to retain "motility" as an essential characteristic of the coli groups. In sewage-polluted waters the motile forms must be always capable of detection if the non-motile forms are present. To avoid errors from this cause, several colonies from each of the agar plates referred to in our scheme of analysis should be examined.

Very few motile bacilli fermenting lactose were found in the samples of sewage examined, save those which corresponded in all other respects with the *B. coli communis*, and all these exceptions liquefied gelatin, and were therefore probably species of proteus, and not true members of the coli group (Table II). None of these were found in any of the waters examined. On the other hand, motile lactose-fermenters differing from the *B. coli communis* in not

producing indol, or in not curdling milk, were found in the water samples, but not in any of the sewages examined.

We would suggest that other workers in this field should agree upon some system of examination and of recording results. A comparison of the records thus obtained could not fail ultimately to afford valuable information on many, at present, obscure points. For this purpose, however, the co-operation of Medical Officers of Health and bacteriologists is necessary. Nothing can be learnt from the mere bacteriological examination; it must be studied in connection with the history of the water. Medical Officers could select samples from sources which they had carefully examined, and these particulars could be ultimately tabulated together with the bacteriological results. To add further to their interest and utility, the result of the chemical analyses of the waters should be recorded, as such analyses frequently throw a good deal of light upon the past history of a water. For certain purposes the chemical analysis is all-important, as the quality of a water cannot be judged from the bacteriological examination alone.

Finally, we append the results of the analyses of a few more or less typical waters, together with notes on their source and the conclusions at which we arrived from the examination of the samples. A study of these and of the table will tend to prove that the correct interpretation of the results of a bacteriological examination requires more than a knowledge of bacteriology. The most expert bacteriologist cannot hope to give an opinion worth having, unless he has made a study of the characters of waters from the most diverse sources.

DETAILS OF SOURCES FROM WHICH THE WATERS REFERRED TO IN TABLE VI WERE DERIVED.

- Group 1.*—(a,) Spring rising in a plantation. Seriously liable to pollution by overflow from cesspool. No pollution at the time of collection.
- (b,) Bored well in chalk, affected by a tidal river which is sewage-polluted.
- Group 2.*—(c,) Chalk well. Boring through London clay. In open country. No possible source of pollution. Tube had been plugged with a sod.
- Group 3.*—(d,) Water derived from a bed of gravel by means of a series of Abyssinian tubes. No drains or sewer near. Churchyard and cultivated ground about 100 yards away.
- (e,) East London Co.'s water as supplied to Ilford. Probably wholly derived from a deep well.

- Group 4.—(f.)* Well in Cambrian Rocks. When well was examined a little water was found entering from near the surface. No source of manurial or sewage pollution.
- Group 5.—(g.)* East London Water Co.'s supply to London Hospital.
(h.) A public urinal discharged into a ditch about 200 yards above the point at which this spring arose. Ditch apparently dry.
- Group 6.—* We have had no water belonging to this group.
- Group 7.—(j.)* Water supply to town in Wales. Three red colonies examined, with identical results; a fourth did not ferment lactose.
- Group 8.—(k.)* A public supply derived entirely from a Welsh river.
- Group 9.—(l.)* A deep well believed to be beyond the suspicion of pollution. A similar well near contained no organisms capable of fermenting bile salt glucose broth.
- (m.)* A public supply derived from the Thames. The two colonies examined only differed in their action upon neutral red.
- (n.)* Also a Thames water supply.
- (o.)* A public supply from the Bagshot sands. Cesspool from a small mansion discharges over a field at a point about 40 yards from the well.
- (p.)* A bored well in the open country. No possible source of pollution.
- Group 10.—(q.)* Shallow well-water suspected of causing typhoid fever. Note that only one out of the three colonies examined gave all the reactions of the organism we regard as the true *B. coli*.

DISCUSSION.

Mr. W. J. DIBDIN proposed a vote of thanks to the authors of the paper, and said that he did not think the meeting would have any difficulty in passing the motion with hearty unanimity, because they must all have felt, as the paper was read, that it was a well-timed paper, a well-written paper, and an admirable example of what such a paper should be, clear, definite, precise throughout. It contained definite premises and came to definite conclusions. Perhaps it was expected that he should make one or two observations, but the difficulty was where to begin and where to stop, there were so many points of the greatest possible interest, and on some of these other gentlemen present would no doubt speak. The first part of the paper, however, touched him rather closely—the comparison of the analyses of various samples of sewage, water, and sewage-

TABLE I.

ORGANISMS GIVING ALL THE REACTIONS OF THE *BACILLUS COLI COMMUNIS* AS GIVEN IN THE TEXT. TAKEN FROM 9 SAMPLES OF SEWAGE, AND 86 SAMPLES OF POTABLE WATER.

	No. of times found in Sewage.	Lactose broth.		Milk.		Glucose with neutral red.		Gelatine liquefaction.	Indol.	Motility.	No. of times found in Water.
		Acid.	Gas.	Acid.	Curd.	Gas.	Fluores.				
A	10	+	+	+	+	+	+	-	+	+	12
A'	10	+	+	+	+	+	-	-	+	+	16

TABLE II.

Closely allied motile organisms found in the same samples.

B	0	+	+	+	-	+	+	-	+	+	1
B'	0	+	+	+	-	+	-	-	+	+	4
C	0	+	+	+	+	+	-	-	-	+	3
D	0	+	+	+	-	+	-	-	-	+	2
E	1	+	+	+	+	+	-	+	+	+	0
E'	1	+	+	+	+	+	+	+	+	+	0
F	1	+	+	+	+	+	+	+	-	+	0
G	1	+	+	+	D	+	+	+	+	+	0

TABLE III.

Closely allied non-motile organisms found in the same samples.

H	5	+	+	+	+	+	+	-	+	-	7
H'	5	+	+	+	+	+	-	-	+	-	7
J	1	+	+	+	+	+	+	-	-	-	0
J'	0	+	+	+	+	+	-	-	-	-	1
K	0	+	+	+	+	+	+	+	-	-	1

TABLE IV.

ORGANISMS OF INTESTINAL TYPE, FERMENTING GLUCOSE AND LACTOSE.

ACTION ON DULCITE, MANNITE, AND SUCROSE.

No. of times found in Sewage.	Dulcitol.		Mannitol.		Sucrose.		Milk.	Glucose n. red broth.		Gelatine.	Indol.	Motility.	Gram's stain.	No. of times found in Water.
	Acid.	Gas.	Acid.	Gas.	Acid.	Gas.	Coag.	Gas.	Fluores.					
2					+	+	+	+	-	-	+	+		0
1					+	+	+	+	+	-	+	+		0
0					-	-	+	+	+	-	+	+		1
0					-	-	+	+	+	-	+	+		1
1					-	-	+	+	+	-	+	+		0
0	+	+	+	+	+	+	+	+	-	-	+	+	-	1
2	+	+	+	+	+	+	+	+	-	-	+	+	-	3
0	+	+	+	+	+	+	+	+	-	-	+	+	-	2
2	+	+	+	+	+	+	+	+	+	-	+	+	-	3
1	+	+	+	+	+	+	+	+	+	-	+	+	-	2
1	+	+	+	+	+	+	+	+	+	-	+	+	-	2
0	+	+	+	+	+	+	+	+	+	-	+	+	-	4
4	+	+	+	+	+	+	+	+	+	-	+	+	-	3
1	+	+	+	+	+	+	+	+	+	-	+	+	-	3
1	+	+	+	+	+	+	+	+	+	-	+	+	-	3
0	+	+	+	+	+	+	+	+	+	-	+	+	-	4

CLASSIFIED ACCORDING TO THE PRODUCTION OF
FLOURESCENCE AND LIQUEFACTION OF GELATINE.
FROM 9 SAMPLES OF SEWAGE AND 17 SAMPLES OF WATER.

No. of times found in Savage.	Lactose.		Dulcitol.		Mannite.		Sucrose.		Coagulation of Milk	Liquefaction of Gelatine.	Indol.	Motility.	Gram's Stain.	Fluorescence.	No. of times found in water.
	Acid.	Gas.	Acid.	Gas.	Acid.	Gas.	Acid.	Gas.							
2	+	+													0
3	+	+					+	+	+	-	+	+			3
4	+	+							+	-	+	+			0
0	+	+							+	-	+	+			1
4	+	+	-	-	+	+	-	-	+	-	+	+			4
0	+	+	+	+	+	+	+	+	+	-	+	+			1
2	+	+			+	+	+	+	+	-	+	+			7
0	+	+			+	+	+	+	+	-	+	+			2

2. Not liquefying gelatine but producing fluorescence.

1	+	+					+	+	+	-	+	-		+	0
1	+	+							+	-	+	-		+	0
0	+	+							+	-	+	+		+	0
3	+	+	+	+	+	+	+	-	+	-	+	+		+	1
1	+	+	-	-	+	+	-	-	+	-	+	+		+	3
1	+	+	-	-	+	+	-	-	+	-	+	+		+	3
1	+	+	+	+	+	+	+	+	+	-	+	+		+	6

8. Lactose fermenters, liquefying gelatine.

1	+	+							+	+	+	+	-	0
1	+	+							+	+	+	+	+	0
1	+	+							+	+	+	+	+	0
1	+	+							+	+	+	+	+	0
0	+	+	+	+	+	+	+	+	Digested	+	+	+	+	1

4. Non-lactose fermenters, producing fluorescence.

3	-	-					+	+	+	+	+	+	+	0
1	-	-							Digested	+	+	+	+	0
0	-	-	-	-	+	+	+	-	Digested	+	-	+	+	1
									Digested					

TABLE VI.
RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF VARIOUS SAMPLES OF WATER.

Group.	Source of Water.	No. of Colonies per c.c.	Growth in bile-salt glucose broth.		Smallest quantity producing growth.	Growth on Solid MacConkey's Medium.	Lactose broth.		Motility.	Gram's Stain.	Phosphorescence.	Litmus Milk.		Liquefaction of Gelatine.	Indol Formation.	B. Ent. Sporegenous, or near ally.
			Acid.	Gas.			Acid.	Gas.				Acid.	Clot.			
a.	1 Spring in Plantation	260	+	-	5 c.c.	Few white colonies	+	-	+	-	-	+	-	-	-	-
b.	2 Bored well in chalk	18	+	-	1 c.c.	" "	+	-	+	-	-	+	-	-	-	-
c.	3 Bored well 375 feet deep		+	+	1 c.c.	" "	+	-	+	-	-	+	-	-	-	-
d.	4 Gravel beds. Public supply	18	+	+	10 c.c.	Many white colonies, 1 red	+	-	+	-	-	+	-	-	-	-
e.	5 River and deep wells "		+	+	1 c.c.	All red colonies	+	-	+	-	-	+	-	-	-	-
f.	6 Well water		+	+	1 c.c.	Red colonies. No haze	+	-	+	-	-	+	-	-	-	-
g.	7 River water supply	10,000	+	+	1 c.c.		+	-	+	-	-	+	-	-	-	-
h.	8 Spring water		+	+	1 c.c.	Red and white colonies	+	-	+	-	-	+	-	-	-	-
i.	9 Moorland supply	20,000	+	+	1 c.c.	" "	+	-	+	-	-	+	-	-	-	-
j.	10 River water supply	Innumerable	+	+	1 c.c.	Red with haze	+	-	+	-	-	+	-	-	-	-
k.	11 Deep well in new red sand-stone	166	+	+	10 c.c.	Red colonies + haze	+	-	+	-	-	+	-	-	-	-
l.	12 River water supply	124	+	+	10 c.c.	" "	+	-	+	-	-	+	-	-	-	-
m.	13 River water supply		+	+	1 c.c.	" "	+	-	+	-	-	+	-	-	-	-
n.	14 Bagshot sand supply		+	+	10 c.c.	" "	+	-	+	-	-	+	-	-	-	-
o.	15 Bored well nearly 1,000 feet deep		+	+	1 c.c.	" "	+	-	+	-	-	+	-	-	-	-
p.	16 " "		+	+	1 c.c.	" "	+	-	+	-	-	+	-	-	-	-
q.	17 Shallow well		+	+	1 c.c.	" "	+	-	+	-	-	+	-	-	-	-

NOTE.—Where the results of the examination of one colony only are recorded, all the colonies examined were identical in character.

polluted water, and the conclusion that chemical analysis is incompetent to show the nature of the pollution, or even that pollution exists. This was a serious question, and one raised now for not the first time. No doubt they must all agree that in certain cases chemical analysis will not detect minute traces of sewage added to a sample of water, and therefore some other method of examination is of the greatest possible value, and is a necessity. The bacteriological investigation does undoubtedly in such cases give most valuable help to those who have the duty of examining water cast upon them. But there is one point about the bacteriological examination of water, however good it may be, and that an important point—it takes time. If a water was in a poisonous state, the whole community might suffer before the evil was detected by bacteriological examination. In the hands of many eminent bacteriologists, ten days was a fair average time for the completion of an examination, and, however valuable its indications may be, the damage might be done before the authorities were informed of the danger. There was, however, another method, which he had mentioned elsewhere, and which he used with the greatest possible advantage; that was the microscopical method, aided by the micro-filter. By the microscopical method he included all available aids, such as "micro-chemistry," polarization, etc. The deposit obtained from a sample is collected in a small filter termed the "micro-filter." By using a centrifuge, in a few moments the whole of the deposit would be collected at the bottom of the two millimetre tube, and on examining that deposit under the microscope, precise and valuable information was at once obtained. Experiments carried out in his own laboratory had demonstrated the effectiveness of the method, and had thrown more light on the London water supply and the efficacy of filtration than had any other process. The incubation for twenty-four hours of the deposit from a sewage-polluted sample gave immediate and unmistakable results, infinitely exceeding chemistry in delicacy, and bacteriology in rapidity, at the same time differentiating between living and dead organic matter. On many occasions he had had four or five separate samples of exceedingly pure deep-well water side by side. By microscopical examination he had been able to tell almost at once, without knowing anything about the labels on the bottles, which wells the water was drawn from. Ordinary pure deep-well water possesses characteristics so definite that he could easily feel his way among those samples with the aid of the micro-filter and the microscope. He did not know any other method of examination which would enable this to be done in so complete and definite a manner. It was a wonderful process, only to be equalled in delicacy by bacteriology itself; it not only surpasses ordinary chemical analysis, but it has the advantage that instead of expressing something in doubtful terms, it states definitely what the character of the water really is, so that altogether it was one of the most satisfactory and comfortable methods of which he knew. Hundreds of times he had been able to write down within an hour of the arrival of the sample an opinion of the water under examination, and he believed he had never once been wrong, and he believed if Dr. Thresh and Dr. Sowden would try it, they would be delighted. Turning to the question of the number of bacteria in a sample of water, he said there have been great discrepancies. Some bacteriologists would report hundreds and others thousands. Now his invariable practice was to cultivate until he could get no more growth. He never liked passing a plate until he was sure he had got all out of it that was possible. Using a four-inch power binocular microscope, with a side light, the colonies would show up on

a dark ground, and it was easy to at once distinguish between colonies and air-bells, so that when he gave a figure, say 150, he meant all that could be got and seen under the best conditions. Then there was another point. In examining the micro-filter deposits from even high-class waters, it would be noticed that some bacteria exist not in the free-swimming but in zoogloea form. Supposing this mass from agitation or other cause was broken up and diffused in the water, it would be counted not as one colony, but as hundreds or thousands, but if not broken up it would be reckoned as only one. That had happened over and over again. Having quoted striking examples of this form of error coming within his own experience, Mr. Dibdin pointed out the fallacies likely to arise in consequence of improper tests. With regard to indol, he said that he never passed bacteria as *B. coli communis* unless they show the indol reaction. The suggestion as to the use of a vaseline plug was admirable, and he should adopt it.

Dr. CHRISTOPHER CHILDS seconded the motion, and said that everyone who was working at this extremely important problem would welcome the paper, which, he believed, was the first serious attempt to bring the matter thoroughly before those who were most particularly interested in the subject. He hoped the paper would lead to the inauguration of a new order of things, to investigations of more scientific character than had hitherto prevailed, and that there might be some combination of medical officers of health, who have the best opportunities of observing pollution *in situ*, with expert bacteriologists, so that the results of observations might be collected and presented in a form that could be generally accepted. With so many experts present, he did not wish to occupy the time of the meeting. Whilst generally concurring in the conclusions set out in the paper, he might perhaps be allowed to criticize some of the details. With regard to the example of the water polluted with 0.1 per cent. of sewage, it was rather unfortunate that the sewage selected was exceptionally weak, whilst the sample of water, to which the sewage was added, was exceptionally pure. With a water on the border line of impurity, that amount of ordinary sewage added to it would probably indicate to the chemist that something was wrong. In many cases, however, a chemist might overlook a water only contaminated to that extent. He was quite sure the authors did not propose the abolition of the chemical analysis altogether. One should keep in mind the possibility of the bacteria being in some instances filtered off by passage through the soil, whereas the chemical products, such as the nitrites, would pass through the soil. In such a case the chemist would detect the pollution where the bacteriologist would fail. Mr. Dibdin had alluded to the question of time. A bacteriological investigation would require at least forty-eight hours as a minimum, but the chemical analysis could be made in an hour, practically speaking. The writers of the paper had protested against the uselessness of quantitative bacteriological analyses, except for the purpose of gauging the effectiveness of sand-filtration. If, however quantitative standards were established by systematic observations, for wells over a given district (especially in the same geological formation), then they would have the means of rapid detection of sewage pollution. An instance of that kind had occurred during the typhoid epidemic at Maidstone. He thought, therefore, that the quantitative method should not be abolished as altogether useless. With regard to the number of *B. coli* found in a given quantity of water, that would be of service if taken into account with the history of the water. The number of *B. coli* found in deep well water or in upland surface water, was not on the same

footing as the number of *B. coli* found in a river passing through alluvial land. A study of the source and history of a water would help in determining whether the bacilli were present by accident or through pollution. He congratulated the Association upon the paper, and would like to see the suggestion thrown out by Dr. Thresh adopted, viz., that medical officers and bacteriologists should work together. Possibly a Committee of members of the Association might be formed, with power to co-opt expert bacteriologists.

Dr. EYRE pointed out that there was a Committee sitting on the question. It was appointed at the last Congress of the Institute of Public Health. He believed their report would be ready shortly, and therefore it might be advisable to postpone action for the present. That Committee would no doubt clear a good deal of ground.

Dr. THRESH asked for information as to what that Committee were doing. Were they dealing with the question of standards—how many bacteria per c.c. would make a good water, and how many would make a bad water?

Dr. EYRE replied that the Committee were endeavouring to deal with the standardizing of methods in the detection of contamination, and not with standards of purity.

Dr. THRESH said he thought it was the question of standards which had been submitted to that Committee.

Dr. EYRE repeated that the Committee had been appointed largely to decide methods, and to report subsequently, if necessary, as to standards. The Committee were accordingly dealing with methods first.

Dr. THRESH pointed out that under these circumstances Dr. Child's suggestion might be acted upon, and the work of the other Committee continued. The Committee would naturally take advantage of information to be obtained from any quarter.

Dr. CHILDS explained that one of the reasons which had led him to make the suggestion was that Medical Officers of Health are practically concerned with these problems, and it was desirable they should be brought into close touch with expert observers. It had always seemed to him that there was very little contact between those actually concerned with these problems and those who make scientific observation. Medical Officers certainly had not the time to carry out the elaborate series of observations required for the work. If they could combine with the experts, he believed those results would be obtained which they all desired.

The CHAIRMAN suggested the question of appointing a Committee should be left to the end of the meeting, when they would have had the benefit of the further discussion on the paper.

Lieut.-Colonel FIRTH said that he felt sure that he was but anticipating the general consensus of opinion of the meeting, when he expressed his cordial agreement with the spirit and general conclusions of the paper under discussion. As the time placed at the disposal of individual speakers was distinctly limited and short, he would confine his own observations mainly to two points which seemed to him to lie at the root of the whole subject; these points were the question of methods, and the question of what was to be our index of pollution.

As to methods, he had little criticism to offer, as the views enunciated in the paper were practically in accord with his own practice. He was particularly glad to see that a good word was said for MacConkey's bile-salt broth, because in the laboratory over which he had the honour to preside, this medium was constantly used as a part of the routine procedure in the bacteriological examination of a water sample. He

had been one of the first to recognize the definite range of its utility, but an extensive experience had convinced him that, provided these limitations were appreciated, it constituted the best all-round medium for general routine work.

Passing to the question of a pollution index, in his opinion, the authors laid stress rightly upon the *B. coli communis*, as that micro-organism played, in the experience of most observers, a very important part as to the decision of the question whether any given water was polluted or not with sewage. He did not think there was any doubt among bacteriologists as to what was and what was not a *B. coli communis*, and, for his own part he had very definite views on the point, which views he believed to be more or less orthodox. But in practice, the question was not capable of being narrowed down *ab initio* to the simple issue of what was and what was not a *B. coli*; we are confronted with the problem of how to detect this much-talked-of organism from among a number of others which present certain general features in common with it. The most prominent cultural feature common to a large group of suggestive bacteria is the ability to ferment various sugars to the formation of gas, especially glucose, and, as a result of this, in formulating any method or technique for the examination of waters, we are at once forced to regard this ability or inability to gaseously ferment glucose as of the first importance in preliminary investigations. Those familiar with bacteriological technique would at once appreciate the fact that this was the fundamental idea underlying the bile-salt glucose broth, of which so much had been said in the paper. But this brought us only to the threshold of the inquiry; the next step was to settle what this function of producing gas in glucose media really meant. Were we to say that all bacteria capable of thus fermenting glucose were incriminated organisms, or were we to discriminate further and lay stress, as evidence of sewage, only upon certain species of this large gas-producing group? It is an interesting point, and one upon which he anticipated the subsequent discussion will show some divergence of opinion.

As tending to a possible answer to this question, let us note what are the micro-organisms which may be found in waters, and which are capable of producing gas in glucose. They may be divided into four great groups. In the first are a number of motile organisms of a somewhat unstable biological equilibrium, which liquify gelatine, produce gas in glucose and sucrose but not in lactose, curdle milk very slowly, rendering it acid, and commonly produce indol in peptone solutions. These organisms represent the great *proteus* family. In the second group are motile bacteria, producing gas in glucose, lactose, mannite, and occasionally in sucrose. These curdle milk rapidly with no peptonization of the clot, they nearly always produce indol in peptone solution, but do not liquify gelatine. They grow characteristically in both of Proskauer and Capaldi's media, producing acid in No. 1, and alkali in No. 2. These organisms are the *B. coli communis*, indifferently derived from the alimentary canal of man or animals. In the third group are non-motile bacteria, not liquefying gelatine, which not only curdle and render milk acid, but ferment sugars, other than glucose, somewhat variably. The type of this group is the *B. lactis aerogenes*. In the fourth group we find motile bacteria, fermenting glucose alone of the sugars, not liquefying gelatine and not clotting milk, but rendering it finally alkaline. These organisms are the intermediates of the colon-enteric series, and include such species as the *B. enteritidis* of Gärtner, the various para-colons, and the paratyphoids. Indol production is variable with this series, but not infrequent.

Now the question is; are we to look upon all these four groups, each capable of making gas in a glucose medium such as MacConkey's bile-salt broth, as representing sewage or matter closely allied to sewage, and consequently, if present in water, inconsistent with its being regarded as pure? Possibly opinions will differ as to the answer, but personally he thought they must one and all be regarded with suspicion, though there are degrees of incriminality. The first or *proteus* group are the least objectionable, and it is not uncommon to find members of that group in undoubtedly safe waters. His experience was that, when bile-salt broth is used, gas production, when due to the *proteus* family, does not result under thirty-six hours incubation, therefore if we take twenty-four hours as our standard of incubation when using that medium in the examination of water, we comparatively eliminate this group. Therefore, if gas production follows after twenty-four hours incubation, the probability is that it is due to the presence of some members of the three other groups, and for practical purposes one may regard the reaction as strong presumptive evidence of pollution and undesirability. We must, however, not rush hastily to a conclusion on this evidence alone. Those familiar with the chemical analysis of water know well that there is no royal road to forming an opinion, and that a single reaction is fallacious. The same is true of a bacteriological examination, and too much stress must not be laid on a single phenomenon or group of phenomena; further subculture needs to be made for identification of species and the judicious weighing of all the *pros and cons* respecting evidence of undesirable matter. The whole history of the water sample must be considered, and too much importance not be laid upon the simple presence or absence of *B. coli* or even rapid gas-producers in glucose. This naturally suggests the question of standards. On this point one is loath to dogmatise, but speaking for himself he did not think a deep well water having any claims to purity should yield a *B. coli* or an intermediate bacillus at all. In the case of surface waters, the position was different, and a workable rule was to regard the presence of any of these bacteria in less than 200 c.c. as justifying an adverse opinion.

Time does not permit us to adequately discuss the significance of *B. enteritidis sporogenes*, but his own experience raised doubts as to the need to attach so much importance to this micro-organism as some workers were disposed to do. He would, however, urge the significance of streptococci not being lost sight of. In his experience these are very hardy organisms, always present in sewage, and capable of existing in sewage-fouled water for over nine months. The streptococci are worth further consideration, as little is known about them beyond the fact that they play a part in septic diseases, and have a close association with sewage and faecal matter generally. Therefore, he urged the keeping of an open mind regarding them and many other suspicious organisms of which we are apt to think we know more than we do. There, naturally, are other points upon which much might be said but time does not permit, possibly other speakers will have much to say upon them; in any case he felt that this discussion cannot but be productive of good, and its development will be followed by a much wider audience than are at present in the room this afternoon.

Dr. S. RIDEAL said it was impossible to discuss the paper in detail. After all it was only a question of degree—the relative delicacy of chemical and bacteriological methods. He agreed with Dr. Childs as to the instances of chemical analyses brought forward in the paper failing to diagnose contamination. Personally, he relied largely upon the amount of

ammonia in the water, and the significance of nitrites and nitrates, which are not referred to at all in the paper. The ammonia test was practically as delicate as the bacterial test, and a good deal could be learnt from the study of the amount of ammonia present in the water, and the dispersal of the nitrogen. These were not shown in the instances given by Dr. Thresh. He was quite certain that the microscopical examination was capable of large extension, and often gave very useful information. Mr. Dibdin had already mentioned that the ease and rapidity of this test made it frequently the only available test. There was another method, the spectroscopic examination, which he was certain in the near future would be largely developed, and its delicacy was also comparable to that of the bacterial method. If they could get a test which would detect a significant element like potassium in small quantity, they had a far more delicate method of attack than that based upon a weighable quantity of food stuff decomposing by specific bacteria. The identification of the particles in the sediment was a subject which would give much useful information, after some experience in this method of attack. Of the earlier bacterial tests, only a few were now considered conclusive, including the MacConkey medium, and Klein's *enteritidis* test, for which Dr. Thresh did not give any standards. With regard to *coli*, he had employed a limit of 25 c.c., and 500 c.c. with *enteritidis*. But that did not give us the actual truth. It was not a rigid test of sewage pollution, so far as the absence of *coli* is concerned. With regard to the quantities given on page 3 in the second paragraph, he did not follow these very well. But in contrasting the gas-forming organisms and the *enteritidis* clot-forming organisms, we come after all to a comparison of chemical tests, fermentation of glucose and souring of milk. He thought that possibly the ratio of the volume of water required to cause curdling of milk anaerobically to that required to evolve gas from glucose in the presence of bile-salt, was a figure which summarized the net result of our present knowledge of water bacteriology from a practical point of view, but no two men seemed yet agreed as to whether 1.40 or more or less was the danger point in a potable water. He thought it was sufficient for their purpose to know of the presence of undesirable organisms in a water supply. If they came to these two main conclusions it mattered very little what the subsequent diagnosis of these two particular organisms might be. These tests give very useful information as to the quality of a water, but whether the quantities taken are sufficiently large or not remains for consideration.

Dr. SPITTA said he was most pleased that so eminent a chemist as Dr. Thresh had brought up such an important subject. The bacteriological examination of water was at present in its infancy, and as there were no standard data to work upon, he hoped that the author's paper would be of real practical service. Proceeding to criticize the communication, Dr. Spitta thought that whilst the absolute number of bacteria per c.c. at 21°C. was no gauge as to the purity of a water from an unknown source, yet it is most important that standard media should always, as far as possible, be adopted for their estimation. Whilst emphasizing the importance of the use of an alkaline medium, Dr. Spitta said he was in the habit of counting the colonies with a lens daily for five successive days. The gelatine employed was first rendered neutral to litmus, and then had 7 c.c. of $\frac{1}{4}$ alkali added per litre. If liquefiers proved to be excessive, the usual ordinary precautions were adopted to prevent them over-running the plates. Alkaline agar plates were also made, incubated at 21°C. and 37°C. for five days, and then counted.

As to Dr. Thresh's methods, Dr. Spitta said it was first of all most

important to arrive at a standard *B. coli*. In the Bacteriological Department of St. George's Hospital, Klein's *B. coli* was taken as the standard. Dr. Spitta agreed with the authors as to the unreliability of neutral red as a primary test; it was most unsatisfactory. The indol reaction, whether in peptone water or in sugar-free broth, was also of no importance for identifying a colon bacillus. Typhoid could be educated to produce indol, and several varieties of coli did not give it. The bile-salt glucose litmus peptone water at 42°C. was very good, but the presence of acid and gas did not necessarily indicate the presence of *B. coli*; some *coli*-like organisms would produce the reaction, therefore extensive subcultures were always imperative for the identification of the specific microbe present. Dr. Eyre's method of incubating the inoculated MacConkey tubes anaerobically was sometimes very useful.

Dr. Spitta then made a few remarks on the methods he employed for the qualitative examination of water. He searched for *B. coli* in 500 cc., 250 cc., 100 cc., 50 cc., and in 10 cc., and for *B. enteritidis sporogenes* in 500 cc., and in 250 cc. He did not now examine for the presence of streptococci. For the isolation of *B. coli* pressure filtration of 1 litre of water was adopted, MacConkey and Parietti tubes being made from the concentrated emulsion, and then subsequently plates. Suspicious colonies were then worked out. Dr. Spitta then mentioned the fact that the filtration process was not in his opinion altogether satisfactory, and that the concentrated medium method was very much more reliable. For this reason he always adopted it as a control, employing the same measured quantities of water as before, and converting them into peptone water by the addition of an appropriate amount of a concentrated solution of peptone kept ready at hand. These flasks were then incubated for two days at 37°C., plates made, and the suspicious colonies worked out. From the concentrated emulsion, after filtration of a further litre, suitable fresh-milk tubes inoculated with amounts equivalent to 500 cc., and 250 cc. of the original water were made, and heated as usual. From the positive tubes animals were always inoculated. Dr. Spitta then pointed out the fallacy of the milk test, and insisted that the animal inoculation and subsequent recovery of the organisms was the only sound method. In conclusion, Dr. Spitta agreed with Lieut.-Col. Firth that a water containing *B. dysenteriae*, *B. typhosus*, and *B. Shiga* would, according to Dr. Thresh's results, be found as unpolluted.

Mr. PERCY GRIFFITH, as a waterworks engineer, said he thought engineers had a legitimate grievance against the members of the medical profession in the very diverse views that were expressed in their reports upon samples of water, and through the uncertainty and diversity of the value attached to bacteriological examinations. Speaking for himself, he felt that the paper that had been read, and the discussion which had followed, had largely dissipated the idea of grievance from his mind, and the publication of that discussion would also tend to remove misapprehension from the minds of many other waterworks engineers. He was much relieved to find that medical officers and their colleagues did not profess to have arrived at a satisfactory conclusion as to the proper method of analysing water, and that it was admitted by them that the many and various systems now in use were uncertain and wanting co-ordination. Under these circumstances it would be only proper for the waterworks engineer to stand aside and not interrupt such a useful discussion, rather urging the medical men to arrive as quickly as possible at some standard method of examination, in which the waterworks engineers and the public might place their entire confidence. If they could eliminate the differences

of opinion which existed as to the safety and suitability of certain classes of water for domestic use, they would confer one of the greatest possible benefits upon the consumers, and those who endeavoured to meet their needs.

Dr. SAVAGE expressed his regret at not having been present when the paper was read. While he agreed with a number of the author's statements, there were many which he would have to adversely criticize. He was quite in accord with them that chemical analysis is much less sensitive and reliable than bacteriological examination. In his laboratory at Cardiff they examined drinking waters from all sources at the rate of several hundred per annum, both chemically and bacteriologically, and under parallel conditions, taken from the same place and at the same time. Additional experience had only confirmed the opinion which he published in 1902, that "a water which is contaminated sufficiently to yield evidence of such pollution by chemical analysis, will usually show overwhelming evidence pointing to the same conclusion on bacteriological examination, while many waters, on the other hand, show pollution by bacteriological methods which on chemical analysis alone are above suspicion." In their laudable anxiety to discredit that which has been too highly valued—the number of colonies developing on gelatin and agar plates—he thought the authors of the paper had gone too far. He quite admitted that, as at present carried out, no two bacteriologists would probably obtain identical numerical results, but to his mind this indicated the need for uniformity of practice and procedure, rather than inutility of the object aimed at. In particular, he found the agar plate enumerations of distinct and considerable value. Of course, all these numerical estimations are secondary to the actual detection of excretal organisms, but the investigation of waters bacteriologically is not easy. Why then discard any method, if it is of assistance, because it is only a partial help and unreliable in itself? Dealing with the simple tests for pollution, he was glad to find himself in accord with the authors. Indeed, that these simple tests were in themselves of little value without further investigation was a conclusion he believed most bacteriologists had now come to. Perhaps he would be allowed to make a personal explanation in regard to a paper he had published in 1901 on "The Neutral Red in the routine Bacteriological Examination of Water," because the authors of the paper under discussion had somewhat misquoted him. Referring to that paper, the authors said, "Apparently assuming that in all cases this reduction was due to the presence of one organism, the *B. coli communis*," and then quoted him as basing certain opinions upon that. He took this as implying that he did not isolate the organisms, but assumed a positive neutral red reaction meant *B. coli*. Now, he did not make any such assumption as that; the organisms were isolated, and the exact object of the investigation was to ascertain in what percentage of cases the neutral red reaction meant the presence of *B. coli* or closely allied organisms. He had found it a fairly close approximation, and later investigations confirmed it, but as he had clearly stated then, other organisms would also give this reaction; and in a subsequent paper he had pointed out that the organism itself should be isolated. In fact, he had never at any time practised any other method except the definite isolation and study of the excretal bacilli themselves. As a means of isolating *B. coli* he had found the use of neutral red broth of great value. In regard to the vexed question as to when a colon bacillus is a *B. coli communis*, the authors clearly indicated some of the discrepancies. He did not find that motility is of any value as a practical test, and he should

certainly not make it, as the authors appear to do, a primary test, and to arbitrarily say that non-motile bacteria are not *B. coli*. He had repeatedly found bacilli quite indistinguishable in every way from typical *B. coli*, and which did not ferment starch, quite non-motile when examined in hanging drop; further, by prolonged artificial cultivation their motility had in many cases been restored. He was quite of opinion that all true *B. coli* are motile organisms, i.e., potentially motile, but the exhibition of motility is not the same thing, and many true *B. coli* exhibit when first isolated no true motility. That was what he had found among several hundred organisms which he had isolated from various sources; as a practical test it is useless. The character of the gelatin surface growth is also of importance, apart from the question whether the gelatin is liquefied or not. It was, however, on the question of numerical standards for these faecal organisms in water that he found himself in greatest opposition to the authors of the paper. They said nothing about the amount in which these faecal organisms were detected; in their very definite conclusions the authors made no mention of relative abundance. Their last conclusion, for instance, was that waters containing the true *B. coli communis* and spores of the *B. enteritidis sporogenes* are decidedly contaminated with faecal matter of recent origin. They even went so far as to gibe at the question of any standard, with an extreme instance. But surely the relative prevalence of an organism was of importance; to him it was the whole crux of the question. He regarded the statement that a water contains *B. coli* as absolutely valueless unless also its relative abundance is indicated. He had found typical *B. coli* in small numbers in nearly all waters, except from some deep wells and springs, provided enough water was investigated. The essential difference was that in contaminated waters it is abundant and found in, say, 1 cc., 5 cc., or 2 cc., while in pure waters it is relatively scanty, perhaps only found when 50 or 100 cc. of the water is examined. He quite agreed with the statement that "to regard a water with two bacilli in a given quantity as unpolluted, and one with three bacilli in the same quantity as polluted, is absolutely absurd." But to regard a water containing, say, 10 *B. coli* in 1 cc. as contaminated and one with one such organism in 50 or 100 cc. as pure is not absurd. At any rate, he had found the numerical estimation of such organisms a vital necessity in the bacteriological examination of water. He was not stating this opinion from a superficial knowledge of the subject, for during the last three or four years he had bacteriologically examined about 1,000 samples of drinking water from all sources, besides conducting a large number of accessory investigations on soils, sea waters, muds, etc. If the authors neglected numerical standards, it was in his judgment a sufficient reason for their opinion that "little stress can be laid upon the detection of the *B. coli* alone." They also appeared to be rather inconsistent, because if numerical estimations are useless, why do they examine 1, 5, 10, and 20 cc. respectively for *B. coli*? Why not examine the whole 36 c.c. altogether, since it would save time and trouble? Or, why not examine a larger quantity, say 100 or 1000 c.c., and have a better chance of finding it? In regard to the detection of *B. coli* he had found the bile salt broth very useful, but it had no special advantage over neutral red broth as indicating the best tube to brush. Neutral red broth also served for the enumeration of streptococci, while a disadvantage of bile salt broth is that it often kills out *B. coli* quickly, and so plates must be brushed early or they may have died out. The authors stated they found *B. enteritidis sporogenes* of value. He had never found it much use, and now only used it occasionally.

It was a great drawback to have to introduce cumbersome filtration methods, if such could be avoided. In his opinion the numerical estimation of streptococci was of very much more value, and much simpler in practical working. In concluding, Dr. Savage again expressed his regret at not having heard the previous discussion, because he did not know how far his remarks had overlapped those of other speakers. Although he had criticized the paper freely, he was not unmindful of the valuable work in it, while the definite way in which the authors stated their conclusions excited his admiration, although he could not share all those conclusions.

Dr. NASH said that with regard to the detection of *enteritidis sporogenes* Professor Hewlett had suggested a very easy method, viz., to take a large tube and dilute the milk with a considerable quantity of water. This did away with the necessity for filtering the water. He quoted a case coming within his own experience which supported Mr. Whitaker's view, and showed that topographical features rather than bacteriological features had to be the guide in determining the character of the particular water under examination.

Dr. EYRE said that the trend of the criticisms he had intended to offer on this paper had been materially altered by the discussion to which he had listened. It appeared to him that an intelligent appreciation of the topographical surroundings of a source of supply was of more, or at any rate of equal, importance with bacteriological findings. As Dr. Savage had pointed out, the existence of one or two *B. coli* in a large quantity of water was not of the same significance as the same number in a much smaller quantity. At present, as there was so little unanimity as to the numerical standards to adopt, the importance of observing the source of a water supply was obvious. Until the exact topographical surroundings were known one could not absolutely condemn a water upon the presence of a few *B. coli*. Recent observations of his own had shown that the *B. coli* is a fairly common inhabitant of the intestinal canal of birds, also several species of fish, and birds' droppings might be an important source of coli in water. Until the character and the source of *B. coli* in water could be determined it was obvious that a small number of coli in water could not be a very valuable guide. To his mind a more important indicator of contamination was the presence of streptococci. Dr. Savage had not placed much stress on the presence of this organism in water, but he (Dr. Eyre) laid more stress upon it than on the presence of *B. coli*. But there again a numerical standard of some kind became necessary. One colony in a large quantity of water would have little significance, but a colony derived from 10 or 25 cc. would to his mind point to the existence of contamination to a large extent. The authors of the paper seemed to overlook the most important information obtained as the result of making gelatin plates, viz., the general constitution of the bacteriological flora of the water under examination. From making constant and repeated examinations of a particular supply, one got to know just the kind of organisms present in a given sample of such water. Every water supply should be examined at regular intervals, and the investigator should make his own local standards or "constants," being always on the look-out for any strange organisms which might possibly be associated with faecal contamination. In making these local standards large quantities of the sample should be examined in the first instance so that the usual proportion of *B. coli* could be ascertained, and afterwards the variations which occur from time to time would be immediately noticed. In this way a just estimate of the character of a supply could alone be obtained.

PROFESSOR HEWLETT agreed that the authors of the paper had been rather hard upon enumeration. The differences obtained by various observers were partly due to the different media employed, and also partly due to the care bestowed on the samples. No reference was made to that in the paper. Unless samples are examined at once a great variation in the number of organisms would take place. The fact that plates occasionally differed markedly did not entirely upset the method. By making a number of plates, 8 or 12, the occasional zoogloea would be eliminated. The authors said that the mere number of bacteria per cc. was most unscientific, as it is not an expression of the fact; possibly, but still everyone knew what is meant by it. The same sort of terminology was employed in other cases. One would speak of albuminoid ammonia, but it was not necessarily derived from albumin. With regard to standards, unquestionably it was extremely difficult to lay down standards, and it was only possible to get at a just view of the character of water by repeated examinations. But they all had to examine casual samples, and they did their best with them, and in such circumstances they must have standards. The authors spoke of a water being passed with two *B. coli* and being condemned with three *B. coli*. That was an exaggerated view of the method of standards. Water was not condemned because it had a point more albuminoid ammonia, and in practice it would not be condemned because it had three coli and be passed with two *B. coli*. With regard to the methods for the isolation of coli, he thought they had all now given up the phenol method. He used the bile salt method. But a good method constantly employed becomes reliable in a particular observer's hands, and he did not think, therefore, it could be said one method was better than another; so much depended upon the personal experience of the user. Then the authors spoke of the *B. enteritidis sporogenes* and the *B. butyricus*, and apparently considered the typical milk change without inoculation quite sufficient, and for his information he would like to know whether the latter was as much a sewage organism as the former. He would also like to know on what number of samples the authors had formulated their conclusions.

Mr. WHITAKER, F.R.S., endorsed the authors' view that no opinion can be expressed as to the character of a water without an intimate knowledge of its source. A case in point had come under his own knowledge lately, in which while chemical analysis gave no indication of pollution, yet the well was open to contamination from a churchyard immediately above it, proving the need for knowledge of the physical conditions of the source of supply. A water might thus come from a place with absolutely bad surroundings, and without a knowledge of those conditions, its true character might not be even suspected. The authors of the paper were right in holding that one kind of test alone is insufficient, and he believed that both chemical and bacteriological tests were desirable, together with a knowledge of the surroundings of the source. He was glad to think that this view had been emphasized in the paper, because too much care in the examination of water supplies could not be taken. Conditions in regard to a water supply were closely interwoven, and the sample should not be looked at from only one point of view. It should be examined in every conceivable light. He hoped that medical officers would keep their minds open in that way.

Dr. MEREDITH RICHARDS observed that so far the discussion had been mainly confined to bacteriologists and chemists. He would like to say a word from the point of view of the medical officer of health, who after

all was the person to interpret the results obtained, and take the responsibility of guiding his authority. He would like to ask what help they got from either bacteriology or chemistry in the protection of water supplies at the present time? It seemed to him the answer was a very uncertain one, and that for practical purposes it was chemical and bacteriological instability that were alone of any substantial value. He then quoted an instance in which such information had led to the discovery of an obscure source of pollution with very fortunate results. In conclusion, he said that when talking over the paper with a well-known public analyst, who was much struck with the remarks of Dr. Thresh about adding tea leaf to so much water, that gentleman observed that if he had been present during the discussion he would have pointed out that a similarly bad bacteriological result might have been got by adding a drop of average London milk to the same large volume of water.

Dr. J. SCOTT TEW considered that two very simple matters came under the head of the paper, viz., the way in which samples are collected for bacteriological examination, and the uniformity of the medium employed. Bacteriologists could hardly realize the manner in which some samples are sent to them. They were occasionally sent in non-sterilized bottles, not taken under fair conditions, and not kept on ice during the journey. There was a great point in regard to the uniformity of the medium, because it stood to reason if they had a gelatin which could only be kept for a fortnight, and a gelatin which could be kept for six months or more, there must be a difference in the nutritive quality, and the bacteria must be affected thereby. He was sorry Dr. Thresh had taken such a poor view of the numerical value of counting the organisms. If samples were regularly analysed for a long time the number of bacteria was a very good test. He had analysed one particular water bacteriologically for the last six years, and at one time the number went up from an average of 40 or 50 organisms per cc. to about 800 or 900 in the summer time. On looking round the gathering ground a number of large deep cracks in the clay could be seen; no doubt there was a relation between the surface of the ground and the water, which accounted for the excessive increase. In this case a local standard could be formed of utility in regard to numbers of bacteria.

Dr. THRESH then replied to the various criticisms passed upon the paper. He observed that he had faced the debate with some trepidation, but found the criticism had been extremely mild, and that no reply whatever was required to a great deal that had been said. With regard to standards, he took it that a water was either polluted or not polluted, and a standard would only come in as to the extent of pollution; he was going to stick to that, and all he had heard during the discussion only helped to convince him that he was right in that contention. If a water contained sewage it was polluted; it did not matter whether it contained 1 part in a 1,000, or 10,000, or 100,000, and the standard would only come in to give some idea as to the extent of the pollution, and it was for that reason that he used varying quantities of water in his examinations. If he found a water contained organisms indicating pollution, he would say the water was polluted, but his opinion as to the extent of that pollution would depend upon the amount of water in which he found the particular organisms. That was, in his opinion, the only logical method. His basis was experience gained in connection with waters from different parts of the country, water supplies the sources of which he had examined, spending sometimes many days in the examination of a single source. Only recently had one got a mode of examination based on knowledge of an accurate character.

In fact, he thought it was only since the introduction of the bile salt medium that one felt there was a fairly sound basis for bacterial investigation and examination. Now one could ascertain whether a water contains organisms of a certain class, which he had referred to as organisms of an intestinal type. If there were no organisms of that type present in a certain quantity of water it was quite unnecessary to go further with the examination. His conclusions were based on a large number of examinations carried out by himself and Dr. Sowden, with pure water to which a millionth part of sewage had been added. With the process now used by them they had no difficulty in detecting this millionth part, by discovering the *B. coli communis* together with the organism which gives the reaction of the *B. enteritidis sporogenes*. If a water had been recently sewage-polluted to the extent even of a millionth part, they could detect it by this bacteriological process. If the pollution was not recent, so that the *B. coli communis* had changed its character, they could not say definitely that it was sewage-polluted, or say more than the chemist who determines the nitrates, that it might have been sewage-polluted at some previous time. There was no knowledge whatever to enable them to say that previous sewage pollution was of such a character as to make a water dangerous for use. He thought the only scientific basis was that of a comparison of waters definitely known to be sewage-polluted, with other waters of which the source was known. It was for that reason that he wished the co-operation of medical officers of health, geologists, chemists, and bacteriologists in endeavouring to make out, not a standard, but some means whereby they could detect whether a water was actually polluted or not. The paper referred chiefly to sewage pollution, but he did not deny that the enumeration of bacteria, or some of these simple so-called tests, might have some value for special purposes. He could quite agree with some of the speakers that in examining samples of the same water at intervals of a week or a month for a considerable period, whatever the test applied, the comparative results might be of considerable use, but if, as is the case in the majority of instances, they had to say definitely whether a water is polluted or not, they must have some system of the kind indicated in the paper, and must make up their minds from the result of an examination, together with information obtained concerning the source. With regard to Dr. Savage, in following that gentleman's contributions he had never been able to settle what his *B. coli communis* was.

Dr. SAVAGE: It has been stated in black and white.

Dr. THRESH said in that case he must have overlooked something which Dr. Savage had published, but in the paper to which he had referred, Dr. Savage had not definitely stated the characteristics of the organism which he calls the *B. coli communis*. Of course, if they were going to omit some characteristics accepted by Klein and others as fundamental, they might say that whenever fluorescence with neutral red was obtained the *B. coli* is present, or that it is exceedingly probable that it is. He had purposely put at the end of the paper the characteristics of a number of organisms found in sewage-polluted waters, and in some others not sewage-polluted. About half the number of organisms which correspond in other respects with the *B. coli communis* did not give fluorescence with neutral red, whilst there are a number of other organisms not allied to the *B. coli* which give that fluorescence. Therefore he did not regard fluorescence as at all essential. On the other hand, they would find the most common organisms resembling *B. coli* even in sewage-polluted water, are organisms which are non-motile, but in every other respect resemble

B. coli. For that reason if anyone contended that motility was not essential he would agree, but if a water was recently polluted there would be more organisms motile than non-motile, and therefore they might safely attach importance to the motility of the organism. With regard to the value of *B. enteritidis sporogenes* as a test, they definitely stated that no experiments were made with animals, and their conclusions were entirely based on examination of sewage-polluted water. If they got the typical reaction described by Klein, the organism producing it was put down as being either *B. enteritidis sporogenes* or a closely allied organism. Their experience with these bacteria was that their significance was the same. (He did not know whether they had ever found the *B. butyricus*). In concluding, Dr. Thresh seconded the proposition of Dr. Child that a Committee consisting of geologists, chemists, bacteriologists, and medical officers of health be formed, with the object of collecting data with reference to waters of various characters, tabulating them, drawing up conclusions, and submitting them to the Society at a future meeting.

The motion was agreed to *nem. con.*

On the motion of Dr. Woodforde, seconded by Dr. Gruggen, it was resolved that the formation of the Committee be left to the Officers of the Society, with Drs. Thresh and Childs.

Note.—The following letter has been received from Dr. MacConkey, who was unfortunately unable to take part in the discussion.

As I was unable to be present at the reading of Drs. Thresh and Sowden's paper on the "Bacteriological Examination of Water," I am glad to have this opportunity of saying a few words on the subject, as there appears to have been a great deal of misapprehension with regard to bile salt broth. The first kind of broth used was one containing not glucose but lactose, and obviously this is to be preferred if search is being made for typical *B. coli* only. The change to glucose was made simply so as to include other organisms, e.g., *B. enteritidis* of Gærtner. In our paper on this medium, Hill and I stated that it is used with a Durham's fermentation tube. It would have been more exact to have said that the broth should be distributed into Durham's fermentation tubes. The temperature of incubation, 42°C., is we consider most important. Incubating at 37°C. does not give the test a fair chance.

In the paper we made the following statements:—

1. "It is therefore, justifiable to conclude that when the reaction is obtained, it is most probably produced by organisms of intestinal origin."
2. "Conversely it may be stated that when the reaction is not present faecal contamination is absent."

Further we gave our reasons for considering certain organisms to be indicative of pollution, and we concluded in the following words:—

"It is possible that future research may reveal sources of error or confusion, but up to the present this test has in our hands proved itself simple and reliable."

It should be noted that we in (1) made no claim that the test was infallible. We concluded that the reaction "most probably" showed the presence of faecal pollution. Having used this test for more than three years I still consider this statement to be correct. If the production of acid and gas obtains, it will in the majority of instances be found to be due to organisms of an intestinal type. It seems also necessary to mention that we never meant that absolute reliance should be placed on a single test. It was put forward merely as a rough test, to indicate the direction in which the examination should be continued. I have always isolated

the organism giving the reaction, and worked out its characters on the different media. It is true that certain organisms belonging possibly to the *Proteus* group produce acid and gas in glucose media, but any error which might be caused by their presence may be easily avoided. If bile salt broth is used as it was intended to be used, I do not think it will lead to many mistakes. Error is more likely to creep in after the organism causing the reaction has been isolated. From deep well water, from filtered river water (twice), from rain water, from roof washings, and from cow dung I have isolated a bacillus which resembles *B. coli* in giving all the usual sugar and milk reactions. It, however, liquefies gelatin slowly and produces a yellow pigment. As liquefaction of gelatin and pigment production may not commence until after the lapse of perhaps ten days, this organism might be returned as a *B. coli*. Further experience has caused me to reconsider the position I took up with regard to certain organisms, e.g., *B. cloacæ*. I am now inclined to think that some of them may not be of intestinal origin. This is a point, though, to which I shall refer in a paper I hope to publish soon. As regards the organisms usually considered of value as indices of pollution, the *B. coli* seems to me to be the most reliable. The *B. enteritidis sporogenes* (Klein) has been stated by Balfour Stewart and others to be present everywhere. Klein disputes their conclusions, and considers that the *B. butyricus* (Botkin) has been confused with his organism. Recently he has stated that the two organisms may be easily differentiated by their growth on gelatin. This statement reopens the whole question, and therefore no definite conclusion can at present be come to as regards the value of this test.

Houston has, I believe, never contended that *all* streptococci are of importance. He described several varieties, some of which he thought might conceivably be of value in relation to the pollution of waters. His results are suggestive, not conclusive, and I have no doubt he would be the first to consider that at present the streptococcus test is of indeterminate value.

At the last meeting of the Council of the Borough of Cardiff, the Salary of the Medical Officer of Health, Dr. E. Walford, was increased from £750 to £800 per annum, and both the Urban and Port appointments were made permanent, i.e., not subject to periodical renewals.

The Milroy lectureship for 1905 of the London Royal College of Physicians has been conferred upon Dr. Thomas Morison Legge, His Majesty's Inspector of Factories, who has chosen for his subject "Industrial Anthrax."

The Council of the Royal College of Physicians have appointed Dr. T. H. Green, Dr. E. Seaton, and Dr. Wethered, adjudicators of the "Weber-Parkes" prize and medals for 1906, and have selected as the subject of the essay for that occasion: "The degree of infectivity of pulmonary tuberculosis, and the administrative measures desirable for the control and treatment of the disease." The prize, of the value of 150 guineas and a silver medal, is awarded triennially to the writer of the best essay upon some subject connected with the etiology, prevention, pathology, or treatment of tuberculosis, especially with reference to pulmonary consumption in man, and is open to members of the medical profession in all countries.

THE SIGNIFICANCE OF BACTERIOLOGICAL METHODS IN SANITARY WATER ANALYSIS.*

By C. E. A. WINSLOW and C. P. NIBECKER.

1. *Sanitary Inspection and Its Limitations.*—It is well recognized to-day that a study of the possible sources of pollution on a watershed, of the direction and velocity of currents above and below ground, of the character of soil, and the liability of contamination by surface wash, may furnish the expert with evidence of the greatest value. Often, however, he must form some opinion upon the quality of water sent from a distance without the opportunity of examining its surroundings; and even when a sanitary inspection can be made its results are by no means conclusive. No reconnaissance can show certainly whether unpurified drainage from a cesspool does or does not reach a given well; whether sewage discharged into a lake does or does not find its way to a neighbouring intake; whether pollution of a stream has or has not been removed by a certain period of flow. Evidence upon these points must be obtained from a careful study of the characteristics of the water in question, and this study can be carried out along two lines, chemical and bacteriological.

2. *The Significance of the Chemical Analysis.*—A chemical examination of water for sanitary purposes is mainly useful in throwing light upon one point—the amount of decomposing organic matter present. Humus-like substances may be abundant in surface waters quite free from harmful pollution, but these are stable compounds. Easily decomposable bodies, on the other hand, must obviously have been recently introduced into the water, and mark a transitional state. "The state of change is the state of danger," as Dr. T. M. Drown has phrased it. Sometimes the organic matter has been washed in by rain from the surface of the ground; sometimes it has been introduced in the concentrated form of sewage. In any case, it is a warning of possible pollution, and the determination of free ammonia, nitrites, carbonaceous matter as shown by "oxygen consumed," and dissolved oxygen, yield important evidence as to the sanitary quality of a water.

Furthermore, nitrates, the final products of the oxidation of organic matter, and the chlorine introduced as common salt into all water which has been in contact with the wastes of human life, furnish additional information as to the antecedents of a sample. The results of the chlorine determination are indeed perhaps more clear than those of any other sanitary process, for chlorine and sewage pollution vary together, due allowance being made for the proximity of the sea and other geological and meteorological factors. Unfortunately, it is only past history and not present conditions which these latter tests reveal, for in a ground water completely purified, from a sanitary standpoint, such soluble constituents remain, of course, unchanged. Thus, in the last resort, it is upon the presence and amount of decomposing organic matter in the water studied that the opinion of the chemist must be based.

3. *The Quantitative Bacteriological Examination of Water.*—The decomposition of organic matter may be measured either by the material

* From the Biological Laboratories of the Massachusetts Institution of Technology (*Technology Quarterly*, Volume xvi, No. 8, September, 1908).

decomposed or by the number of organisms engaged in carrying out the process of decomposition. The latter method has the advantage of far greater delicacy, since the bacteria respond by enormous multiplication to a very slight increase in their food supply, and this fact, which necessitates great care in methods and great caution in the interpretation of results, has led hasty observers to condemn the quantitative bacteriological methods. The past ten years have witnessed, however, remarkable progress, and the establishment of a procedure for the making of approximately uniform media, through the efforts of G. W. Fuller, G. C. Whipple, and other prominent members of the American Public Health Association, has placed quantitative bacteriology on a reasonably firm basis.

The distinction between quantitative and qualitative bacteriological analysis is a somewhat arbitrary one. The gelatin plate is not only quantitative but also qualitative, inasmuch as it eliminates numerous bacteria for whose growth its conditions are unfavourable, and the dextrose broth tube is a quantitative as well as a qualitative test when it is applied to a series of measured portions of the water to be examined. A better classification would separate processes which indicate decomposing organic matter in general, from those other methods which aim at the separation of the organisms associated more specifically with sewage pollution. Under the first head comes only the standard gelatin plate count at 20°; and this count, as above suggested, roughly corresponds, in not too heavily polluted waters, to the free ammonia and "oxygen consumed," as revealed by chemical analysis. If low numbers of bacteria are found, the evidence is highly reassuring, for it is seldom that water could be contaminated under natural conditions without the direct addition of foreign bacteria or of organic matter which would induce a rapid multiplication of those already present. The bacteriologist, in such cases, can declare the innocence of the water with justifiable certainty. Recently an examination was made by one of us of a town supply which was derived from a filter gallery on the shore of a lake below a gathering ground occupied by a considerable population. Public confidence in this water had been shaken because the chlorine was high, about eight parts per million. It is true that the ammonias were fairly low, the free ammonia being about .03 parts and the albuminoid ammonia about .05 parts per million; but the gelatin count proved far more instructive. Plates made from water taken at different parts of the system showed from 0 to 5 colonies per cubic centimetre, indicating, in connection with sterile litmus-lactose-agar plates at 37° and negative tests for *Bacillus coli*, that at the time of examination all pollution had, without question, been effectually removed. Only repeated studies could, of course, prove this condition to be permanent, but the same objection applies to any other method of analysis.

If the gelatin count be high, the interpretation is less simple. In the first place, high numbers are at times due to the exceptional multiplication of certain water forms, which may generally be detected by inspection of the plates. Thus a sample of spring water recently received from a distance contained, on arrival, 4,200 bacteria per cubic centimetre, almost all the colonies being those of the fluorescent water bacillus. Sterile litmus-lactose-agar plates and negative tests for sewage bacteria confirmed the conclusion that in this case the high count signified only a multiplication in transit. Large numbers, under ordinary conditions, when they include a normal variety of forms, indicate, however, the presence of an excess of organic matter. Such organic matter may not mean sewage pollution; it does mean at least the presence of washings from the surface

of the ground, which always implies the possibility of pollution; and no supplies exposed to such conditions are now considered satisfactory. The close correspondence between the excess of bacteria in surface waters during the winter and spring months, and the epidemics of typhoid fever due to the same waters, brings out forcibly the reality of this danger, and emphasizes the fact that high total numbers of bacteria are always to be regarded as possibly significant.

4. *The Isolation of Intestinal Bacteria.*—The bacteriologist can, however, do more than detect the presence of general organic contamination; he can discover as well in polluted water certain semi-parasitic organisms, found in large numbers in the alimentary canal, whose presence specifically indicates the entrance of sewage. Ever since its interference with the early attempts to isolate the germ of typhoid fever from water, the *Bacillus coli* has been recognized as an organism of this character, and in recent years the researches of the English workers, A. C. Houston, E. Klein, and W. H. Horrocks, have shown the importance of the streptococci in the same connection.

The whole subject is a new one, and even in the technique of the colon test divergent opinions still exist on two points, which, it is to be hoped, may be harmonized for the sake of comparability. In the first place, the tests used in defining *Bacillus coli* are not yet quite uniform. For example, Whipple has recently¹ given forty-eight hours as the period for the nitrate, milk, and indol reactions; while twenty-four hours is the time employed in many laboratories for the two first, and seventy-two hours for the last of these tests. Whipple also includes the failure to form spores as one of the routine tests for *Bacillus coli*, which seems to us needless, as there are no forms likely to be found in water analyses which form spores while giving all the other reactions of the organism. These slight differences in method do not, however, materially affect the practical results of the colon test. The main characteristics of the bacillus, the typical reactions on agar and gelatin, and in dextrose broth, milk, nitrate solution, and peptone solution, are well understood; and the effect of the different periods used for the tests will only be manifest in the inclusion or exclusion of certain allied forms, which Whipple assumes, with some probability, to be typical colon bacilli, weakened by sojourn under unfavourable conditions. It seems to us desirable, in the present state of our knowledge, to exclude, as far as possible, these atypical forms, whose significance is still uncertain.

More serious than slight variations in the technique of the colon test is the failure to apply it quantitatively to the examination of small samples of water, cubic centimetres or fractional parts. *Bacillus coli* has frequently been found in large samples of waters of fair sanitary quality. Prescott² has shown the identity of this organism with certain lactic acid bacteria found upon grains and other cereals. Whipple remarks that, "*Bacillus coli*, if not widely distributed in nature, resembles certain common bacteria in all points covered by the usual tests;" but it by no means follows, as he states, that this throws "doubt upon the use of this organism as a conclusive test for faecal contamination." Many German bacteriologists, particularly the pupils of Kruse, at Bonn, have indeed concluded, because they could isolate colon bacilli from good waters by the examination of a series of litre samples, that the test was valueless. It is essentially, however, a question of less and more. Colon bacilli are either wanting in good waters or are so rare as not to be found in the examination of samples of one cubic centimetre; they are found in a majority of one cubic centimetre samples of water so polluted as to be dangerous for drinking;

between these two extremes their numbers vary with the amount of pollution. Klein and Houston³ in England; Jordan,⁴ and Winslow and Hunnewell⁵ in America, and very recently, Petruschky and Pusch⁶ in Germany, have exhaustively studied the distribution of the colon bacillus with uniform results. That the absence of this organism demonstrates the harmlessness of a water as far as bacteriology can prove it, no one would probably hesitate to acknowledge; and that, when present, its numbers form a trustworthy measure of its sanitary condition, the observers above quoted have proved beyond reasonable cavil.

5. *The Fermentation Test.*—In a thorough examination of a single sample of water the attempt should be made to isolate colon bacilli and streptococci, and to work them out in detail. Often, however, when a quick result is desired, or when a long series of routine observations must be made, some shorter method is desirable. The classic work of Theobald Smith early pointed out that the dextrose broth tube furnished such a rapid test,⁷ and it has since been well established that organisms found in water which at 37° produce in twenty-four hours a good quantity of gas, made up of approximately two parts of hydrogen to one part of carbon dioxide, are almost always colon bacilli. In the paper to which reference has several times been made, Whipple¹ has brought strong evidence of the value of this, which he calls the "presumptive test" for *Bacillus coli*. The diagrams there given, showing the chemical and bacteriological relation of certain surface waters grouped under six headings, according to their relative pollution as determined by inspection, are striking, and indicate that the presumptive colon test harmonizes closely with actual conditions. Whipple's scale, according to which water giving a positive presumptive test in one cubic centimetre is questionable, and in one-tenth of a cubic centimetre is probably unsafe, seems justified by all the evidence at hand.

6. *The Litmus-Lactose-Agar Plate.*—Besides the gelatin plate count at 20° and the study of dextrose broth tubes, either with determination of the gas formula alone, or with sub-cultures definitely to identify the colon bacillus and the streptococci, there is another method of examination—the direct plating of the water in litmus-lactose-agar—which has never come into such general use, but which is capable of wide and helpful application. Hazen and White,⁸ as long ago as 1891, suggested that agar plates grown at the body temperature, instead of permitting the growth of all the water species, would "present a selected number, namely, those which can live at blood heat; including, we may believe, most of the parasitic and pathogenic germs, which, under the circumstances, are the ones of greatest interest; and eliminating those species which cannot grow at the temperature of the body, and are, therefore, in most cases, as such, presumably harmless."

In 1893, Mathews,⁹ now so widely known for his physiological researches, published an account of the Wurtz litmus-lactose-agar plate, introduced into America in the previous year by Professor Sedgwick and himself, and suggested its application to the sanitary analysis of water. Fifty-nine samples of water examined gave results summarized in the overleaf table, indicating clearly what the author described as a "heat and agar differentiation."

The main object of this work was to facilitate isolation of the typhoid bacillus from water by eliminating those forms likely to mask it on the gelatin plate. It was obvious, however, that a method giving such special prominence to organisms growing at the body temperature, and to the acid formers, which have more and more come to be recognized as intestinal forms, must have a direct application to sanitary water analysis.

The general interest awakened about 1893 by the colon test perhaps accounts for the fact that the agar plate method was used less for its own

Sources of Water.	Average Number of Colonies per c.c.	
	Gelatin 20°.	Wurtz-Agar 37°.
Wells, springs	1,664	28
Reservoirs	158	43
Ponds	296	95
Taps	242	24
Streams	278	181

sake than as an aid in the separation of *Bacillus coli*. It has been extensively applied to this purpose by the Massachusetts State Board of Health; in 1899 the average number of colon bacilli in the Merrimac River water thus determined varied from eight per c.c. in August to 140 in December.¹⁰ Irons,¹¹ at about the same time, compared the method with the dextrose broth tube for the isolation of *Bacillus coli*, and concluded that it was less useful than the latter, especially when applied to highly polluted waters.

English sanitarians have made good use of this test, modified by the addition of one-thousandth part of phenol to the litmus-lactose-agar medium. The elaborate researches of Chick,¹² for example, showed 6,100 colon bacilli per c.c. in the Manchester Ship Canal, 55-190 in the polluted River Severn, and numbers up to 65,000 per gram in roadside mud. On the other hand, of thirty-eight unpolluted streams and rivulets, thirty-one gave no *Bacillus coli*, and the other seven gave one per cubic centimetre or less. The Liverpool tap water, snow, rain, and hail gave no colon bacilli.

Few recent authors appear to have used the 37° count and the count of acid-formers as in themselves important, although Rideal¹³ lays some stress upon the former, and mentions that a London water gave on an average only one-twelfth as many colonies on agar at 37° as on gelatin at 20°. The blood temperature count has, however, been in constant use in the biological laboratories of the Massachusetts Institute of Technology, at the University of Chicago, at Beloit College, and some other institutions, and in legal practice, with results of uniform significance.

7. *New Studies of Unpolluted Waters by means of the Litmus-Lactose-Agar Plate.*—We are strongly of the opinion that this feature of the bacteriological analysis should not be neglected, particularly in view of the fact that the litmus-lactose plate reveals the presence of the streptococci which may be overlooked in the dextrose tube. Because of the small attention paid to the method in recent text-books, and the paucity of published data as to its results, we have thought it worth while to repeat Mathew's work of 1893 by the examination of 259 samples of water. The samples covered as wide a range as possible of waters presumably not polluted by sewage, our object being to show definitely whether organisms growing at 37° and fermenting sugar are rare in such sources. Besides the public supplies of thirteen cities and towns, we examined waters from brooks, ponds, springs, deep and shallow wells, swamps, and pools in fields and woods. The samples were collected between January and May of 1903, and in some instances the spring rains had washed excessive amounts of organic matter into the waters tested. In most cases the samples were brought to the laboratory within four to six hours, and two gelatin plates, two litmus-lactose-agar plates, and three dextrose broth

EXAMINATION OF 259 SAMPLES OF WATER FROM APPARENTLY UNPOLLUTED SOURCES.

Sources of Samples.	Number of Samples.	Gelatin Plates.				Litmus-Lactose-Agar Plates.				Dextrose Broth Tubes.			
		Number of plates.	Maximum number of colonies.	Minimum number of colonies.	Average number of colonies.	Number of plates.	Maximum number of colonies.	Minimum number of colonies.	Average number of colonies.	Plates showing red no. colonies.	Number of tubes with gas.	Number of tubes with gas 1-0.	Number of tubes with gas 2-1.
Cambridge supply (tap) ..	5	10	240	20	94	8	15	2	11	0	15	0	0
Wakefield and Stoneham supply (tap) ..	7	14	150	20	59	18	12	2	6	0	21	0	0
Lynn supply (tap) ..	6	12	20	0	16	12	12	2	3	0	18	0	0
Brookline supply (tap) ..	1	2	—	all liquefied	—	2	2	1	18	0	0	0	0
Plymouth supply (tap) ..	6	12	70	10	35	12	6	0	2	0	18	0	0
Peabody supply (tap) ..	3	6	261	30	141	5	36	1	21	0	9	2	0
Dedham supply (tap) ..	6	12	13,500	0	3,717	11	3	0	1	0	18	0	0
Newburyport supply (tap) ..	6	12	267	100	38	12	14	2	9	0	18	0	0
Salem supply (tap) ..	5	10	41	200	232	10	23	10	14	0	15	0	0
Taunton supply (tap) ..	4	7	845	10	13	8	5	0	2	0	12	0	0
Sharon well (tap) ..	3	6	1,250	240	738	6	74	30	46	2	9	3	0
Medford supply (tap) ..	5	10	5,000	4,200	524	10	16	3	8	0	15	0	0
Milton supply (tap) ..	2	4	—	all liquefied	4,700	2	13	12	0	0	6	0	0
Westerly, R. I., supply (tap) ..	1	2	1,010	30	223	2	121	83	7	0	3	0	0
Brooks ..	61	122	54	0	18	30	5	0	1	0	45	0	0
Driven wells ..	15	30	1,270	20	294	64	13	0	2	0	95	13	0
Springs ..	32	64	340	100	167	30	24	0	9	0	45	1	0
Ponds fed by brooks ..	15	30	—	all liquefied	—	2	5	3	4	0	3	0	0
Melted snow ..	1	2	—	all liquefied	—	2	44	365	31	0	66	2	0
Pools in fields ..	22	44	780	100	365	44	95	2	3	0	80	2	0
Pools in woods ..	22	44	580	10	181	43	14	0	3	0	65	0	0
Roadside pools ..	10	20	9,000	410	811	20	10	0	4	0	30	2	0
Stream, Blue Hill Reservation ..	1	2	—	all liquefied	—	2	0	0	0	0	3	0	0
Flow from rocks ..	2	4	60	30	47	4	2	0	0	0	6	0	0
Ponds fed by springs ..	6	12	420	60	188	12	5	0	2	0	18	0	0
Drainage from manured pasture ..	1	2	1,270	1,200	1,235	2	28	26	27	0	3	0	0
Swamps ..	3	6	310	240	269	6	10	0	6	0	9	5	0
Rain water, after twelve hours' heavy fall ..	7	14	—	all liquefied	—	14	6	1	2	0	21	0	0
Shallow well in Lynn Woods ..	1	2	20	10	15	2	1	1	1	0	3	0	0
Totals ..	259	517	511	4	775	41	38	3	8				

tubes were inoculated from each, one cubic centimetre portions being used, or one-tenth of a cubic centimetre portions in plating from those samples which contained an obvious excess of organic matter. The agar plates were counted after twenty-four hours at 37°, the number of red colonies being noted, and at the same time the dextrose broth tubes were examined and the gas formula determined. The gelatin plates were counted after forty-eight hours.

8. *Results of Our Studies.*—The results of the examination are shown in detail upon the accompanying table. The gelatin counts, it will be noted, ranged high in some cases: the Dedham, Medford, and Milton supplies, the Sharon well, the roadside pools, and the drainage from a pasture giving figures which would excite suspicion. The high Milton figures may probably be explained by the fact that these samples were two to three days old when examined, a condition which obtained in no other case. The Dedham average was due to very high counts on two samples, the other plates being sterile.

The total count on litmus-lactose-agar was, in general, low, the highest average being 46 for the Sharon well and 31 for the pools in the fields. The general average for the whole 259 samples was less than 8. Colonies of strong red colour were found in only two samples, one from the Sharon well and one from the Brookline supply. In the latter case, we have reason to suspect contamination after the collection of the sample and while it was out of our hands. A very faint acid-producer, giving a mere suggestion of red colour, was present in a number of the public supplies, and proved to be *Bacillus mycoides*, or a closely related form. Finally, of the dextrose broth tubes inoculated, only forty-one showed gas, and of these, only three, made from the Sharon well, gave the proper gas formula. The organism here actually proved to be *Bacillus coli*; and as the well is situated just below a stable and barnyard, we are inclined to believe it actually polluted. Thus this apparent exception only adds to the force of the general rule.

If we consider the results of this examination of the litmus-lactose-agar plate, it becomes apparent that organisms capable of growth at the body temperature are not numerous in unpolluted waters; acid-formers are practically absent.

We have made no special comparative examinations of polluted waters, because their condition is fairly well known. The Massachusetts State Board of Health results, and those obtained by Chick for *Bacillus coli* alone, are sufficiently large to give an idea of the number of acid-formers present in polluted streams; while in some recent work at the Institute, to be published shortly, Mr. S. K. Baker has found total 37° counts ranging from 9,800 to 16,900 in water from various parts of the Charles River. Two twenty-four hour examinations of Boston sewage, made at the Sanitary Research Laboratory of the Massachusetts Institute of Technology during the summer of 1903, gave an average of 3,660,000 bacteria per c.c. on gelatin at 20°, and 2,310,000 bacteria per cc. on lactose-agar at 37°, with 550,000 acid-formers. In general, we may say that the total count on litmus-lactose-agar will be likely to run into hundreds in polluted waters, sometimes equalling that obtained on gelatin at 20°, with a large proportion of acid-formers; while good waters will show a count under fifty, with acid-formers only rarely present. From exceptionally pure waters sterile plates at 37° may often be obtained.

9. *Summary of Bacteriological Methods.*—In conclusion, it appears, in the light of present knowledge, that the full bacteriological examination of the future will consist of three parts: the gelatin plate count as an

estimate of the amount of organic decomposition in process; the total count and the count of red colonies on litmus-lactose-agar, as a measure of the organisms which form acids and thrive at the body temperature; and the study of a series of dextrose broth tubes for the isolation of colon bacilli and streptococci. The simple examination of the dextrose broth tube and the count on the litmus-lactose-agar plate will serve for what Whipple has well called presumptive tests.

10. *Significance of Bacteriological Results.*—The results of the bacteriological examination have, in several respects, a peculiar and unique significance. First, this examination is the most direct hygienic method of water analysis. Whipple, in the paper quoted above, says that his presumptive test "gives results that agree well with chemical and biological analysis." Bacteriology, however, needs no such indirect justification. What we dread in drinking water is the presence of pathogenic bacteria, mainly from the intestinal tract of man, and it is quite certain that the related non-pathogenic bacteria from the same source will reveal the presence of these disease germs more clearly than will any chemical compounds. In the second place, the bacteriological methods are far more delicate than any others. Klein showed by experiment with dilutions of sewage that the colon test was from ten to one hundred times as sensitive as the methods of chemical analysis; and a simple calculation shows that this must be the case, since sewage contains only from a hundred to a thousand times as much chlorine as good drinking water, against ten thousand to a hundred thousand times as many colon bacilli. Studies of the self-purification of streams have confirmed these conclusions on a practical scale. Thus in the Sudbury River it was found that while the chemical evidences of pollution persisted for six miles beyond the point of entrance, the bacteria introduced could be detected for four miles further.¹ Thirdly, negative tests for *Bacillus coli* and low bacterial counts may be interpreted as proofs of the good quality of water, with a certainty not attainable by any other method of analysis. Many a surface water with reasonably low chlorine and ammonia has caused epidemics of typhoid fever; but it is impossible, under any natural conditions, that a water could contain important typhoid contamination without giving clear evidence of pollution in the dextrose broth tube or on the lactose-agar plate. It seems to the writers that the real application of chemistry begins where that of bacteriology ends. When pollution is so gross that its existence is obvious and only its amount needs to be determined, the bacteriological tests will not serve on account of their excessive delicacy. In studying the heavy pollution of small streams, the treatment of trades wastes, and the purification of sewage, the relations of nitrogenous compounds and of oxygen compounds are of prime importance. In other words, when pollution is to be avoided because the decomposition of chemical substances causes a nuisance, it must be studied by chemical methods. When the danger is of infection, and comes only from the presence of bacteria, bacteriological methods furnish the best index of pollution.

In the study of certain special problems the paramount importance of bacteriology is generally recognized. The distribution of sewage in large bodies of water into which it has been discharged may be traced best in this way, on account of the ready response of the bacterial counts to slight proportions of sewage, particularly since the ease and rapidity with which the technique of plating can be carried out make it possible to examine a large series of samples with a minimum of time and trouble. For the same reasons, and because the factors which condition the disappearance of

disease germs from a polluted river must operate most nearly in the same manner upon related parasitic forms, the fermentation tube and the gelatin and lactose-agar plates furnish the best criteria for a study of the self-purification of streams. Finally, the quickness with which slight changes in the character of a water are marked by fluctuations in bacterial numbers, renders the bacteriological methods invaluable for the daily supervision of surface supplies or of the effluents from municipal filtration plants.

In the commoner case, when normal values obtained by such routine analyses are not at hand, the problem of the interpretation of any sanitary analysis is a more difficult one. The conditions which surround a source of water supply may be constantly changing. No engineer can measure the flow of a stream in July, and deduce the amount of water which will pass in February. Yet the July gauging has its own value and significance. So a single analysis of any sort is not sufficient for all past and future time. If it gives a correct picture of the hygienic condition of the water at the moment of examination, it has fulfilled its task; and this the bacteriological analysis can do. The evidence furnished by inspection and by chemical analysis must be welcomed whenever it can be obtained. Yet we are of the opinion that, on account of their directness, their delicacy, and their certainty, the bacteriological methods should be the last to be omitted, and, if necessary, they alone may furnish conclusive testimony as to the safety of a potable water.

In conclusion, we desire to express our thanks to Professor W. T. Sedgwick, whose interest in this subject has been our chief inspiration, as it was that of some of its earliest investigators in 1891 and 1893.

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¹² Chick, H. The Distribution of *Bacterium coli communis*. Thompson-Yates Lab. Rep., Vol. 3, 1900-1, pp. 1 and 117.

¹³ Rideal, S. Water and its Purification. London. 1902, p. 292.

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THE MICHIGAN METHOD FOR THE BACTERIOLOGICAL EXAMINATION OF WATER.*

By VICTOR C. VAUGHAN, M.D.,

Dean of the Medical Department of the University of Michigan.

At the opening of the hygienic laboratory of the Michigan University in October, 1888, I began a new method for the bacteriological examination of drinking water, which, with various modifications, has been carried out since that time.

It may be briefly described as follows: The samples are collected in sterilized receptacles and sent to the laboratory without delay. Immediately on receipt, plates are made with 0.05 c.c., 0.1 c.c., 0.5 c.c., and 1 c.c. of the water. For many years only gelatin plates were prepared, and these were grown at room temperature. During the past two years, however, only agar plates are used, two sets being made, one of these grown at room temperature, and the other at 38° C. At the higher temperature the toxicogenic organisms crowd out the non-toxicogenic, while at the lower the reverse is true. The colonies developed on these plates are counted at the expiration of twenty-four, forty-eight, and seventy-two hours.

At the same time that the plates are made, beef-tea tubes are inoculated with like amounts of the water, and these tubes are kept in the incubator for twenty-four hours at from 38° to 40°. This temperature is regarded as a point of importance, and is never allowed to fall below 38°, for the reason already given that many harmless water germs do not multiply at all, or do so but feebly at 38°. So far as I know, this fact was first observed in this laboratory, and it has been practically applied ever since the opening of the institution in 1888. If no bacteria develop at this temperature the water is reported as perfectly safe. Certainly it can cause no infectious disease when it contains no bacteria that will grow at the temperature of the human body. It matters not how many thousand it may show per cubic centimetre when grown at room temperature.

When germs are found in any of the tubes after twenty-four hours in the incubator, from 1 to 2 c.c. of the beef-tea cultures is injected intra-abdominally into white rats or guinea-pigs. Generally two animals are thus inoculated from each tube. If none of these animals die from the effects of these injections, the water is regarded as safe. If one or more of the animals die, agar plates are made immediately after death from the heart's blood. The thoracic cavity is opened, the heart exposed *in situ*, its surface seared with a hot iron, and the cavity punctured with a sterile glass pipette, into which a few drops of the blood are drawn. With the blood thus obtained the plates are made. The purpose held in view in these animal experiments is to use the animal as a plate for separating the toxicogenic organisms from the non-toxicogenic. These agar plates are developed at 38°, and the success of the method is largely dependent on the skill and care given to this part of the work. The colonies found on these plates are studied most carefully, and in the routine work five cultures are made from each kind of colony. By this I mean to say that if all the

* Abstract from article in Journal of the American Medical Association, Vol. xlii, No. 15, April 9th, 1904.

colonies appear to be the same, cultures are made from at least five colonies, while if it is evident that there are two or more kinds of colonies present, five cultures are made from each kind. It is true that this procedure takes considerable time and demands much labour, but it has been found that unless this procedure be carried out, pure cultures are not obtained, and it is subsequently impracticable to differentiate the organisms. It not infrequently happens that when the colonies are apparently the same, we succeed in obtaining two or more germs from them. We have tried for these plates various kinds of culture media, such as litmus-lactose agar, for the purpose of bringing out more differentiation among the colonies. This point is still a subject of investigation, but in the routine work we are employing ordinary agar plates. Sometimes it is found necessary to re-plate the cultures obtained from the plates originally made from the heart's blood. The cultures obtained from these plates are carried through tests on various media.

CONCLUSIONS.

1. Of 709 samples of drinking water sent by health officers and other physicians to the hygienic laboratory of the University of Michigan between Oct. 1st, 1888, and Dec. 31st, 1903, 213, or 30 per cent, contained toxicogenic germs.
2. Ten samples, or 1.4 per cent, contained no bacteria capable of growth at 38° C. Of these 10 samples, 4 were from deep springs, and 6 from the Great Lakes—4 from Lake Superior and 2 from Lake Huron.
3. Waters that contain no germs capable of growth at 38° C. or higher cannot cause disease.
4. Waters that contain no toxicogenic germs are not condemned.
5. Waters that contain as their only toxicogenic organism a typical colon bacillus are not condemned. By a typical colon bacillus we mean one which is non-motile, produces indol abundantly, produces acid in milk, coagulates milk within twenty-four hours, and evolves more or less gas from glucose and lactose cultures.
6. Waters which contain as their only toxicogenic organism a typical proteus bacillus are not condemned. It must be remembered that other germs cannot be excluded until after repeated plating of the cultures made from the heart's blood fails to show their presence.
7. Waters that contain any member of the venenosus group or any such germ as we have marked doubtful in the table given are condemned.
8. I have never found in drinking water a germ that responded to the Widal test.
9. Sixteen years of experience with this method of water analysis convinces me that the results given by it are in the majority of instances trustworthy.

FLIES AND TYPHOID FEVER.—A number of cases of typhoid fever occurred at Bonny Downs, East Ham, in cottages near the sewage works and the town's refuse heaps. There was an intolerable nuisance arising from flies bred on the refuse heaps, and dead flies were found in most of the water cisterns in the cottages. These cisterns had no covers, and are usually placed over the sink in the kitchen or scullery. The sludge from the specifically infected sewage being pumped into lagoons formed of house refuse, flies could easily convey infection to the drinking water in the cottages. The bacteriological examination of the water from several of these cisterns showed that it was contaminated by organisms derived from sewage. The water as taken from the mains was of excellent quality. *Essex County Ann. Report.*

BUILDING BYE-LAWS IN RURAL DISTRICTS.

By ALFRED ASHBY, M.B., F.R.C.S.,
Medical Officer of Health, Reading, Wokingham, and Caversham.

In connection with the subject of Building Bye-laws in rural districts, the fact should not be lost sight of that there exists an energetic body styling itself "Building Bye-laws Reform Association," the aims and objects of whose work of destruction are given in their own words as follows:—

"(i). For the purpose of securing, with as little delay as may be, some relief from the more oppressive of the bye-laws now in force in rural districts, the Committee to approach the Local Government Board and endeavour to secure their publishing a new set of model bye-laws for these districts, embodying amendments which the Committee may suggest to the desired end. Further, to urge District Councils to amend existing bye-laws accordingly.

"(ii). Following on the above, to prepare a set of draft building bye-laws carrying out the recommendations of the Special Committee that 'the bye-laws should lay down principles,' and that 'each bye-law should provide that unless the principle it enunciates is otherwise given effect to to the satisfaction of the local authority, it shall be considered to be given effect to if the requirements set out in the schedule to the bye-laws are complied with.'

"(iii). As soon as practicable to deal with the bye-laws of urban districts in like manner."

It should be noted that the assault is to be carried into urban districts if and when effective building bye-laws in rural districts shall have been demolished.

The proceedings of this Association should be carefully watched by all local authorities.

The decision of the judges in "Salt v. Hall," given in the King's Bench Division of the High Court of Justice on May 25, 1903, would appear to give justices so wide a discretion in the enforcement of building bye-laws in rural districts, as to meet any exceptional cases, so that there is less necessity than ever for any radical modification of them.

This case is stated in Knight's *Local Government Reports*, October, 1903, p. 753, in the following words:—

"A bye-law made under section 157 (2) of the Public Health Act, 1875, in the model form, requiring every person who erects a new building to cause it to be enclosed with walls of brick, stone, or other

incombustible materials, is a good and valid bye-law, even though made for an area of rural character, in which buildings are few and scattered, and though no provision is made for dispensing with its requirements in the case of isolated buildings where there is no practical reason for its being complied with.

"If, however, proceedings are taken for a breach of the bye-law in such a case, it is competent to the justices to treat non-compliance with it as a trifling offence within the meaning of section 16 of the Summary Jurisdiction Act, 1879, and to dismiss the information accordingly.

"Per Channell, J. All bye-laws relating to the construction of buildings ought to contain provisions under which compliance with the hard and fast rules they lay down may be dispensed with in the case of buildings of exceptional character to which those rules are unsuited."

This, which is to be regarded as only an *obiter dictum* of the judge, is quite contrary to the practice of the Local Government Board, enunciated in the circular they issued with their original code of model bye-laws; and if unlimited discretion on the part of local authorities and their officers in insisting upon compliance with bye-laws is to become general, it would seem to open the way to many undesirable proceedings.

It would appear preferable that the law should be so altered as to give power to County Councils to grant special dispensation from compliance with bye-laws in rural districts, where good reasons could be shown.

In many rural districts there are essentially urban conditions; therefore it would be in the last degree mischievous to so modify bye-laws for those districts that they would be adapted for only strictly rural areas in which buildings are few and scattered in thoroughly isolated positions.

In view of the request of the Council of our Society for the Branches to consider and report upon what modifications (if any) are desirable in the bye-laws issued by the Local Government Board *re* new buildings in rural districts, the following observations are submitted:—

The model bye-laws alluded to are embodied in series IV (Rural Districts) dated 1903. They are framed under section 23 (3) of the Public Health Acts Amendment Act, 1890, for rural districts in which that section is in force. They relate to new buildings and certain matters in connection with buildings, but they do not relate to new streets, because the Act does not empower Rural District Councils to make bye-laws with respect to them.

It is desirable that those Councils should have control over new

streets, at any rate in the more thickly inhabited parts of their districts, and for that purpose they must obtain urban powers by an order of the Local Government Board under section 276 of the Public Health Act, 1875, to enable them to make the necessary bye-laws under section 157 (1) of that Act.

Such bye-laws would be similar to Nos. 3 to 8 in the model bye-laws for urban districts, series IV. They would not often come into operation in strictly rural parts, where new streets are seldom formed, but in the event of any such being laid out the local authorities should be able to regulate them, for it is impossible to foretell what parts may eventually develop into populous places.

In the model bye-laws for rural districts, there are no regulations with respect to the structure of walls, foundations, roofs, and chimneys of new buildings *for securing stability and the prevention of fires*. That is because the Act of 1890 does not empower Rural District Councils to make bye-laws under section 157 (2) of the Act of 1875, but merely to make bye-laws "with respect to the structure of walls and foundations of new buildings *for purposes of health*"; it does not allow them to make any bye-laws with respect to the structure of roofs and chimneys of new buildings.

It is certainly desirable that such matters should be subject to regulation by bye-laws in rural districts, and that can be brought about by the Local Authorities obtaining from the Local Government Board urban powers to make bye-laws for that purpose under the Act of 1875.

In some quarters there is too much tendency to study the outside appearances of new buildings, with results by the way which are often anything but pleasing, at the expense of the more prosaic, but nevertheless essential, requirements for securing stability and the prevention of fires, and for purposes of health.

The model bye-laws for new buildings in rural districts will allow Jerry to run riot and have full sway in those districts. He will be able to erect dwelling houses, even in what are practically urban localities, of wattle and daub, stud and mud, or any other flimsy structure, to his heart's content.

This ought not to be possible, but it appears reasonable that the extremely elaborate directions respecting the structure of walls of new buildings contained in the model bye-laws for urban districts, series IV, should be very materially modified and simplified in bye-laws for rural districts.

Each rural authority should adapt those bye-laws to the requirements of their district; but in all cases there should be a bye-law regulating the construction of walls, which should also permit of the use of

hollow walls, or of timber framing under certain conditions, and a minimum thickness of 9 inches should be prescribed for the external and party walls in domestic buildings, and of $13\frac{1}{2}$ inches for two-thirds of the height and of 9 inches for the remainder of the height in public buildings and buildings of the warehouse class; the thickness in each case to be increased by one-third if concrete or similar material be used. All party walls should reach to the under side of roofs.

The structure of the walls of buildings of the warehouse class should be subject to regulation by bye-laws, especially in view of the tendency of the present time to remove factories from towns into country districts.

The bye-laws should, however, give Rural District Councils power to dispense with the requirements concerning the structure and thickness of walls of non-exempted new buildings not exceeding one storey in height, proposed to be erected in areas of strictly rural character in which buildings are few and scattered.

Such a provision, in conjunction with the much improved and more far-reaching exemption of buildings from the operation of the bye-laws, given in bye-law 2 (h) of the rural series, would appear to meet all reasonable objections to the operation of building bye-laws in rural districts.

It is very desirable that bye-law 9 in the rural series should require at least one window that may be opened in every habitable room, to be placed with the top near the ceiling, so as to secure proper change of air in the upper part of rooms.

Bye-law 58 in the urban series requires an aperture or air-shaft with an unobstructed area of 100 square inches to be provided in every habitable room of new domestic buildings in which there is no fireplace and flue. That is reduced to 50 square inches in the corresponding bye-law 11 in the rural series. If an opening of 100 square inches is required for the ventilation of rooms in urban districts, an opening of a similar size would appear to be necessary in rural districts.

If possible, a bye-law requiring lighting and ventilation of staircases should be added, for such places are often dark and unventilated.

There should be added at the end of bye-law 15 of the rural series the words "at a point in the upper half diameter of such sewer," as in bye-law 61 of the urban series.

It will be observed that in bye-laws 19 and 20 of the rural series the minimum diameter of drain ventilating pipes and soil-pipes has been reduced to $3\frac{1}{2}$ inches from 4 inches, as required by bye-laws 65 and 66 in the urban series.

There are serious objections to a soil-pipe having a diameter of

only $3\frac{1}{2}$ inches. The trap of a water-closet has that diameter, and if it is connected with a soil-pipe of the same diameter it will generally be syphoned when the closet is used unless there is a proper arrangement of anti-syphonage pipes, about which the bye-laws are silent; whereas if the trap is connected with a 4-inch soil-pipe it will very rarely be syphoned, even in the absence of anti-syphonage pipes. Another objection is that when a $3\frac{1}{2}$ -inch trap is connected with a $3\frac{1}{2}$ -inch soil-pipe, there is generally a contraction at their junction which tends to produce blockages, which would not occur if the trap was connected with a 4-inch soil-pipe. Moreover, it is undesirable to have anything less than a 4-inch pipe for the ventilator of a house drain.

In the model series for rural districts there are no bye-laws dealing with: (1) The structure of floors; (2) The height of rooms intended to be used for human habitation; and (3) The alteration of buildings.

Section 23 (3 and 4) of the Act of 1890 gives Rural District Councils power to make bye-laws with respect to those matters, and it seems desirable that they should exercise that power.

The following propositions for consideration by the Branch are appended:—

(1). That in rural districts bye-laws in addition to those which Rural District Councils may make where section 23 (3 and 4) of the Public Health Acts Amendment Act, 1890, is in force, are required in respect of: (a) New streets; (b) Stability and the prevention of fires in new buildings. And that it is therefore desirable that such Councils should obtain from the Local Government Board the power necessary to enable them to make bye-laws under section 157 (1 and 2) of the Public Health Act, 1875.

(2). That such bye-laws in rural districts may reasonably be modified and be less stringent and elaborate than the bye-laws relating to those matters in the model bye-laws for urban districts, series IV.

(3). That bye-laws should give Rural District Councils power to dispense with the requirements concerning the structure and thickness of the walls of non-exempted new buildings not exceeding one storey in height, proposed to be erected in areas of a strictly rural character in which buildings are few and scattered.

(4). That it is desirable that the law should be so altered as to give power to County Councils to grant special dispensation from compliance with bye-laws with respect to new streets and buildings in rural districts, where good reasons can be shown.

(5). That all building bye-laws should provide for the exemption of certain buildings from the bye-laws, as in section 2 (h) of the model series IV for rural districts.

(6). That it is desirable that bye-law 9 in series IV for rural districts should require that the top of the window named therein should be near the ceiling.

(7). That it is desirable that series IV should contain a bye-law requiring staircases to be lighted and ventilated by means of windows, etc.

(8). That in bye-law 11 of series IV for rural districts the words "*one hundred square inches*" should be substituted for the words "*fifty square inches*."

(9). That the words "at a point in the upper half diameter of such sewer" should be added at the end of bye-law 15 in series IV for rural districts, as in bye-law 61 of series IV for urban districts.

(10). That in bye-laws 19 and 20 of series IV for rural districts the words "*four inches*" should be substituted for the words "*three and a half inches*."

(11). That it is desirable that series IV for rural districts should contain bye-laws with respect to the structure of floors and the height of rooms intended to be used for human habitation.

(12). That it is desirable that series IV for rural districts should contain bye-laws made under section 23 (4) of the Public Health Acts Amendment Act, 1890, with respect to the alteration of buildings.

(13). That it is desirable that in districts where section 25 of the Act of 1890 is not in force, there should be a bye-law prohibiting the erection of buildings on ground filled up with offensive matter, similar to bye-law 9 in series IV for urban districts.

DISCUSSION.

Propositions 1 to 3 were adopted. Proposition 4 was adopted, with the addition of the words "acting on the advice of their Medical Officer of Health," after the word "Council."

Propositions 5 to 8 were agreed to. Proposition 10 was not adopted, as it was pointed out that it might interfere with the substitution of iron for stoneware pipes. It was thereupon agreed to add the words "that if $3\frac{1}{2}$ inch pipes are laid, proper anti-syphonage pipes be provided," in bye-laws 18 and 19 of series IV for Rural Districts.

Propositions 11 to 13 were agreed to without alteration.

A MUNICIPAL CRECHE.—The Acton Improvement Bill contained clauses which were to give the authorities of Acton power to establish a municipal crèche. There are 450 laundries in the district, and a great number of the women employed are mothers. The average infant mortality in Acton is high, and this fact is believed to be due to mothers leaving their babies during working hours to the care of young children. The proposal made was to establish a day home for sixty children, and to charge about 4d. a day for each child. It was estimated that the plan would have added $\frac{1}{2}$ d. to the rates. The Select Committee of the House of Commons refused to pass the clauses, apparently on the somewhat unsatisfying ground that the contained idea was novel from a legislative point of view.

LAW REPORTS.

HIGH COURT OF JUSTICE.
KINGS BENCH DIVISION

January 19th, 1904.

BEFORE WILLS AND KENNEDY, J.J.

OLIVER v. CAMBERWELL BOROUGH COUNCIL.

Public Health (London) Act 1891, Sec. 3—Effect of Notice—Drain—
Sewer—Recovery of expenses from Council.

An owner was served with a notice under Section 3 of the Public Health (London) Act, 1891, requiring him to repair a drain because of a nuisance, and stating that if the work was not done the council would commence proceedings. The owner therefore did the work, but in the course thereof found that the pipe was a sewer. In an action to recover the cost of the work, it was held that he could not do so, as work done upon receipt of notice, under Section 3, is done voluntarily and not under compulsion.

This was an appeal from a judgment in a County Court in favour of the defendant Council. The plaintiff had been served with the following notice:—

The Vestry of Camberwell.

Public Health (London) Act, 1891.

Public Health Department, Vestry Hall, Camberwell, S.E.,
March 18th, 1903.

Intimation.

To the Owner, No. 117, High Street, Peckham.

Take notice, that I, the undersigned, having visited the above premises, find that the nuisances numbered 9, 12, 21, 38 and 40, in the schedule at the back hereof exist thereon. I, therefore, now, by this written intimation make the existence of the said nuisances known to you, as being the person who is required to abate them; and I have to request that the same be abated within the period of seven days. At the end of this time I shall again visit the premises; and, if the necessary works have not then been completed, the vestry, as the sanitary authority of the parish, will commence proceedings against you by the service of a statutory notice.

(Signed E. HOME,

The officer appointed by the vestry
for the said parish to take
proceedings under the above-
named Act.

The plaintiff, on receipt of this notice, did the work at a cost of £17, but during the course of the work it was discovered that the drain was a sewer. He therefore commenced this action to recover the amount. For the Council it was contended that he could not recover, as he had done the work voluntarily, and not under compulsion, and the County Court judge took that view, holding that work done in compliance with an intimation under Section 3 was done voluntarily.

Naldrett appeared for the appellant, Courthorpe Munroe for the defendants. Several cases were cited, including *Thompson and Norris Manufacturing Co. v. Hawes* (1895), 59 J.P. 580. The court with reluctance dismissed the appeal.

WILLS, J. said, "I confess to giving the decision which I am about to give with some reluctance, because I do not agree with it; but I do not think this question is really open to us after the decision of the Court of Appeal in *Thompson and Norris Manufacturing Co., Limited, v. Hawes*. It is true that that decision did not turn entirely upon the point now before us; but that point was distinctly raised, and is distinctly dealt with in the judgment of LINDLEY, L.J. There can be no doubt that he had then before him a notice in substantially the same form as the notice before us; and he held that a notice under Section 3 of the Act of 1891 is not equivalent, upon the question of compulsion, to a notice under section 4. WRIGHT, J., has, at least twice, decided the same thing upon exactly the same point. Inasmuch as these three cases, to which I have referred, deal with the very point before us, and there is really no substantial difference of any kind to be drawn between the notices in those cases and the notice now in question, I think we are bound to follow those decisions, and to say that there was no legal compulsion upon the present plaintiff to do the work which he did, and that, therefore, he cannot recover against the defendants. I cannot, however, give this judgment without saying again that I do so with great reluctance, and only because I feel compelled to do so; and he then gave his reasons at length for taking the opposite view.

KENNEDY, J., in concurring with the judgment also said that he did not agree with it.

March 3rd, 1904.

BEFORE LORD ALVERSTONE, L.C.J., WILLS AND KENNEDY, J.J.
BEARDSLEY v. GIDDINGS.Sale of Food and Drugs Acts—Milk—Time for instituting Proceedings—
Time of Summons—Delay in serving.

The provision in Section 19 (1) of the Sale of Food and Drugs Act, 1899, that proceedings must be instituted within 28 days from the time of purchase, is complied with if the summons is issued within that time, although it may not be served until later.

This was a case stated by the Wiltshire justices, on the hearing of an information which charged the respondent for that he had unlawfully sold to the appellant and to his prejudice as and for milk a certain article of food which was not of the nature, substance, and quality of the article of food demanded by the appellant. The sale was on June 23rd, 1903, and on July 18th, being before the expiration of twenty-eight days from the time of purchase, the information was laid by the appellant, an inspector under the Sale of Food and Drugs Acts, and a summons issued and left for service by the police. It was, however, not served on the respondent until July 22nd, which was more than twenty-eight days from the sale. Section 19 (1) of the Sale of Food and Drugs Act, 1899, is as follows:—
"When any article of food or drug has been purchased from any person for test purposes, any prosecution under the Sale of Food and Drugs Acts in respect thereof, notwithstanding anything contained in Section 20 of the Sale of Food and Drugs Act, 1875, shall not be instituted after the expiration of twenty-eight days from the time of the purchase." The justices dismissed the summons, on the ground that the time from which the institution of the prosecution was to be calculated was the date of the service of the summons, and not that of the laying of the information.

Randolph appeared for the appellant, and contended that the institution

of proceedings dated from the laying of the information, *Simon*, for the respondent, that the date was that of the service. The court allowed the appeal, and sent the case back to the justices to hear it.

LORD ALVERSTONE, L.C.J., said the general rule was that the laying of the information and the issue of the summons was the beginning of a prosecution. In Section 19, general words were used, namely that "a prosecution shall not be instituted." The Act of 1899 did not alter the usual rule, and there was nothing to show that the legislature meant to alter that rule.

WILLS AND KENNEDY, JJ., agreed.

March 4th, 1904.

BEFORE LORD ALVERSTONE, L.C.J., KENNEDY AND CHANNELL, J.J.
TOUGH v. HOPKINS.

Public Health (London) Act, 1891, Sections 23, 24. Nuisance—Black Smoke—Funnel of Tug on River.

The funnel of a steamboat is a chimney within the meaning of Section 24 of the Public Health (London) Act, 1891, and the owner may be convicted for failing to comply with an order to abate a nuisance arising from black smoke issuing from such a funnel. It is not necessary that the magistrate should specify what works are necessary to abate such a nuisance, if it is not caused by improper construction, but by bad stoking.

This was a case stated by the Lord Mayor on an information preferred under section 24 of the Public Health (London) Act, 1891, against the appellant, for that on August 24th, 1903, between Custom-house and Southwark bridge, on the steamship *Richmond*, a nuisance existed—namely, a chimney sending forth black smoke—and that the appellant had failed to comply with a notice to abate the nuisance. The appellant was the owner of the steam tug. On April 25th, a notice to abate the nuisance had been served upon him. On August 24th, while the tug was proceeding between the Custom-house and Southwark bridge, there was being sent forth from the funnel dense black smoke for five minutes in such quantity as to be a nuisance. The tug was proceeding to Kingston-on-Thames, being employed in plying for hire between Woolwich and Kingston. The engines and boiler were constructed so as to consume as far as possible all the smoke, but the furnaces had been freshly stoked opposite the Custom-house, and it was said that from three to four minutes was not an unreasonable time to allow the fresh fuel to cease emitting black smoke, but the emission of smoke could have been prevented by the fire being kept bright by frequent and careful stoking. It was contended by the appellant that section 24 was inapplicable to a steam tug while plying to and fro, and that proceedings in respect of smoke from vessels plying on the Thames could only be taken under section 23. On behalf of the respondent, it was contended that the funnel of the tug was a chimney within section 24 (b). The magistrate found that the funnel was a chimney within section 24 (b), that the black smoke amounted to a nuisance, and he convicted the appellant and made an order upon him prohibiting the recurrence of the nuisance. The appellant then required him to specify the works to be executed to prevent the recurrence, but the magistrate refused to specify, as it was only a question of stoking.

Hamilton, K.C. and *Bigham* appeared for the appellant, *Danckwerts, K.C.* and *R. Cunningham Glen* for the respondent. The court dismissed the appeal.

LORD ALVERSTONE said that he thought the decision of the magistrate was right. Section 24 was a "nuisance" section, and it was not without importance that it immediately followed section 23. If the words could be fairly applied to a chimney on board a steamship, there was no reason why they should not be so applied; for unless the words "any chimney (not being the chimney of a private dwelling-house)" showed that a steamship could not be included, the object of the legislation would be avoided by not so applying them. There might be cases where the black smoke would come from a chimney which would, in ordinary language, be called a funnel. But he did not think that any argument could be based on the fact that the word "chimney" was used, for "funnel" was only the technical name for a particular kind of chimney. He did not see why the emission of black smoke from the funnels of vessels on the Thames should not be prevented as well as from chimneys on land. Section 24 was not sufficient to enable the Court to hold that the funnel of a steamship was not a chimney. As to the other point, the order was not bad, because it did not specify any works to be executed (although the defendant asked that they should be specified), for there were no works that could be executed.

KENNEDY and CHANNELL, JJ. delivered judgments to the same effect.

UNDERGROUND BAKEHOUSES.—The Bradford Corporation recently summoned a baker for using an underground bakehouse which had not been certified as required by the Factory and Workshop Act. The stipendiary magistrate found that the premises in question had been used as a bakehouse before the passing of the Act, and held that he was bound by the decision in *Schweitzerhoff v. Wilkins*, and therefore the premises did not require a certificate. Notice of appeal has been given. (See note on case quoted in *Public Health* xiv. 401, April, 1902.)

CORRESPONDENCE.

ALLEGED TAMPERING WITH DEATH CERTIFICATES BY REGISTRARS.

To the Editor of Public Health.

SIR,

I find that the Registrar of Deaths in this district often alters the age given on my death certificates on the representation of the relative or other person who registers the death, usually I believe for some purpose of receiving insurance payment. This is often the case in deaths occurring at the workhouse, where I have obtained the age from the deceased person himself, and in some instances a corroboration by other near relatives. Now if this is the usual custom, it minimizes the deaths of old persons to a very considerable extent, as the age is always required to be registered as younger by five, ten or more years. This must vitiate to a certain degree the Registrar General's statistics, and tend to lower the expectation of life in this country, re-acting on life insurance premiums by making them higher. This seems to me to be an important question, and I should like to know if other medical officers of health who are in general practice have observed the prevalence of a similar practice by registrars in other districts.

I am, yours, etc.,
Rural M.O.H.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED, 1888. INCORPORATED, 1891.

A MEETING of the Society was held at No. 9, Adelphi Terrace, London, W.C., on Friday, April 8th, 1904. Present: The President (Dr. J. Groves, J.P.), in the chair, Drs. W. G. Willoughby, H. Meredith Richards, J. A. H. Brincker, W. H. Symons, E. F. Willoughby, W. C. Wanklyn, R. A. Dunn, A. Newsholme, W. A. Bond, T. W. H. Garstang, W. Berry, A. E. Thomas, J. M. Martin, S. G. Sloman, H. Colwell, E. Seaton, J. Priestley, T. Robinson, J. H. Jones, W. Gruggen, G. H. Hope, M. Robinson, P. C. Smith, H. B. Collins, G. Millson, R. Duffield, F. J. Allan, J. F. J. Sykes, S. Davies, and Herbert Jones (members), and Dr. Preston King (visitor).

Correspondence.—Letters regretting inability to be present were received from Drs. T. R. Bailey, Lockhart Stephens, J. Wheatley, and J. M. Wilson.

REPORT OF COUNCIL.

Your Council beg to report:—

1. That they have approved the principle of the Bill introduced into Parliament by the British Medical Association on February 2nd, 1904, dealing with the proposed reconstruction of the Local Government Board, with the addendum that the Public Health Administration should be in the hands of a body entirely distinct from the Poor Law Authorities. They have informed the British Medical Association of such approval, explaining to the Association at the same time in a covering letter that the Council of the Society of Medical Officers of Health are of opinion that the Society is not in a position to itself petition, by virtue of the fact that Medical Officers of Health are *quæ* their appointments officially connected with the Local Government Board which it is proposed in the Bill to reconstruct.

2. That they have approved the appointment of a Minister of Public Health provided such Minister be a member of the Cabinet, and are of opinion that the wishes of the Society in connection with such an appointment are met by the Local Government Board Bill, 1904, as amended, introduced into Parliament on February 2nd, 1904, by the British Medical Association, a Bill which provides, *inter alia*, for "a president who is to be one of His Majesty's Principal Secretaries of State," and have instructed the Hon. Secretaries to communicate with Miss Cochrane to that effect.

3. That they have elected the following officers for the year 1904-05: Treasurer, Dr. George Millson; Hon. Secretaries, Dr. Herbert Jones and Dr. Joseph Priestley; Editor, Dr. Francis J. Allan; Hon. Solicitors, Messrs. Jones and Hamp; Hon. Librarian, Dr. H. Meredith Richards.

4. That they have appointed as Auditors, Dr. Oliver Field and Mr. A. G. Warren, A.C.A.

5. *Investigation re "Return" Cases.*—That they have considered a resolution from the Northern Branch in connection with the isolation of scarlet fever in hospitals, and recommend in connection therewith: "That the investigation into the incidence and causation of 'return cases' of scarlet fever and diphtheria be undertaken by the Society." And they have appointed a Committee of the Council for the purpose

consisting of Drs. A. Newsholme, J. R. Kaye, J. Wheatley, J. F. J. Sykes, and A. Mearns Fraser, together with the President and Hon. Secretaries, *ex-officio*, to draw up in connection with "return cases" a schedule of inquiries, which Medical Officers of Health and Medical Superintendents of Isolation Hospitals are to be afterwards requested to adopt.

6. *Jubilee of the Society.*—That they have referred it to the Finance and Journal Committee, with instructions to report at the September Council meeting, to consider the steps to be taken to mark the Jubilee of the Society in 1906.

7. *Annual Dinner.*—That they are taking steps to hold the Annual Dinner (without ladies) as usual in October, and have left the details to the Finance and Journal Committee.

8. *Delegates.*—That they have appointed as delegates the following members of the Society:—

(a) To the Glasgow Congress of the Sanitary Institute, Dr. Maxwell Ross, Dr. W. Robertson, and Dr. P. Caldwell Smith.

(b) To the Folkestone Congress of the Royal Institute of Public Health, Dr. A. Mearns Fraser, Dr. Griffith, and Dr. J. Priestley.

9. *Provincial Meeting.*—That they have accepted a cordial invitation to hold the Provincial Meeting of the Society at Newcastle-on-Tyne, and have left the details as to date, etc., to the Finance and Journal Committee.

10. *Teaching and Hygiene in Schools.*—That they have instructed the Secretary to send to the Educational Authorities throughout England and Wales copies of the resolutions passed by the Society on the subject of the teaching of hygiene in public elementary schools to the following effect:—

(a) Domestic hygiene, personal hygiene, and physical training to be a compulsory part of the training of all teachers.

(b) The teaching of elementary domestic hygiene, personal hygiene, and physical training to be compulsory subjects in all elementary schools.

11. *Parliamentary Committee Report.*—That they have received and adopted the following report:—

Your Parliamentary Committee beg to report:—

(a) *Re-vaccination Bill.*—That they have considered this Bill, and recommend the Council to petition in favour of the same, and to leave the drawing up of the petition to the officers of the Society.

(b) *Alkali Works Bill.*—That they have had their attention drawn to the Alkali, etc., Works Bill, 1903 (to be reintroduced in all probability during the 1904 session), and suggest that the Council leave the matter in the hands of the Parliamentary Committee, with power to take such action in the name of the Society as they may think fit should the Bill be reintroduced.

(c) *Public Health Bill.*—That they have ordered a communication to be sent to the Council of the British Medical Association expressing the hope that the Association will introduce their Public Health Bill (Security of Tenure) in the present session of Parliament, and enquiring whether the Council can take any step to ensure the passing of such Bill.

(d) *Tuberculosis (Animals) Compensation Bill, 1904.*—That they have had their attention drawn to this Bill, and suggest that the Council leave the matter in the hands of the Parliamentary Committee, with power to take such action in the name of the Society as they may think fit.

(e) *Quinquennial Census.*—That they have received letters from the Epidemiological Society, the Institute of Actuaries, and the Royal Statistical Society, approving of the Society's action with reference to the proposed Quinquennial Census, 1906.

12. *Report from the Finance and Journal Committee.*—That they have received and adopted the following report, and in connection therewith have appointed Mr. W. A. Lawton as Executive Secretary of the Society at a salary of £150 per annum.

Your Finance and Journal Committee beg to report:—

(a) That they have received a letter from the Sanitary Inspectors' Examination Board enclosing the auditor's report and a copy of the balance sheet showing a balance in hand of £123 13s. 4d.

(b) That they have arranged for Mr. Kent to retain his position as Clerk to the Society up to the end of the Society's financial year (June 30th, 1904), and suggest that the Council recommend the Society to pass a vote of thanks to Mr. Kent for his past services as Clerk to the Society, and that such vote of thanks be engrossed on vellum under the seal of the Society and signed by the President and the Hon. Secretaries.

(c) That they have received a report from Dr. R. Dudfield, as the Society's representative on the Joint Committee, *re* permanent office accommodation, and in view of the fact that the Society of Arts and the Royal Statistical Society have withdrawn from such Joint Committee, they have decided also to withdraw as a society from further negotiation in regard to the purchase of a site for a building to be used jointly by the Sanitary Institute and other kindred societies.

13. That they have received and referred to the Parliamentary Committee a communication:—

(a) From the North Western Branch suggesting the desirability of "the Medical Officer to the Education Committee being the Medical Officer of Health of the district in those districts where the Sanitary Authority is also the Education Authority, and that, where it is thought necessary to obtain the services of an expert with regard to such matters as defective hearing, sight, or mental deficiency, the duties of such expert should not be made to include any now performed under statutory direction by the Medical Officer of Health." (January 19th, 1904.)

14. That they have also referred to the Parliamentary Committee and to the Branches the resolutions which were referred to the Council by the Society on the subject of food adulteration, together with the following from the Metropolitan Branch, with a request that the Branches will submit their observations (if any) thereon to the Parliamentary Committee on or before the last day of July, 1904. The resolutions are:—

(a) That the Council of the Incorporated Society be asked to consider the advisability of the Warranty Sections of the Sale of Food and Drugs Acts, 1875-99, being amended so as to prevent any defence of warranty being allowed under such Acts in regard to milk.

(b) That the Local Government Board and the Board of Agriculture be respectfully urged to bring in the necessary legislation with a view to giving effect to the recommendations contained in the 1901 Report of the Departmental Committee of the Local Government Board *re* Food Preservatives and Colouring Matters. [The Local Government Board and the Board of Agriculture have already been written to by the Metropolitan Branch.]

(c) That, having regard to the large amount of milk that is introduced into the Metropolis from outside, the Local Government Board and the Board of Agriculture be asked to take such steps as will ensure the Dairies, Cowsheds, and Milkshops Orders of 1885, 1886, and 1899 being efficiently carried out by all Sanitary Authorities (more especially in rural districts); and, further, that, outside the Metropolis, provision be made whereby the carrying out of such Orders be transferred to the

respective County Councils, wherever default is persistently made by the Sanitary Authorities concerned, as provided for in the case of the Metropolis by sections 100-101 of the Public Health (London) Act, 1891. The Local Government Board and the Board of Agriculture have already been written to by the Metropolitan Branch.]

And in connection with this same subject your Council have already approved the following two resolutions:—

(a) Referred by the Society on February 12th, 1904: "That it is desirable that the findings of the Departmental Committee upon the use of preservatives and colouring matters in food should be made the subject of legislation without any further delay."

(b) Passed by the Metropolitan Branch on March 24th, 1904: "That the Local Government Board and the Board of Agriculture be respectfully urged to bring in the necessary legislation with a view to giving effect to the recommendations contained in the 1901 Report of the Departmental Committee of the Local Government Board *re* Food Preservatives and Colouring Matters."

15. *Byelaws re New Streets and Buildings.*—That they are considering the bye-laws issued by the Local Government Board *re* New Streets and Buildings in Rural Districts, and in that connection have ordered to be printed and sent round to the Branches and to the members of the Council the suggested alterations and amendments drafted by the Home Counties Branch, together with copies of the replies received from the other Branches in connection with the same subject.

16. That they have received a communication from the Royal Colleges of Surgeons of England and Edinburgh, and from the Association of Certifying Factory Surgeons, approving the Society's action in connection with the Ventilation of Factories and Workshops.

It was moved by the President and seconded by Dr. Garstang that the same be received and adopted.

To which an amendment was moved by Dr. Robinson (Leicestershire) and seconded by Dr. Gruggen, "That the Society do *not* support the Bill of the British Medical Association, but express the opinion that a Minister of Public Health should be appointed."

In moving the amendment, Dr. Robinson said the Bill of the British Medical Association said nothing about a Minister of Public Health, and therefore they ought not to give it their support.

Dr. Priestley said they would see from the Council's report that had been added, and they only supported the Bill with the addendum they suggested.

The President put the amendment, when only three voting in favour, he declared the same to be lost.

Before putting the Council's report for adoption, the President drew attention to the paragraph it contained recommending the Society to petition Parliament in favour of the Re-vaccination Bill, and he expressed the hope that everyone present would vote.

The motion for the adoption of the report was then put to the meeting, when all present voting in favour, the President declared the same carried unanimously.

ELECTIONS.

The Society then proceeded to elect a President for the year 1904-5.

The Hon. Secretaries reported that the following Fellow had been duly proposed for election: John Frederick Joseph Sykes, M.D., D.Sc. (Edin.), L.R.C.P. (Lond.), M.R.C.S. (Eng.), F.S.S., 40, Camden Square, N.W. Proposed by Louis C. Parkes, M.D.; seconded by Reginald Dudfield, M.B.; and they reported that Dr. Sykes had also been nominated by

Joseph Groves, Francis Vacher, J. Spottiswoode Cameron, James Wheatley, D. S. Davies, and Bostock Hill.

A ballot was then taken, and the President declared Dr. Sykes unanimously elected.

Dr. Sykes thanked the Society for electing him, and expressed the hope that he would be able to maintain the dignity and honour of the Society.

The Society proceeded to ballot for the election of candidates, and the President declared the following to be unanimously elected:—

AS FELLOWS:—

Harrie, Alfred, M.B., Ch. B. D.P.H., 27, Avondale Road, Chesterfield Assistant M.O.H. Chesterfield R.D.C.

Jennings, William Ernest, M.D., D.P.H., Major I.M.S. (c/o Messrs King, King & Co., Bombay), Health Officer Port of Bombay.

AS MEMBERS.

McCormick, Charles V. M.R.C.S., L.R.C.P., D.P.H., Bank Road, Bootle.

Sandilands, John Edward, M.A., M.D., D.P.H., 9, Sussex Villas, Kensington, W.

AS AN ASSOCIATE.

Saunderson, Richard, 181, Ebury Street, S.W.

Several candidates were then nominated for election at the next meeting.

A paper was then read by Dr. J. Howard Jones on "The Control of Measles Epidemics."

A discussion ensued in which Drs. M. Robinson, T. W. H. Garstang, R. Dudfield, S. Davies, G. Millson, J. F. J. Sykes, Herbert Jones, Preston King, W. Gruggen, H. M. Richards, A. Newsholme, T. Robinson, W. A. Bond, and Thomas took part. Dr. J. Howard Jones replied.

A vote of thanks was passed to Dr. Jones for his paper.

Home Counties Branch.—A meeting was held at the Holborn Restaurant on February 19th, 1904. Present: Messrs. C. Sanders, W. T. G. Woodforde, W. Gruggen, Cattell, A. W. J. MacFadden, J. A. H. Brincker, H. H. Brind, R. W. C. Pierce, J. Williamson, J. C. Thresh, G. Bower, R. H. Frith, W. H. Willcox, W. B. Barclay, F. C. Lewis, S. Rideal, C. E. Fowler, H. W. Kinnersley, C. Grant Pugh, W. H. Bailow, S. Sowden, W. J. Dibdin, G. F. McCleary, D. L. Grimwood, R. A. Dibdin, C. Childs, W. Whitaker, Shirley F. Murphy, H. Kenwood, A. Ashby, E. L. Marsh, C. E. Cassal, Prof. R. T. Hewlett, G. Newman, H. R. D. Spitta, and H. Mereworth Richards.

Dr. Ashby read a paper on Building Bye-laws in Rural Districts.*

Resolved that Drs. Ashby and Woodforde form a Sub-Committee to draw up a series of bye-laws applicable to rural districts, and that further consideration of Dr. Ashby's paper be adjourned until this has been done.

Drs. Thresh and Sowden then read their paper on the Bacteriological Examination of Water.† This was followed by a valuable discussion in which the following took part, Mr. Dibdin, Dr. Childs, Col. Firth, Dr. Rideal, Dr. Spitta and Mr. Griffith.

As the hour was then far advanced, it was resolved to adjourn until March 18th, 1904.

ADJOURNED MEETING, March 18th, 1904.—Drs. Ashby and Woodforde produced their report on Rural Bye-laws, together with a series of model clauses. These were discussed in common with Dr. Ashby's paper.

It was finally resolved that the Bye-laws be submitted to the Society, with a view to being printed and circulated. On the motion of the Hon. Secretary, seconded by Dr. Nash, a hearty vote of thanks was tendered

* See p. 504.

† See pp. 459-497.

to Drs. Ashby and Woodforde for the pains they had taken in revising the byelaws, and for their excellent suggestions thereon.

The discussion on Drs. Thresh and Sowden's paper was then resumed by Dr. Childs, who was followed by Drs. Nash, Eyre, Savage, Hewlett, Richards and Tew and Mr. Whitaker.

Dr. Thresh briefly replied.

On the motion of Dr. Childs seconded by Dr. Thresh it was resolved, that a Committee of the Branch consisting of geologists, chemists, bacteriologists and medical officers of health be formed, with the object of collecting data with reference to waters of various character, tabulating them, drawing up conclusions and submitting them to the Society at a future meeting.

On the motion of Dr. Woodforde, seconded by Dr. Gruggen, it was resolved that the formation of the Committee be left to the officers of the Society with Drs. Thresh and Childs.

Southern Branch.—A Meeting was held at Lewes, on March 25th, 1904. Present:—Drs. Kelly (in the Chair), Groves, Foulerton, Stott, Steinhäuser, Willoughby, and Griffith, with Councillor Holman Bishop as visitor.

The question as to desirable modifications in the Model Bye-laws of the Local Government Board for rural districts was considered, and the following resolution passed:—

"That this Branch, while not desirous to recommend alteration of any particular bye-laws, is of opinion that in the Model Bye-laws provision should be made for allowing building as cheaply as possible consistent with the interests of the public health, and that with this end in view the Local Government Board, while issuing Model Bye-laws, should more readily permit Local Authorities to deviate from the bye-laws in the interests of economy."

Dr. Steinhäuser mentioned the chief points in his paper on "The Treatment and Prevention of Consumption in Country Towns," which had previously been printed and sent to members, and discussion followed in which all those present took part.

North-Western Branch.—An ordinary meeting of the Branch was held at the Victoria Hotel on March 18th, 1904. Present: Dr. W. Berry, J.P. (in the chair), Drs. Martin, Sergeant, Laird, Owen, Vacher, Wheatley, Wilkinson, Hitchon, Forbes, Greenwood, Barlow, Edlin, Chronnell, and Meredith Young.

Dr. Barlow read a paper on "The Infants' Departments of Public Elementary Schools," and concluded by moving the following resolution, which was seconded by Dr. Young, and carried unanimously: "That in the opinion of this Branch it is inadvisable from the point of view of public health to encourage the attendance at public elementary schools of children under the age of 5 years."

Dr. A. W. Martin then read a paper on "The Phthisical Constitution a Dietetic Disease." Drs. Vacher, Wheatley, Greenwood, Barlow, and Meredith Young took part in the discussion, and a vote of thanks was unanimously thereafter recorded to the readers of both papers.

An ordinary meeting of the Branch was held at the Victoria Hotel on Friday, April 15th, 1904. Present: Dr. W. Berry, J.P. (in the chair), Drs. Laird, Wilkinson, Chronnell, Edlin, Forbes, Cowie, Martin, Pringle, Hamilton, G. R. Parker, Gornall, Graham, Alfred Harris, and Meredith Young, with Dr. Kenneth Fraser as a visitor.

A letter was read from Dr. Parker, of Lancaster, relating to the Annual Meeting of the Incorporated Society, and it was resolved that all arrangements in reference to the Annual Meeting be left in the hands of the President, Dr. Parker, the Honorary Secretary, and the Honorary Treasurer, with full power to act as they deem advisable.

Dr. Harris, Assistant M.O.H., Chesterfield, then read a paper on "Scarlet Fever," and Drs. Pingle, Gornall, and Martin took part in the discussion.

A vote of thanks was unanimously accorded to Dr. Harris for the paper. Dr. W. Berry then reported on the matters which had been discussed at the Council Meeting of the Incorporated Society.

West of England and South Wales Branch.—A meeting of the Branch was held at 40, Prince Street, Bristol, on Thursday, February 18th. Present: Drs. J. Tubb-Thomas (President, in the chair), D. S. Davies, Symons, Martin, Bond, Heaven, Howard-Jones, and Messrs. Cotterell and Skinner.

The Hon. Sec. read a letter from the Sanitary Institute inviting members of the Branch to attend the Quarterly Meeting of the Institute at Cardiff on April 23rd at 11.0 a.m., when the subject of School Hygiene would be discussed, and offering to forward the tickets, etc., necessary.

Resolved that the Hon. Sec. be authorised to make known the invitation to the members of the Branch in due course.

Dr. D. S. Davies contributed some introductory remarks upon Mr. Kane's new system of Public Baths, in which he gave a brief resumé of the laws relating to the establishment of Public Baths, and the history of the various Public Baths and Wash-houses in the City of Bristol, where the matter had been dealt with very thoroughly by the Corporation at a very small cost to the ratepayers.

The members afterwards visited the Baths recently erected at Barton Hill at a cost of £17,000, where the City Baths Superintendent very kindly conducted the party round and explained the whole system.

The chief point of interest in the new system was the substitution of spray baths instead of the orthodox slipper bath. The building was ventilated on the plenum system, the dressing rooms being supplied with air at a temperature of 65° F., whilst the bathrooms were heated to the temperature of 105° F. The inventor claimed that by this system of differential heating a maximum cleansing effect was ensured, whilst the average amount of water used in each bath was about ten gallons, compared with about forty gallons as required in the Slipper Bath system; thus a considerable amount was saved in fuel.

The premises also contained most beautifully fitted bathrooms provided with first quality porcelain slipper baths and fittings, laundry, boiler-houses, and swimming bath, which was converted into an assembly room in the winter months.

A vote of thanks was accorded to the Superintendent, Mr. Kane, and the Architect, Mr. Skinner, for their kindness in affording the members an opportunity of visiting the place.

Midland Branch.—A meeting of the Branch was held in the Council House, Birmingham, on Thursday, April 7th, at 3.30 p.m. Present: Dr. Robinson (President) in the chair, Drs. R. Green, H. May, F. H. May, Malet, McCrindle, Orton, Richmond, Robertson, Snell.

A paper was read by Dr. Henry May on "The birth and death rates of England and Wales in 1903," and a discussion took place in which Drs. Robinson, Robertson, Orton, Malet, and Snell took part.

CURRENT PUBLIC HEALTH LITERATURE.

Official and Parliamentary.

Supplement to the Annual Report of the Chief Inspector of Factories and Workshops for the year 1902. Return of Persons employed in Factories, Workshops and Laundries. (Textile Factories and Laundries, 1904—Price 4d.)

Lead Poisoning in Earthenware and China Works. Return to Parliament for the years 1899 to 1903. (March 19, 1904—Price 1½d.)

Enquiry as to Additional Improvements in Ventilation of Flax and Linen Mills. Price 2s.

The Journal of Hygiene, Vol. IV., No. 1, JAN., 1904.

Chemical Constitution of the Tubercle Bacillus. W. Bullock and J. J. R. Macleod.

Fundamental Experiments on Immunity. E. F. Bashford.

Ankylostomiasis. A. E. Boycott and J. S. Haldane. (Practical suggestions on diagnosis, prevention, and destruction. They found that the encapsulated larvae immersed half an inch in depth for 16 hours in London tap-water, and in a 1.8 per cent solution of salt were unaffected, but they died in 0.2 per cent corrosive sublimate solution, and in water containing 1.0 per cent of Izal.)

British Medical Journal, Vol. I, 1904

(Feb. 20.) The Diminishing Birth-rate and What Is Involved by It: Being an Abstract of the Inaugural Address delivered before the British Gynaecological Society. J. W. Taylor. (See also *Lancet*, same date.)

(Feb. 27.) A Case of Scurvy in an Infant fed on Humanized Sterilized Milk. Hy. Ashby.

(March 5.) Lead Poisoning and Water Supplies. (Final part of Dr. Houston's Report in "Supplement in continuation of the Report of the Medical Officer of the Local Government for 1901-2".)

(March 12.) Hemiplegia during Whooping Cough and Diphtheria. Hy. Fraser. Illness due to Milk. H. Kenwood.

(March 19.) Treatment of Hæmoptysis at a Sanatorium. J. P. Milton.

Hæmosozic Sera. M. A. Ruffer and M. Crendiropoulo.

Capsule Formation by *D. pneumoniae* in Culture. M. H. Gordon.

Feeding in Relation to the Health of the Young. J. Niven.

The Destruction of Rats on Board Ship. F. de Lisle. (Testifying to the efficacy, convenience, and cheapness of CO and CO₂ generated by his method—See *B.M.J.*, 1902, Feb. 1st, p. 295.)

(March 26.) Physical Development and Infant Feeding.

(April 9.) Some Experiments on Enterica, Scarlet Fever, and Measles in the Chimpanzee. A. S. Grünbaum.

Notes on Recent Cancer Mortality in the Thames Valley. A. Urquhart.

The Physical Development of the London Schoolboy, 1,890 examinations. Leslie T. Thorne.

Epidemic Sore Throat from Suppurative Mammitis. R. French.

Marmorek's Anti-tuberculous Serum. A. Latham.

Strains of the Tubercle Bacillus.

London Milk Supply.

The Lancet, 1904.

(Feb. 20.) The Use of Antistreptococcic Serum in the Treatment of Scarlet Fever and of Diphtheria. F. Percival Mackie. (Antistreptococcic serum is of distinct value in a certain number of cases of scarlet fever, particularly in those where the throat lesion is severe and toxæmia is going on. (2) Bacteriological examination will give no sure guide as to the cases in which the serum will be beneficial, therefore it is advisable to give the serum early and to make the examination afterwards. (3) The serum ought to be given early in the disease. The longer the disease has lasted before the serum is used the less likelihood is there that it will be beneficial. (4) If the first dose or two have no effect on the temperature, its continuation will probably not be of any value. (5) The serum is liable to produce urticario-erythematous rashes. (6) Even in those cases in which it does no good there is no evidence to show that it does harm. In diphtheria where there is evidence of streptococcic infection, the same serum might be used.)

(March 12.) An Enquiry into the Source of Scarlatinal Infection and its bearing upon Hospital Treatment. R. E. Lauder, M.O.H., Southampton. (For a year Dr. Lauder has adopted a method of segregating mild and convalescent cases, thus protecting them from cases which are acute or suffering from discharges. By this means, results are more satisfactory, and the average period of detention has been reduced from forty-eight to thirty-four days.)

The Medical Officer of Health: His Report and His Sanitary Authority.

The Pollution of Tidal Estuaries. (Summarizes two reports of Mr. A. G. R. Foulerton, with reference to the conditions existing in Sussex, and the report of Dr. T. J. Browne and Prof. McWeeney on those in Ireland. The latter also discusses the value of *B. coli* as a guide to pollution. It is generally agreed that careful local inspection of shell-fish layings is of more value than chemical or bacterioscopic examination, but that they are a valuable aid in all but obvious cases of pollution.)

Sanitation in the Bakehouse and Restaurant Kitchen.

Smoke Prevention at Gas Works: A New Process of Gas-making.

Does Sec. 126 of the Public Health Act, 1875, apply to Measles and Whooping Cough? Preston King. (Continued in subsequent Numbers by Dr. Neech, and others.)

Rural Depopulation: A Scheme to Prevent the Migration to the Towns.

Dentition and Tuberculosis. (Westenhoeffer in a paper read before the Berlin Medical Society, believes that during dentition infection may readily occur.)

(March 19.) Recent Experimental Work on Bacillary Dysentery. Lt.-Col. R. H. Firth.

The Sale of Whisky.

(March 26.) The Recent Epidemic of Smallpox in Liverpool.

The Infectivity of Scarlet Fever. (See Dr. Lauder's article above.)

Chickenpox as a Notifiable Disease—pros and cons.

(April 2.) The Relations of Pulmonary Tuberculosis to other Diseases. F. Parkes Weber.

Epidemiology of Enteric Fever and Cholera in Hamburg. Dr. Reincke (Epidem. Soc.)

(April 9.) The Use of Dr. Marmorek's Antituberculous Serum. A. Latham.

Analyst, 1904.

(Jan.) Abstracts.—Estimation of Formaldehyde in Milk. (Jour. Am. Chem. Soc., 25, 1086.)

(Jan.) Abstracts.—A Comparative Study of Methods. (Jour. Am. Chem. Soc., 25, 1086.)

Detection of Yolk of Egg in Margarine. G. Fendler. (Zeit. für Untersuch. des Nahr. u. Genussmittel, 1903, VI., 977 and 980.)

Arsenic in Hens' Eggs. (C. R., 1903, 186, 1083-5.)

Assay of Crude Alkaloids from different kinds of Coca Leaves. W. Garsed. (Pharm. Jour., 1903, 784-791.)

Detection of the Blood of Different Animals. A. Partheil. (Zeit. für Untersuch. Nahr. u. Genuss., 1903, 928-927.)

(Feb.) On the Salinity of Waters from the Oolites. W. W. Fisher. (An elaborate paper, dealing with the origin of the saline constituents of these waters. The evidence in favour of the Author's theories is supported by numerous analyses and many geological data.)

Abstracts.—Phenol-phthalin (a reduction product of Phenol-phthalein) as a test for Blood. Utz. (Chem. Zeit., 1903, 1151). (Pus and Animal Secretions containing Leucocytes give the same reactions.)

Report of Departmental Committee on Butter Regulations.

(March.) Abstracts.—Salicylic Acid in Cherries and Violets. A. Desmoulien. (Jour. Phar. Chim., 1904, 121-125.)

Determination of Alcoholic Strength of Tinct. and Lin. of Iodine. F. H. Alcock (Pharm. Jour., 1904, 9.)

Determination of Morphine in Opium. P. L. Aslanaglon. (Chem. News, 1903, 285-287.)

Determination of Morphine in Opium and T. Opii. E. Dowzard. (Phar. Jour. 1903, (71) 909-910.)

Cod-liver Oil and its Adulterants. E. Tardy. (Phar. Jour., 1903, 840.)

The Adulteration of Saffron. A. Motler. (Zeit. für Untersuch. Nahr. u. Genuss., 1903, 1084-1085.)

The Ash of Certain Drugs. J. C. Umney. (Pharm. Jour., 1903, 899.)

Distinction between Ordinary and Distilled Water in Mineral Water. D. Lohmann. (Zeit. f. Öffentl. Chem., 1903, 458-9.)

The Journal of the Royal Army Medical Corps, Vol. II.

(No. 8.) Paratyphoid Infections. Lt.-Col. R. H. Firth.

Domestic Flushing. Major W. H. Horrocks. (Experiments with closets, traps, and drains. A two-gallon flush is not sufficient to carry dejecta through a wash-down closet drain and intercepting trap to the sewer, even when the best conditions are employed. A proper relation between W.C. trap drain and interceptor must be maintained even with a three-gallon flush; W.C. trap and drain pipes should not be more than 4 inches.

A Curious Epidemic resembling Smallpox in Somaliland. J. Welland.

Sterilizer for Infected Discharges. Major H. A. Cummins.

Military Plague Hospital, Maitland, Cape Town. Col. D. Bruce.

(No. 4.) The "Cure" of Phthisis. Capt. J. E. Carter, R.A.M.C.

Paralysis of Posterior Thoracic Nerve, apparently the direct result of Smallpox. Capt. F. E. Gunter.

Water, Vol. VI.

(Feb. 15.) London Water Supply considered in relation with the Geology of the Thames Basin. J. C. F'Anson. (Illustrated)—continued.

Life of Cast Iron Pipes.

Use of Sea-water on Roads. J. W. Cockrill. (As the result of experience since 1889, he maintains that if properly used sea-water does not injure road surfaces.)

(April 15.) Modern Methods of Filtration (Automatic Compressed Air and Oxidizing Water Filter.)

The Journal of the American Medical Association, Vol. XLII.

(No. 7.) New Aspects of Yellow Fever Etiology Arising from the Experimental Findings of the Last Three Years. Carlos J. Finlay.

Diphtheria of the Nose. W. Schepppegrel. (Characteristics of nasal diphtheria. Mildness of the disorder and difficulty of enforcing isolation. The question of antitoxin treatment.)

Acute, Subacute, and Chronic Infectious Osteomyelitis: Its Pathology and Treatment. Edward H. Nichols.

(No. 8.) Vital Statistics: The reporting of Births by Medical Men.

Susceptibility to Disease. W. H. Graves.

(No. 9.) The Etiology of Rheumatic Fever: Contradictory Results of Bacteriological research.

(No. 10.) Hospital Cars for Tuberculous Travellers. (Proposition of the Santa Fé Railroad Company to isolate tuberculous patients on hospital cars. The impracticability of doing this in such a way as to prevent possibilities of infection, or of applying it to any but the most marked cases.)

The Disinfection of Paper Money. (Proposition to disinfect currency (paper money especially), as it passes through the banks a commendable one.)

The Dangers of the Bath. (The danger of bathing in typhoid-laden water, as emphasized from East Indian experience.

The Panama Canal Commission's Sanitation Problem. (Necessity for a hygienic department under a thoroughly competent and untrammelled director.)

Inorganic Analogies with the Reactions of Immunizing Bodies and Allied Substances. (Colloidal silicic acid as an amboceptor. Further suggestions as to the chemistry of immunity.)

Destruction of Weaklings an Impossible Proposition. (A possible advantage in more severe enforcement of the laws against criminal degenerates.)

The Relation of Acid-Fast Bacilli to the True Tubercle Bacillus. (Recent facts brought out by Moeller in regard to immunization against tuberculosis by inoculation with bacilli of the acid-fast group. Experiments on rabbits and guinea-pigs.)

(No. 11.) Bovine and Human Tuberculosis. D. E. Salmon. (The report of the German commission. Inconstancy of the types of tubercle bacilli. Criticisms of Koch's rules.)

The Condition of the Blood in Patients Suffering from Pulmonary Tuberculosis. John M. Swan.

Demonstration of Tubercle Bacilli in Fluids. (Marmorek's new method of determining the development or non-development of tuberculosis (*Semaine Méd.*, Dec. 28, 1903.) More cautious and less optimistic statement by Nattan-Larrier (*Soc. de Biologie*, Dec. 25, 1903, Jan. 22 and Feb. 5, 1904.)

A Typhoid Fever Centre: Remarkable prevalence of typhoid fever at Pittsburgh.

(No. 12.) Soluble Bacterial Toxins. (Serum treatment. Its lack of universal applicability. The recent efforts to obtain soluble toxins. Brieger and Mayer's as well as Macfadyen and Rowland's work in this direction (*Centralbl. f. Bakt.*, 85, 1904.)

The Cold Winter and the Mortality Rate. (Diseases influenced by cold weather and exposure. The increase of pneumonia. Probability of high mortality of the spring months on account of the cold winter just passed.)

Tuberculophobia in France. (Recent ruling to isolate consumptives in French hospitals. Its inconsistency and impracticability.)

The Ficker Typhoid Test. (The difficulties of the Gruber-Widal test in general practice. Substitution of fluid containing dead typhoid bacilli for the living cultures, as proposed by Ficker, and its advantages (*Berl. Klin. Woch.*, 1903., 45, and Feb., 1904.)

Tuberculosis and Pregnancy. (The effect of tuberculosis on pregnant women. Its dangers. Advisability of avoiding pregnancy in such cases. Tuberculous patients should not marry (*Berl. Klin. Woch.*, Dec. 28, 1903.)

(No. 18.) Is the Increase of Pneumonia due in a measure to the use of Soft Coal?

Medical News (New York).

(Feb. 20.) Administrative Control of Tuberculosis. Herman M. Biggs.

House Infection of Tuberculosis. L. F. Flick. (He considers that tuberculosis is only communicable within confined quarters, and that the house is the essential element of communicability. It prepares the soil for the tubercle bacillus, and furnishes the amount of contamination which is necessary to overcome the resistance of the individual. The workshop is another common means of spreading the disease. Enclosures, such as hotels, churches, public halls, places of amusement, and public conveyances, where the public stay but a short time, are very unlikely to convey the disease. Consumption can properly be called a house disease.

(March 12.) A Clinical Study of Sixty-four Cases of Intestinal Infection, by the *B. dysenterica* (*Shiga*), in Infants. L. E. La. Fetra and J. Howland. (The organism was found in sixty-two cases; the symptoms varied, some being merely mild forms of intestinal indigestion, others were severe.)

New York Medical Journal.

(Jan. 30.) Investigations of a Bacterial Treatment of Tuberculosis (*concluded*). Stephen J. Maher.

Public Health and Food Preservatives (*concluded*). B. G. Eccles.

A Suggestion for the Rapid Calculation of Percentage Milk Mixtures: With a description of a Mechanical Device for the instantaneous calculation of such Formulæ. Thompson S. Westcott. (A method of computing the milk percentage by two revolving disks superimposed on each other, in which are openings reading on a still lower disk. By the proper use of this device an almost instantaneous method is obtained of determining the quantities of 16 per cent cream, whole milk, and sugar required to make any of the usual percentage formulæ for any quantity of total mixture.)

(March 5.) Post-diphtheritic Paralysis of Accommodation, with Report of a Case. A. Brav.

American Medicine.

(Dec. 26.) Typhoid Fever and Tuberculosis. William Osler. (These diseases may be concurrent; enteric fever is rarely mistaken for tuberculosis, but much more frequently tuberculosis is mistaken for typhoid. In rare cases pulmonary consumption follows typhoid, but he does not think that the facts warrant the statement often made that typhoid convalescents are especially liable to tuberculosis; many of these cases are tuberculous from the outset.)

Experiments with Radium on Bacteria. F. van Beuren, Junr. and H. Zinsser. (They do not expect much bactericidal action from radium.)

(Jan. 2.) A Bacteriological Investigation of Commercial Vaccine Virus. William T. Howard, Junr. and William H. Weir.

The Methylene-blue Eosin Stains. Walter Baumgarten.

(Jan. 28.) Acute Lobar Pneumonia: An analysis of 486 cases, and of 100 autopsies. John McCrae, J. C. Fyshe, and W. E. Ainley. (It appears from these statistics that immigrants, at least in the climate of Montreal, are three times as liable as natives to the disease, and that the outdoor worker is much more frequently attacked. The question of the liability of alcoholics to pneumonia is complicated by other questions, so that it is impossible to give positive figures. In 60 cases where bacteriological examinations were made, 65 per cent showed the presence of the pneumococcus, in 5 per cent of which it was mixed with other organisms to the extent of being a mixed infection; 20 per cent were mixed infections of other kinds, while the streptococcus was the main agent in 8 per cent.)

Bacteriological Study of the Intestines of Fish. Edith Loeber.

Journal of Medical Research (Boston).

(December.) Observations on the Morphology of *Bacillus tuberculosis* from Human and Bovine Sources. S. R. Wolbach and Harold C. Ernst.

Influence of Certain Bacteria on Coagulation of Blood. Leo Loeb.

Bacterium Pyogenes Sanguinarium. N. L. Berry, Junr. and Harold C. Ernst.

The Passage of Tubercle Bacilli through the Normal Intestinal Wall. (A Preliminary Report.) Mazyck P. Ravenel.

The Occurrence of the Colon Bacillus on the Hands. C. E. A. Winslow. (It was found on the hands of 10 persons out of 111 examined.)

(Jan.) Scarlet Fever: Protozoan-like Bodies found in four cases. F. B. Mallory.

Actinomyces cultivated from Commercial Vaccine Virus. Wm. T. Howard, Junr. (Actinomyces have been found in bovine vaccine virus by three sets of workers, Sabrazes and Jolly, Folli, and himself. The vaccine virus of five vaccine establishments in the United States examined by him during the period from October, 1902, to May, 1903, contained actinomyces—twenty-four times in a total of nine-five cultures. Nine different species of actinomyces, six of which are apparently new, were found. These organisms probably reach the virus from the air, water, soil, hay, straw, and hide. While unsupported by bacteriological investigations, or by experiments, it is not improbable that some of the post-vaccinal suppurative infections are caused by these organisms, and are cases of a typical actinomycosis.)

PUBLIC HEALTH:

The Journal of the Incorporated Society of
Medical Officers of Health.

VOL. XVI. No. 9.

JUNE, 1904.

EDITORIAL.

MEASLES.

THE subject to which the attention of the Society was invited at its last meeting is one of perennial interest. Various means have been tried in the hope of placing measles under some sort of control, but the results as a rule have been disappointing and unsatisfactory. The early infectivity of the complaint reduces the value of ordinary methods of isolation, when once a family or school with susceptible members has been invaded.

Sooner or later it seems most people are attacked by measles, but Dr. Theodore Thompson has shown in his well-known report on this subject, that the incidence of attack is highest during the third, fourth, and fifth years of life. An analysis of the deaths proves that those who die are with few exceptions under five years of age; hence if children can be protected from an attack during their early years, the mortality might be materially checked.

In order to achieve this result several plans of campaign were advocated at the recent meeting. In the first place, early information of the presence of the disease must be obtained. Notification, whether it be by medical man or school teacher, is of no use unless energetic action is to result. Just what that action is to be, has not hitherto been quite clear. The valuable suggestions made by some of those who took part in the discussion, may, we hope, help to realize that united action for which Dr. J. Howard-Jones pleads.

The scheme carried out so successfully by Dr. Garstang should be specially studied by those in charge of rural and small urban districts.

In towns, closure of schools is practically of no use, as the homes of the children are so close together that intercourse is continually taking place between them. The Health Visitor can do much good by

warning parents of the dangers of the disease, and thus lead them to recognize that measles is a really serious complaint.

Where practicable, the suggestion of Dr. Kerr is worth trying, viz., during a threatened outbreak to exclude from school only those children who have not had measles. By this means there is much less interference with school work, especially in the boys' and girls' departments, than by excluding all the members of a family in which a case has appeared. The difficulty lies in ascertaining which children have had measles. In districts in which little change is taking place and the teachers will co-operate, it is fairly easy, and the results are satisfactory to everyone. Dr. Herbert Jones gives a card for each child in a school, with a list of infectious diseases upon it, and gets the teacher to fill in the particulars as to those from which the child has suffered. When an outbreak threatens, the unprotected children are readily separated. A more drastic method of dealing with measles was advocated by several speakers; it is that young children should not be sent to school at all. The sending of such children to school is simply for the purpose of enabling a Government grant to be secured, and for relieving their mothers of the trouble of looking after them. Dr. Howard Jones points out that if children under five were excluded, we should not require to build new schools for many years in most towns, for 14 per cent of the present accommodation would not be required. Where, however, the mothers must go out to work, the provision of some place in which to leave the children seems a necessity.

Is it of any good to disinfect after measles? We need more information on this point. Some hold that the infection of measles is short-lived, that it is not carried in clothing, etc., but depends chiefly on personal contact in the early stages. If this is so, then, it is argued disinfection is of little use. On the other hand, according to M. Vallin,* the virus may remain active several days, and if protected from air and light, would appear to be able to survive for long periods. He produces, however, no clinical evidence to substantiate this statement, but he concludes—and in this M. Grancher agreed with him—that disinfection would lead to the destruction of virulent and persistent pneumococci and streptococci, and thus prevent pulmonary complications in subsequent cases. But as we know that this result may be obtained by seeing that the patients are kept in bed, it does not appear that disinfection can claim much credit in this respect. That it leads people to regard measles more seriously, and that the thorough cleansing which should be part and parcel of the disinfecting process is often highly desirable, we willingly allow.

* *Public Health*, xii, 802, August 1900. "The Compulsory Notification of Measles and Infectious Pneumonia."

We want to collect information:—

- (1) As to the time when infection in measles begins and ends.
- (2) As to conveyance of infection in clothing; instances of families (with susceptible members), taking up residence in rooms or houses which have not been disinfected after measles; instances of contacts conveying infection.
- (3) As to the period when death occurs during an attack of measles.

Seeing that nearly all deaths from measles occur in children under five years of age, it would afford a useful means of comparison, if Medical Officers of Health in their Annual Reports would state the measles death-rate per 1000 of children living in that age-period, as well as the rate per 1000 of total population, as by this means comparison could be made between districts with dissimilar amounts of child population.

FATE OF TYPHOID BACILLI IN BEER.—Professor Surmont of Lille, France, has been testing the beer made there in respect to its effect on typhoid germs. He found that the cultures of typhoid bacilli added to the beer were all killed in one-half to sixty-seven hours, the bactericidal effect being most pronounced in proportion to the amount of lactic acid in the beer; the acetic acid had also a lesser influence of the same kind. The beer, as it is manufactured, is evidently a hygienic drink, but when water is mixed with it, as frequently occurs, the germs in the water may prove a source of infection. Beer weak enough to allow survival of bacteria becomes more bactericidal as it ripens, as the bacilli in it generate more lactic acid, which in turn has a destructive action on them.

IMPORTANCE OF DOMESTIC AS WELL AS PUBLIC SANITATION.—There is no doubt that the unhealthiness of the lower-class districts is largely the result of the habits of the people who live in them, as well as of the condition of the houses they occupy. Years ago, when Birmingham in common with other great towns was in a much more insanitary condition than at present, an enormous diminution of the death-rate was brought about by the carrying out of certain great public measures, such as the provision of purer water, better drainage, extended sewerage, more extensive paving of streets and roads, and improved privy accommodation. So far as I can judge, this improvement in the death-rate was directly due to the public sanitary measures then adopted, irrespective entirely of any alteration in the habits of the people. And I have no doubt that further public measures of a radical nature will produce again a marked decrease in the mortality, the measures most urgently needed being the thinning out of houses in all congested districts, the abolition of the pan privies, the paving of courts, and the greatest possible attention to the prompt and careful removal of refuse. But when all these reforms are effected, there will still be left the ill-health which arises from the dirty, neglectful, intemperate habits of the people themselves, and it is to remedy these, if possible, that Health Visitors are so valuable an adjunct to the sanitary staff.—ALFRED HILL.

THE CONTROL OF MEASLES.

A PLEA FOR UNITED ACTION.

By J. HOWARD-JONES, M.D., D.Sc.,
Medical Officer of Health for Newport, Mon.

It needs no apology on my part to occupy your time this evening by the discussion of a disease which is included among the preventible ones, but which causes annually in England and Wales a death-roll of 13,000 lives.

I may say at once that I do not come here with a remedy for this deplorable and colossal reminder of the failure of our present methods of dealing with the disease. My object in bringing up the subject is the urgent necessity for united action in the matter.

Measles is a disease which periodically gives cause for anxiety to Medical Officers of Health; it is one which is very consistent in the manner in which it produces epidemics, which are almost as explosive in character as the sneezes which proclaim the onset of an attack in one of its victims.

The early infectivity of the disease, combined with the apathy of the general public, has more or less resulted in sanitary authorities crying out "Kismet" when face to face with a threatened epidemic, to the detriment of the reputation of the science of preventive medicine.

In common with the experience of other Medical Officers of Health, measles has periodically given me cause for anxiety at Newport, and I have on these occasions felt the necessity for action of some kind to stay the ravages of the disease; but the machinery for administrative action is very incomplete, and in consequence any action taken in one direction has to a great extent been neutralized by the incompleteness of the general scheme for the control of the disease.

As each epidemic has made its appearance I have tried various experiments. Amongst these was the notification of cases of measles, along with other diseases, by School Attendance Officers on post cards supplied by the Health Department, the closure of the Infants departments of the elementary schools, the medical inspection of the Infants departments at the time of a threatened epidemic, the extension of the Christmas holidays throughout all the schools to a month during an epidemic, together with the closure, on my request, of the more juvenile classes of all the Sunday schools and some private schools, and the postponement of various public gatherings, in addition to

the usual routine work in connection with the prevention of epidemic disease generally.

The epidemic of measles in which I tried the closure of the Infant departments of each school affected, produced a record measles death-rate of 1.56 for the year; but I am confident this was chiefly due to the fact that the disease had taken root before closure could be carried out, to the incompleteness of the scheme, and to the deficiency in the staff required for the carrying out of the necessary measures.

It is worthy of note that the epidemic during which all the elementary schools in the town were closed simultaneously for a month, was shorter in duration by nearly two months than previous epidemics of the kind, besides being less fatal.

The means adopted in this country for the prevention of measles have up to the present not had any appreciable effect in reducing the death-rate. As a matter of fact there has been no improvement in the death-rate from measles during the last fifty years. During the third quarter of the last century there was some improvement, but this was followed by a serious rise during the last twenty years, whilst the mortality from all the other principal zymotic diseases, with the exception of diphtheria and whooping cough, has decreased, in some instances very markedly.

I think most authorities are agreed as to the manner in which epidemics of measles are propagated. The disease is therefore surely one which will allow of common action, due allowance being made for local conditions. Nevertheless, the action taken varies in almost every provincial town in the country. The great advances made in preventive medicine with respect to the control in particular of plague, malaria, and yellow fever, ought to stimulate us to take up this homely but very fatal disease with greater earnestness and thoroughness.

The ignorance and callousness exhibited by parents in relation to measles, will not be overcome until Public Health Authorities deal with the disease more seriously and with more consistency than at present.

In order to illustrate my contention, let us analyse the various practices of the provincial towns of England and Wales in respect to school closure. Some time ago I instituted enquiries into this subject, with the following results:—

In nine out of the sixty-seven larger towns school closure is not carried out at all; in another group of ten it is only carried out when the attendance is seriously affected (when closed under such circumstances it cannot be regarded as a preventive measure); in twenty-four towns the Infant departments only are closed, whilst in thirteen the whole schools are closed at one stage or another of an epidemic.

With respect to the exclusion of contacts from school, no action is taken in seven towns.

Again, the action of sanitary authorities in respect to Sunday schools varies considerably. In twenty-five of the towns nothing is done in the matter; in eighteen towns closure is advised occasionally; in eighteen others this is advised as a routine practice. In one town, namely, Reading, the Corporation have Parliamentary powers to close Sunday schools or private schools if necessary.

The action of sanitary authorities in respect to compulsory notification of measles also varies very markedly.

Prof. Mathew Hay gives the following summary in his article on the Notification of Measles and Whooping-cough in *Public Health* (July, 1903): "It would appear from the information I have thus obtained that measles is at present compulsorily notifiable in Scotland in eight towns and six county or rural districts, in England and Wales in fifty-five towns or urban districts and twenty-one rural districts, and in Ireland in three towns or urban districts. In all, sixty-six towns or urban districts, and twenty-seven county or rural districts. In fifty-four other towns and rural districts it was for a time tried, but is now discontinued."

Where not compulsorily notifiable, measles is not included among the dangerous infectious diseases, although it is responsible for 8 per cent of the total deaths during epidemic years.

Disinfection after measles is either necessary or unnecessary. During the height of an epidemic it becomes impossible to deal with this, probably in any town, in a thorough manner; but in many towns it is not carried out by the sanitary authority at all. If disinfection is necessary after measles, then let us take common action in the matter as far as possible.

Examples could be quoted without number respecting the want of unity and conformity in preventive action in respect to measles. I fear there is not a single measure which is universal.

The question which, however, concerns us most as administrators is the remedy. It is impossible to deal with such a controversial matter during the course of a short paper. I shall therefore content myself by briefly referring to the more important requirements.

From a perusal of the measles statistics of various towns, and Dr. Theodore Thompson's excellent report on the subject to the Local Government Board, I find that between 90 and 95 per cent of the deaths are among children under five years of age; also, that measles is most fatal during the second year of life, whilst the incidence of attack is highest during the third, fourth, and fifth years of life.

It has also been contended that the liability to attack diminishes

progressively after the fifth year. Probably this is true to a certain extent.

Dr. Kerr, Medical Officer to the London School Board, in his report for the year 1902, states that from enquiries made in certain schools they found that 75 per cent of the children over five years of age attending school had already had measles, a fact which partly explains their immunity from attacks of the disease.

Where did these children, and in addition the others who had already died from attacks of measles, contract it? The majority of them probably in school.

The question naturally arises, is it advisable to send them to school so young?

Personally, I am fully convinced that it is high time children under five or even six years should be excluded from school.

The law does not require that infants under five years of age should attend school, but Government grant is paid for their attendance; it is therefore to the interest of the school authorities to ensure a high average attendance of those on the school register.

Time will not admit of my stating the many disadvantages and dangers of early school attendance. If there are any here who require proofs, they will find them in Dr. Newsholme's interesting and able paper on the subject in *Public Health* for July, 1902.

To me the whole system appears to be contrary to physiological laws, and we shall probably find it a serious source of physical and mental deterioration.

We have it on the authority of our President that the atmosphere of schools is unfit to breathe after half-an-hour's occupation. It is probably much worse than the air breathed by children when they are not in school.

According to the returns of the Registrar General for 1902, it was estimated that there were 722,206 children in England and Wales between three and four years of age, and 715,897 between four and five years; 27.2 per cent of the former and 58 per cent of the latter were attending elementary schools. This proportion would naturally be much higher in urban districts. There were thus 610,989 children under five years of age in elementary schools, which is equal to 14 per cent of the total number of scholars.

The annual amount spent upon the so-called education of these infants would be at least £1,250,000.

The school attendance of infants at age periods when they are particularly liable to infection is undoubtedly responsible for the propagation of epidemics, and consequently a large proportion of the preventible deaths.

What are the advantages of the present system? I fear they are far outstripped by the evils arising therefrom.

In addition to the minor infectious diseases, measles and whooping-cough visit most schools biennially. If a child starts school life between three and four years of age, it will probably get exposed to infection in respect to these diseases before it is five years old, in consequence of school attendance.

In order to reduce the mortality from measles, it is of the greatest importance that we should employ every means of lengthening the inter-epidemic periods. By encouraging school attendance of infants under five or six years of age, we are simply courting disaster in this respect.

An analysis of the epidemic grants to schools for 1901-2 affords a proof of the greater incidence of infectious disease in the infants' classes. Although the number of children in schools for older scholars is nearly two and a half times as great as that in infant departments, yet the epidemic grant was equal to an average of 27,165 attendances in the latter compared with 24,829 in the former.

As Medical Officers of Health we are not directly concerned with the financial aspect of this question, but we may well consider the claims which might be advanced from this point of view.

At present provincial towns find a great difficulty in securing loans for public works at reasonable rates. If children under five were excluded from our elementary schools, we should not require to build new schools for many years in most towns, except in new growing districts unprovided with schools, for 14 per cent of the present accommodation would not be required.

A matter of urgent importance in our national struggle for existence is undoubtedly the provision of greater facilities at our Universities for higher education, and more particularly for research work. If this school reform were adopted, the magnificent sum of £1,000,000 per annum could be utilized for this purpose without increasing our present national expenditure, whilst there would yet be a balance in hand of £250,000, a part of which could be utilized with great advantage to the physical welfare of our scholars, by the provision of medical inspection of schools for the double purpose of detecting and correcting physical defects, and of the prevention of epidemic disease.

I have not suggested that this money should be paid to Medical Officers of Health in virtue of the additional duties which are almost daily been thrust upon us without any corresponding increase in salary.

The present time is particularly opportune for reviewing the subject of school closure, for it is generally recognized that the spread of measles is closely associated with school attendance, and the recent

Education Act has, as a matter of fact, robbed Medical Officers of Health of very powerful weapons in combating infectious diseases associated with scholars.

It was a comparatively simple matter to close schools, or departments of schools such as infants' classes, when they were acting as foci for the spread of epidemics, under the old Act; but now that article 101* has been repealed, our position has been very materially changed. Grants in future will be given on the basis of the number of scholars in school attendance. Under the old Act the Medical Officers of Health had to deal with an outside authority, the School Board, who received the School grant in spite of school closure; whereas in future we shall have to fight our own Authorities, who will be direct losers in proportion to the extent of our interference with school attendance.

The total Epidemic Grant for 1901-2 amounted to the respectable sum of £56,000, for the number of scholars that were excluded in this way averaged 51,944.

MEDICAL INSPECTION OF SCHOOLS.

The medical inspection of schools has been sadly neglected in the great majority of towns, and as the 1902 Education Act will increase the responsibilities of Medical Officers of Health as the medical advisers to County and Borough Councils, opportunities may thus be afforded for us to advocate the appointment of "medical inspectors" for schools. This matter will become acute, undoubtedly, in face of the loss of the Epidemic Grant; for if particular classes are not to be closed when they are acting as foci for the spread of epidemic disease, then it becomes absolutely necessary in the interests of the lives of school children that there should be a rigorous inspection of schools, with the view of excluding all infectious cases.

In connection with this subject I may mention an experiment which was recently tried by the Newport School Board at my request. Several cases of measles were reported to me by the school attendance officer in connection with one of the elementary schools. An epidemic of measles was due in accordance with the usual cyclical appearance of the disease. I interviewed the School Board at their first meeting, and informed them that in my opinion we were threatened with a serious epidemic of the disease, and asked them to appoint a medical man to visit the Infants departments of the schools affected, to inspect the infants for any cases presenting symptoms of measles, in order that they might be forthwith excluded from school. In a short period forty-eight children were sent home under suspicion and for future observation; sixteen of these turned out to be genuine

cases of measles. Unfortunately the School Board carried out the experiment for a month only. This single experiment, however, afforded amply proof that the Infants department of that particular school was an active agent in spreading the epidemic which followed.

I have not mentioned the subject of Isolation Hospitals for measles, and do not intend dealing with it here, for it is very desirable for us to get other preventive measures in good working order before taking up such a vast and expensive scheme. If we did so, possibly at a future date we might be charged in consequence with producing a new and more virulent type of the disease!

No efforts should, however, be spared, by means of the visits of Health Visitors in particular, in urging upon parents the necessity for proper nursing and at least the isolation of affected households, even if the proper isolation of particular cases be impracticable.

Yet another matter which deserves our serious attention is that of the notification of measles, and its inclusion among the dangerous infectious diseases.

The expense attached to measles notification, when dealt with according to the Infectious Diseases Notification Act of 1889, has caused many Local Authorities to rebel and to give it up after due trial.

If we are to make any attempts at controlling measles, it is absolutely necessary for us to get as early and as complete information respecting its presence as possible. This I think could be assured by powers similar to the local act in force at Reading, where a fee of 1s. is paid to medical men for the first cases attended by them in any household, and for subsequent cases after an interval of thirty days, combined with prompt notification of all cases coming to the knowledge of the school authorities, who will in future be servants of County Councils, etc., and therefore more easily persuaded in such matters. This could be further supplemented by the co-operation of district nurses, relieving officers, and others.

A scheme of this kind would at a moderate cost supply us with prompt information respecting the great majority of cases; and the other preventive measures necessary, which are dealt with fully in Dr. Theodore Thompson's Report, could thus be carried out, except at the height of a big epidemic, when the work is probably beyond the powers of the staff of the best-equipped Health Department in the country.

I trust, gentlemen, that during the course of the above remarks, I have convinced you that the time has now arrived, as the Government Departments say, for us to reconsider our treatment of this subject, and I would suggest that the matter be taken up by the Incorporated Society of Medical Officers of Health.

DISCUSSION.

Dr. M. K. ROBINSON gathered that Dr. Jones advocated notification in some form: he supposed the same system as in Reading, with a fee of one shilling. They ought not to endeavour to reduce fees, but rather to raise them to, say five shillings, with only one notification from each house. The notifications were exceedingly valuable, and well worth the money. How did Dr. Jones arrive at his conclusion that means adopted for the prevention of measles had not reduced the death rate? Dr. Jones might urge his recommendation of notification still further, if he knew the results achieved in a town like Dover, where notification was in force. Seven years ago they applied to the Local Government Board for measles to be added to the list of notifiable diseases. The Local Government Board replied that they would only allow it for a period of five years. If all the recommendations he made when the notification was first adopted had been accepted, the results would have been even more satisfactory than they are, for instance, additions to the staff and hospital accommodation for special cases. In the seven years prior to notification, they had 180 deaths, in the seven years following 81. In 1896, the year preceding notification, measles was very prevalent all over the country, and especially in Dover, where the rate was 1.11 higher than in England and Wales. The average for the first six years after notification was 0.26 per 1,000 lower than the average for England and Wales, and very much lower than Dover in the previous years. But for those facts he would not have been able to induce the Town Council to renew the notification, or rather, not to have suspended it, because even his own Sanitary Inspector was very busy with a view to getting it suspended, but he managed to show that the result was so good and the amount spent so little, only £150 a year, that it was paltry in comparison with the advantage gained. Notification had not been a failure, but an eminent success.

Dr. GARSTANG said the subject was one which had recently interested him considerably. In his districts, he had on several occasions been able to distinctly shorten or stop epidemics of measles. If he made a bold statement like that, the Society would perhaps listen to him while he detailed the simple methods he had put into force. He might be told that his limited experience did not warrant a general deduction. If so, he would accept the correction. He might be told that he had only taken his own particular line and had excluded other factors: that had certainly not been his intention. He had no experience of large towns. His work was entirely in country districts, the largest with a population of only ten thousand. In the large rural districts in which he worked they hardly ever had an epidemic of measles, probably because of the very scattered nature of the population, but epidemics had been frequent in the small urban districts. He tried the effect of school closure, but came to the conclusion that school closure by itself was unsatisfactory, because if the children did not associate together in the schoolroom, they were together in each other's houses and back yards, and the infection was disseminated almost as rapidly, and he therefore adopted more measures for preventing the intermingling of children at home. This he tried in the shape of getting a special servant employed by his authority as an Assistant Inspector, and he laid upon him the duty of making a list of the known cases, and then visiting every house every day to see that the parents were keeping their children within their own premises. That was all the scheme he had to lay before them. Contrary to his expectation,

it had worked with remarkable success. In 1898 an epidemic occurred, starting in the Board School at Over, in Winsford Urban District, which has a population of 10,000. It had a street of three miles or over, and it was very easy for an epidemic to start at one end and sweep through to the other. On February 21st, the Infant department of the school was closed, and the mixed department on the 24th until March 15th, a period of 22 or 19 days respectively. Having no subordinate officer available for such duty as he contemplated, he got the Council to appoint the School Attendance Officer, at a salary of £1 per week, to act as a temporary Assistant Inspector during the time the schools were closed. He did what he (Dr. Garstang) had already described, advising the parents that children who were ill should be kept in bed, and contacts kept at home. The epidemic ceased as if by magic. On March 29th, however, it was found that the disease had broken out at the next school, which was at once closed until the 25th April—27 days, under similar conditions, and that was the end of the epidemic. It was noteworthy that among upwards of 300 cases known to have occurred in the latter outbreak, not a single death occurred; so that whether they checked the epidemic or not, they had at least saved life. In the latter half of 1899, in the same district, there was a slight epidemic which affected a different school, and died out with the summer holidays, and needed no special measures. In 1902 another serious epidemic occurred, commencing at a school at the extreme end of the district on April 12th. He recommended the previous measures, but the Council this time, in a fit of economy, refused to carry them out. He repeated the advice on May 12th, with a similar result. The effect was that the epidemic slowly spread over the whole district, involving one school after another, and only died out in August, having caused an unknown number of cases with at least six deaths. He ventured to tell the Council that he would not like to have the moral responsibility of those deaths, and he was promptly told by the Clerk "that it was his business to advise but not to dictate," and that the Council would please itself what steps it took. In another urban district, almost like a rural district, having a population of 6,000, a death from measles occurred in January, 1898, but an epidemic was not heard of until April and May, when twelve deaths were registered. One school was closed on April 1st, and the schoolmaster was appointed temporary Assistant Inspector, to carry out the duties previously described. Four other schools were closed, and all except one reopened on May 9th, a period of 13 to 39 days. One was kept closed until the 21st, i.e., 25 days, and there was no further trouble with that epidemic. A distant corner of the district had a few cases, but school closure there for twelve days with similar precautions finished the whole affair. The district then remained free from measles for four years. The next epidemic occurred in 1902. He saw its introduction at one end of the district. He closed the school, and appointed the school master to the usual office, which all but stamped out the disease in three weeks without any other school becoming affected. 75 cases and well over 100 contacts had been under supervision. At the next meeting, the Council felt some difficulty in sanctioning the action he had taken, and declined to continue the appointment. The result of the withdrawal of the supervision was that the disease immediately resumed its march through the district. Other schools had to be closed, and it only died out at the end of May—five months from the beginning—after an unknown number of cases and at least seven deaths. He was therefore personally convinced from his observations that it was

and to suppress them in a comparatively short space of time, if effective steps were taken to keep the patients in bed, and contacts isolated from their neighbours. He always grouped whooping cough and measles together for preventive measures, because they were both exceedingly fatal infections, and not notifiable. In May, 1899, a notice to isolate was issued by one of his Councils, but no officer was appointed, and the notice was therefore disregarded and the epidemic spread. He remembered walking along the street at the time of a local wedding, and seeing a group of half a dozen women with perhaps twice as many very young children at a street corner. One of the children was seized with a fit of coughing, whooped and vomited. No notice was taken of it either by the mother or her companions. In this year (1904) he had had a severe measles epidemic in another district. It began in January and it was the end of February before they got hold of it, when it had assumed large proportions. The schools were closed, and one of the masters appointed as temporary Inspector, and although the disease had got six weeks start, it disappeared as if by magic. After three weeks there were not half a dozen cases left in the town, and none at all a week later. He felt some confidence in detailing his experience and in recommending similar measures, not excluding any other remedies that might be suggested, but supplementing them; his having at least the merit of being simple, cheap, and easy of application.

Dr. R. DUNFIELD had tried his best for the last seven years to control the spread of measles. It was hardly necessary to recapitulate the difficulties that handicapped them. It was the "baby" class in the schools that was the main source of the spread of this disease. It was the *family* they had to deal with, and he tried to prevent the children of an infected family from associating with the children of a well family in the same house. Until the last year, they in London were in an unfortunate position. Dr. Jones seemed to indicate that measles was not a dangerous infectious disease because it was not notifiable, but on looking through the Acts, it seemed to him that section 121 of the Act of 1875 applied to measles, because, at that time the term "dangerous infectious disease" was not defined. In London, section 59 of the Public Health (London) Act, 1891, distinctly defined what were the dangerous infectious diseases, and the London section 68 which corresponded to section 121 of the 1875 Act was limited to diseases notified. In April of last year, however, the County Council issued an order applying section 60 relating to the spread of infectious diseases to measles, and since then it had been a much easier to deal with the disease. The absence of notification was a difficulty that had been urged by Dr. Jones in a modified sense, and by Dr. Robinson in a wider form. He admitted that in many cases no medical practitioner was called in. He relied on school information, which he tried to obtain from the teachers and the School Attendance Officer. He urged the teachers to report not only known cases of measles, but suspects. The difficulties were that touch was lost with the schools during holidays, and that a large proportion of cases occurred in families not sending children to school. He found he was getting every week more information, because the private people came to notify the cases themselves. In 1903 (not an epidemic year) he had information of 929 cases; in 1904 up to March 31st of 759 cases. They supplied the teachers with books of notification forms. When the notice came in, the lady Inspectors made systematic enquiries, and leaflets of advice were issued and systematic disinfection was carried out;—not in every case, but in

did not regard systematic disinfection as necessary. He could not agree with them. Fourteen days after the first case had sickened the men called and offered disinfection. If they found another case had occurred, the disinfection was postponed, enquiries were made with reference to the second case, and fourteen days after the sickening of that case disinfection was again offered. If necessary, it was of course again deferred. Fourteen days after disinfection they visited again to see if any further case had occurred.

Dr. S. DAVIES said they had had in Woolwich the usual epidemic of measles every two or three years, and for some time past they had been going in for school closure and household education in measles. At first they only closed the school when the proportion affected was at least one-tenth of the scholars, but during the last eighteen months, in one half of the Borough, they had as an experiment closed schools directly one case of measles occurred. In addition to that, they had very carefully educated the people by leaflets in the house where measles had occurred. They had not gone in for disinfection, as he did not think it worth the expense. He had not yet made up his mind that school closure was a success, but they had been doing what they could to discourage measles, and the result had been most satisfactory. During the past three years they had considerably reduced their mortality. The comparison of Woolwich with other Metropolitan Boroughs during the past year was most satisfactory, in spite of the fact that they had measles in every ward in the Borough. But the chief gain was perhaps not so much the reduction of the cases as the education of the people, by which they were got to pay more attention to measles cases, to isolate the patients, and to treat them in a sanitary way. He thought Dr. Jones was mistaken in his reference to whooping cough, for during the last twenty years there had been a steady decline in the mortality from this disease. With regard to notification, considering that more than half the cases were not seen by any medical man, he did not know that it would be of great advantage, but he could not see why notification should not be compulsory on the householder.

Dr. MILLSON had three lady Inspectors engaged in this work, and believed their visits were having a very good effect. Mortality from measles was almost wholly confined to poor people. It was the carelessness and ignorance of the mothers who exposed their children too soon, that they had to contend with. He believed notification would be a very good thing, but it was difficult to get their Sanitary Authorities to understand that they could not get immediate results.

Dr. SYKES said it was premature to spend public money in dealing with a disease like measles, about which they did not know the facts. They seemed to be agreed that it was the right thing to educate the parents and not to educate the children, when measles was about. Dr. Jones had not told them in his paper why measles increased during the last quarter of last century. During that period the school age diminished; it sank from five years to three. That was the cause of the increase in measles—the diminished age of attendance at school. In his paper Dr. Jones said, "I think most authorities are agreed as to the manner in which epidemics of measles are spread." He (Dr. Sykes) did not know that they were at all certain about the question of whether at a particular period the disease was infectious or not, or how long before the rash or how long after were questions they could not answer. He was very doubtful whether disinfection was of very much value until they took into consideration the question of isolation. Something ought to be

done to get an experiment carried out in the isolation of measles. Dr. Garstang told them he had been successful in keeping children in their own homes, but the condition of the houses and homes in a rural district and a large city was very different. In a rural district each family lived in its own house, and the family was to that extent isolated, but in a town, where there were ten families in one house, it was very different, and it was possible that in a large town district, hospital isolation would have the same effect as Dr. Garstang's isolation of one family in one house. Notification, unless they could carry out isolation, would not be a success, and that was the reason why so many towns had given up notification.

Dr. HERBERT JONES referred to the question of whether measles was a dangerous infectious disease under section 126 of the Public Health Act. He expected that in the provinces each case would have to be dealt with on its merits, but he thought that an authority would not have very much difficulty in convincing a magistrate that measles was a dangerous infectious disease. Under the model bye-laws as to tents and vans, the occupier had to notify any case of, *inter alia* measles. He did not know that any cases had been taken before any magistrates, but there was a case in which phthisis was considered to be an infectious disease, and in which the owner of an hotel recovered in the County Court the expenses of disinfection of certain rooms occupied by a person who died from consumption. The County Court Judge held that to be an infectious disease under the Act. He did not go quite to the extent of Dr. Garstang in getting an Assistant Inspector appointed. His endeavour was to get away the well children from the sick house, and for that purpose he had displayed in the house of children who had measles a placard with a warning to well children that they ought not to go near that house. In two schools he had adopted the plan of keeping away the children who were not immune from measles, and he found that in many schools almost 50 per cent had had measles and were immune.

Dr. PRESTON KING (of Bath) said he had written some letters on the subject, and perhaps in the first he was too dogmatic, but Dr. Jones took it as a fact that measles was not included under section 126 of the Public Health Act. It had been pointed out that it was a much more fatal disease amongst the lower classes than the higher, and therefore it would seem to be dangerous for one class of society and not for another. How could they, under those circumstances, prosecute a person for taking his child into the street with measles? They encouraged them and allowed them to go to the hospitals to be treated for the disease. Surely the public had a right to think that if measles was such a dangerous infectious disease, they would add it to the list of notifiable diseases. This question had been raised by his friend Dr. Symons sending out a notice which he (Dr. King) called "bluff" to the effect that persons exposing their children with measles were liable under section 126 of the Public Health Act. A mother was not liable because she brought her child to see him at the hospital. It would be very little use to notify measles unless they could isolate also. Dr. Jones had his hearty support in the suggestion to keep away children from school under five years of age. They ought not to go to school, and were only sent because it was an easy way of getting rid of them. They would be much better off in the open air than in a stuffy school room.

Dr. GRUGGEN asked if the last speaker really suggested that children with measles and whooping cough should be allowed to wander about at large. Until the passing of the Notification Act most of them believed that measles was a dangerous infectious disease.

Dr. MEREDITH RICHARDS did not think the Notification or Prevention Act limited section 126 of the Public Health Act. In some districts, if Dr. King asked the children to go to the hospital whilst they were suffering from measles, the authority would prosecute *him* instead of the parents. As far as he could see, there were no facts that would show the necessity for disinfection except the education of the public. It was practically impossible to stop epidemics of measles. If epidemics could not be stopped at large schools like Rugby and Harrow, how could they hope to stop them in ordinary elementary schools? If they could not prevent the epidemics, they should try to prevent mortality, and the education of mothers was likely to be the most successful method. Success largely depended on the isolation of contacts. In his district there was at present an epidemic involving six large schools, mainly confined to the Infants departments. A difficulty arose in the upper departments, because children were kept away who lived in the same house. Seventy per cent of the older children had already had measles—was there any need to keep them away? He proposed sending a warning notice to the head master and mistress, asking them to look out for suspicious symptoms. In Croydon the teachers sent him a note of children suspended for suspicious symptoms. These were visited by the Health Visitor, and if the symptoms fell in with the usual signs of measles, the cases were treated as such.

Dr. NEWSHOLME hoped Dr. Symons would prosecute the gentleman who encouraged parents to attend at his hospital with measles and whooping cough. With regard to the question of contacts raised by Dr. Richards, he had ceased to exclude from school attendance the other children in the house who had already had measles. The Inspector got a complete list of children who had had measles previously, and if they attended classes higher than the Infants department they were allowed to go back. All the children who had not had measles were kept away. Of course, that was altogether wrong if the infection of measles was carried in the clothing of the brothers and sisters of the patient, but in most instances the school was some considerable distance from the home, and he was of opinion that there was little if any infection carried in the clothing. He agreed, however, with Dr. Sykes that they wanted more facts. They wanted fewer statistics and more clinical investigation. He was not convinced of the necessity of disinfection, although he did it sometimes. Dr. Millson said that the mortality occurred chiefly among the lower classes, and was due to neglect. There was some degree of truth in it, but if they would collect the statistics of all the measles cases notified to them, and the dates of deaths, they would find that the majority die during the first week. That did not fall in with the exposure theory. They wanted on that, too, more fact, more clinical investigation. He did not approve of disinfection solely for educational purposes. Dr. Garstang's plan of a daily visit to infected houses to see that there was no mixing of the non-infected with those known to be infected, was excellent. Their preventive measures against measles had failed largely by reason of the method of its spread. It was like influenza—who would suggest that they could keep down an epidemic of influenza by disinfection or any other known method? Measles was the same. They could control smallpox because they knew an artificial method, without which they would be almost as hopeless as with regard to measles; and it was just as well to recognize that they had to know a great deal more about the disease and the manner in which it spread and ceased to spread, before they could get much farther. He did not agree with the argument that

by not allowing children under five years of age to attend school they would spoil the attendance at girls' schools. If done universally, that argument would cease to exist, and mothers would stop at home to nurse their children as they ought to do, instead of helping to earn a living for their drunken husbands. The withdrawal of the epidemic grant was a great calamity. It had removed the inducement to teachers to notify cases. They depended largely on the voluntary notification from teachers, but now they did not get the same amount of notification of measles and whooping cough as they previously did.

Dr. T. ROBINSON was certainly in favour of notification, but not at two shillings per case. He tried to get a clause put in the Burton-on-Trent Act with a half a crown fee for the *first* case. He had found the period of incubation to be eleven or twelve days. The infection almost ceased after the first few days. The infection ceased very rapidly after the rash appeared. He agreed with Dr. Howard Jones that they had no legal standing, and they would fail in a court of law if they prosecuted for exposing a case of measles or whooping cough. He suggested that children should not be allowed in school before five years of age. Dr. Garstang's method of daily visits was most excellent. Some method of control over Sunday schools was also wanted.

Dr. W. A. BOND said the most powerful influence for the prevention of measles would be the increased education of teachers and growing children. Teachers should be educated to know the necessity of excluding children at the beginning of any nasal catarrh or of any catarrh at all, when measles epidemics threaten. A great many cases of measles might in that way be prevented. With regard to notification, as so many authorities objected to pay money for increased information respecting measles, he advocated compulsory notification by the parents or the person in charge of the child. The Sanitary Authorities would not have to pay, and there could be no reasonable objection to that course. In his district they had appointed a lady Inspector. In common with most other districts in London, they had had a large epidemic of measles, and he had found her most useful in making enquiries. With regard to the closure of schools, he had been blamed in one case this year by the managers for not closing, because by not closing they would not get so large a grant as if closed. By closing, the average attendance would have been kept up, and the grant would have been greater. He was told it would make a difference of at least £14. The question of children under five years was a difficult one. They did not learn much, but they had to make a beginning. So far as the prevention of measles was concerned, it would be an advantage to exclude them.

Dr. TURB-THOMAS said it was an established fact that the mortality from measles lessened as the age increased, and they would therefore probably lessen mortality by increasing the school age to five years. Speaking on the control of measles in institutions, he said measles was generally introduced in the incubation period or by a child having a prodromal rash. There were prodromal rashes in measles cases which were sometimes notified as scarlet fever or scarlet fever and measles. He had seen a varicella rash in measles, and a papular rash on the chest which deceived even experts until two days later the ordinary measles rash appeared. He had also seen cases of measles with no rash at all. It was very important that they should have some means of actually diagnosing measles, and the sign he had found most important was that of Koplik spots. He had never found them absent when looked for. He had isolated a case with only two Koplik spots. They might be found during the incubation period, but rarely after the rash had disappeared.

Dr. HOWARD JONES, in reply, said he was rather amused at Dr. Sykes' argument that they must have isolation before notification. How could they fill their hospitals if they did not know where the cases were. On the subject of the epidemic grant, he said that in future the grant would be paid on the average attendance calculated on the total number of times the school had been opened. If they closed a class, the amount would be less to that extent. He had the same experience with whooping cough. The teachers asked, "Is it necessary to keep all contacts at home, because we lose the grant?" The question was very difficult, but of course they ought not to become the tools of the Educational Authority.

Dr. Edmund B. Smith (M.O.H., York), takes the *Yorkshire Gazette* to task with reference to a criticism recently published by it on the suggestion that children under five years of age should be excluded from school. In the course of his letter he says:—

"Measles is a preventable disease, but a very difficult one to cope with and to suppress, owing to the fact that it is at no time more infectious than it is in its earliest stage, before a doctor is called in or before the disease is recognized. This fact makes hospital isolation only partially effective, and it is also very costly, as it requires more extensive accommodation than any other of the infectious diseases. Very few fever hospitals have sufficient accommodation to cope with it along with the other infectious diseases, and very few have tried the experiment—for the above reasons. On the other hand, isolation in cottage homes is practically impossible, and owing to that fact and to the inevitable "only measles" attitude, it spreads rapidly from the infants through the household, not infrequently attacking the older children for a second time in their lives.

Now is it not a fact: (1) That the infant department is largely a mere convenience for mothers?; (2) That little real education is achieved therein?; (3) It is a fact that, unless great care is exercised, the little delicate brains and eyes suffer strain, with serious after-effects in later childhood.

"I grant that the environment of and care bestowed in infants' departments are often much superior to that in many homes; but in my experience and belief, as in that of many other medical officers, infants' departments are on the whole, from a health point of view, a mistake—I might say a serious mistake—and we believe that their continuance will soon prove to be a very important matter for settlement."

LEAD POISONING FROM WALL PAPER.—M. Lefour reported at the Obstetrical Society of France (*Presse Méd.*, May 14th, 1904) the case of a pregnant woman who exhibited signs of lead poisoning, the origin of which was obscure. Her urine was found to contain one milligramme of lead per litre. Lead was found in the wall paper in the house to a considerable extent, and the author having analysed a number of these papers taken at random from a warehouse, found lead in most of them. M. Fère corroborated M. Lefour's results, by independent analysis, but he had detected the presence of arsenic as well as lead.

THE INSANITARY CONDITION OF COLLIERIES.

By J. CHRONNELL, M.R.C.S., L.R.C.P.,
Medical Officer of Health, Hindley Urban District Council.

I DO not propose to take up much of your time with this paper. A great deal of attention has been given to the subject since the appearance of the *ankylostoma duodenale* in the mines of Cornwall and Lanark. The present state of affairs is shortly stated thus: It has not been thought necessary to provide a collier whilst at work with clean water, nor give him any sanitary conveniences, at many collieries. Of course the practice varies. Some firms have a supply of fresh water, others take their water from pits in the immediate neighbourhood even for surgical purposes, and as to closet accommodation, at some places there is none at collieries that have been years in existence. If women happen to be employed on the surface, a privy is put down for their use, and the men use the same or any convenient place on the bank; one is always told in that case the provision is made for the women. At others, you may find a rail and a few rough boards knocked together to form a privy—but it is not necessary to pursue that matter. Where I have personally seen the managers of collieries, and pointed out the defective arrangements I have described, there has been no attempt to justify them, but a promise of improvement has been made.

It must be remembered in this connection that the Medical Officer of Health has no right, as such, on a pit bank, unless it happens to be a metalliferous pit-bank (*vide* Factory and Workshops' Act, 1901). It is difficult to understand why this distinction is drawn. As far as I can ascertain, H.M. Inspectors are responsible for whatever is done, and I suppose they have not thought it necessary to enforce any general regulations.

As to the working places, one Wigan firm has recently introduced pails at the bottom of the pit shaft, and in one or two of the most crowded working-places. With that exception I believe I am right in saying that no provision of any kind is made. Need we wonder, then, that once the *ankylostoma* is introduced into a colliery, if suitable conditions of temperature and moisture are present, that it is almost impossible to get rid of it? How careless the men are is shown by the fact that those working at the face suffer most from this affection. The present want of system is injurious not only to the men employed in the pits, but is

* Read before the Northern Branch of the Society of Medical Officers of Health.

dangerous to the general population in some of the southern parts of Europe—people suffer from the ailment who have no connection with collieries.

How serious the question is becoming is proved by the steps taken by the Home Office, which has issued a Blue Book and a special report written for it by Dr. Haldane; it has also called a conference of masters and men. The *Colliery Guardian* issued an instructive illustrated supplement in November, and the Miners' Federation has published a translation of the reports of Drs. Tenholt, Breton, etc. I feel, then, the time has come when this branch of the Society should not only discuss, but try and provide a remedy or remedies. I take it that whatever provision is made must apply, firstly to the surface, secondly underground; it must be efficient and not costly, and it must be compulsory. For the surface there ought to be fresh water, and on every pit bank a liberal supply of water closets, proportionate to the number of men employed. In the working places I cannot suggest anything better than the system devised in Westphalia of properly constructed pails.

DISCUSSION.

Dr. Sergeant, in proposing a vote of thanks to Dr. Chronnell for his paper, emphasized the importance of the subject, especially to him in the administrative County of Lancaster. From actual experience he knew that the condition of many of the collieries in that county was open to serious objection on sanitary grounds. He submitted a few extracts from a Special Report on the subject which he was shortly to lay before his Council, and gave in brief a life history of the *ankylostomum duodenale*.

Dr. Wheatley in seconding the vote of thanks, stated that in some parts of England the water from collieries was pumped up and used as a source of supply for drinking purposes. Considering that the pollution of mines by excreta involved a risk not only of infection by *ankylostomum*, but also by typhoid fever and several other intestinal diseases, the importance of securing good sanitation below ground as well as above ground was one which could not be too strongly emphasized.

Mr. J. Gerard, H.M. Inspector of Mines, criticized somewhat adversely Dr. Chronnell's paper and the remarks of those who had followed him. He regretted that the speakers were not more up-to-date in their knowledge of the condition of mines and collieries. Colliery owners were only too anxious to carry out the best sanitary measures known to them. He described a number of methods in use in collieries known to him, for the collection of excreta, the methods consisting chiefly of a somewhat crude adaptation of the pail system, though it was not stated what ultimately became of the contents of the pails, nor was it stated whether any measures were taken to prevent contamination by urine. Mr. Gerard stated that excreta were deposited not in the working parts of the mines, but in the disused portions, amongst piles of debris which would never be disturbed again. He asked the opinion of the Branch on a proposed system of dealing with excreta which consisted essentially in the construction of a

concreted area some few yards square on which excrement could be deposited, and be subsequently covered over with coal dust, which appeared to be the miner's panacea.

The President, Dr. W. Berry, stated that he should like to ask Mr. Gerard for information as to the power of the Medical Officer of Health to deal with conditions existing below ground in collieries, for it appeared to him that this was the gist of the whole question. No Medical Officer of Health liked to interfere with matters over which he had legally no control, for it simply meant that he would be laying himself open to rebuff.

Mr. Gerard stated his inability to answer this question.

Dr. Chronnell, in replying on the discussion, stated that he wished to repudiate a suggestion that he was not up-to-date in the statements that he had made. The statements made by him had reference to conditions which existed at the present day in his own district, and he therefore failed to see in what respect he was not up-to-date. He thanked the Branch for their contribution to the discussion.

TYPHOID FEVER IN PARIS.—M. G. H. Lemoine, in a paper read before the Society of Public Medicine (*Presse Médicale*, May 14th, 1904), said that the epidemic was the result of the contamination carried into the various sources by the floods caused by the continuous rain at the end of January and beginning of February.

DISPOSAL OF REFUSE AT CARMARTHEN.—A Local Government Board enquiry has been held with reference to the question of securing a site for the deposit of the town refuse. According to the report in a local paper (*The Welshman*) the enquiry elicited some interesting information tending to show that close proximity to a dust heap was conducive to longevity. Expert evidence even went so far as to say that notwithstanding swarms of flies had been seen attacking decaying fish, etc., the presence of the refuse was not injurious to the health. We would recommend to Carmarthen a study of the evidence given in the case of Chailay Rural District Council v. Keymer Brick and Tile Co., Ltd., Chancery Div. (see *Public Health* xvi., 224; Jan., 1904).

TUBERCLE BACILLI ON PUBLIC HOUSE FLOORS.—Statistics show that persons employed in public houses are specially liable to contract consumption, and it has been suggested that this is induced by consumptive persons spitting on the floors. As the sputum dries the bacilli may be disseminated through the air in the form of dust, especially when the floors are swept out, and inhaled by other persons. In order to test the possibility of this Dr. Allan, Medical Officer of Westminster (Monthly Report, Jan., 1904), obtained permission to take, after closing time, some samples of the expectorated matter on the floor of the public bar in a district in which deaths from consumption are numerous. The samples were submitted to Prof. Klein, who found tubercle bacilli in active condition therein. Dr. Allan suggests that instead of sweeping out the bars it would be more satisfactory to have them thoroughly scrubbed or mopped out with a hot solution of washing soda ($\frac{1}{2}$ lb. to 3 gallons of hot water), or at least that the floor should be well sprinkled at night with some reliable disinfectant which would ensure the sputum from drying by the morning when the floors are swept out.

THE BIRTH AND DEATH RATES FOR ENGLAND AND WALES IN 1903.*

By HENRY MAY, L.R.C.P.,
Late Medical Officer of Health, Aston Manor.

I FEAR that the rates which furnish the pretext for these remarks, and other rates that resemble them in being founded on the population at all ages—"crude" rates as they have been called—have lost some of their early prestige, and are regarded with a more qualified esteem than that in which they were held twenty or even a dozen years ago. I do not mean that to the lay mind they have depreciated in value, for their authority with the general public remains unimpaired. If in some respects they are not so fully trusted by those who understand their true inwardness and can gauge their real value, it is not because the special information they convey is less accurate, nor less indispensable; but owing to the variation shown since 1881 in the age-distribution of the population, a leading factor once relied on as stable has proved liable to change.

AGE DISTRIBUTION.

The following table gives the age distribution of the population of England and Wales per 1,000 persons at ten different ages as shown at the last four censuses. The numbers for 1871 are included, in order that it may be seen how little alteration took place between 1871 and 1881.

Year.	ENGLAND AND WALES.									
	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50 and upwards.
1871 ...	185	119	107	96	88	147	118	88	60	47
1881 ...	186	121	108	98	89	146	118	84	59	46
1891 ...	128	117	111	102	91	151	115	86	57	47
1901 ...	114	107	108	100	96	161	128	89	60	47

The following additional figures, taken from the Medical Officers' Report for Aston Manor, 1903, show the striking character and great extent of the alteration in the age distribution of a suburban working-class population during twenty years.

Year.	ASTON MANOR.									
	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50 and upwards.
1881 ...	157	181	110	101	90	156	118	74	42	26
1891 ...	127	128	119	107	97	162	118	78	46	28
1901 ...	120	106	102	106	109	174	120	88	50	30

* A Paper read at the Quarterly Meeting of the Midland Branch, Council House, Birmingham, April 7th, 1904.

It is the custom to make correction for diverse conditions of age and sex in comparing the death-rates of different places, but no such correction is customary for different times; and yet the alterations that have taken place in the last two decades in the relative proportion of persons at different ages are so important, that it has become no less requisite to make correction for age, in all this class of rates, to ensure an accurate comparison between the present and earlier years in the same place. This does not affect weekly and quarterly returns, and annual rates for several consecutive years are comparable, but I need not say how much trouble it introduces in presenting tables of official statistics for a series of years, nor that it adds another element of disparity in comparisons between different places. A corresponding correction for sex is of minor importance, for the whole extent of the alteration in the relative proportion of the sexes during the twenty years was only 3 per 1,000, an increase to that amount in the female sex.

I need hardly add that wrong estimates of the population, especially in later inter-censal years, is another source of error, not that the infantile death-rate does not belong to the category of those which require correction for age.

I have sometimes thought there is a tendency to ignore the many defects of these annual rates. They are, as it were, the current coin of our business, with an intrinsic and a face value, and their faults and peculiarities are likely to appear in stronger relief in exceptional rates. In this and other respects last year's birth and death rates have special claims on our attention. The birth-rate was 28.4 per 1,000, the lowest point reached, though very nearly identical with the rates of the three preceding years: 28.7, 28.5, 28.6. The death-rate was also the lowest point reached, 15.4—much lower than those of the two previous years—16.9 and 16.3, the latter being then the lowest that had been recorded. The extent of the decline in each, and the causes that produced it, are matters of technical interest, and they also deserve careful consideration, because of their close relation to some of the chief national and social problems of the time.

THE POPULATION PROBLEM.

How much the development and destiny of a country hangs on the margin between the births and deaths—modified by migrations—is seen in the growth of our own nation into a world power during the last century. A large space in the literature of the nineteenth century was occupied by the discussion of the population question. The central point of the Utilitarian creed, which had such a conspicuous influence on thought and political activity in the first half of the

century, was that "the expansive force of population is the great motive power which moulds the whole social structure," (*English Utilitarians*, vol. ii., p. 181). The public were deeply concerned at the time in the pessimistic opinions held at the beginning of the century as to the danger of starvation from over-multiplication, and the duty of practising moral restraint to check the too rapid growth of the population; but these burning questions then are now matters of historical interest only. Fortunately the means now in use were not in vogue at the time of Malthus, and though the country trebled in numbers during the immense expansion of last century, it has not yet approached starvation-point; rather, to quote the words of Huxley, "What is often called the struggle for existence in society, is not a struggle for the means of existence but for 'the means of enjoyment'" (*Essays*, vol. ix, p. 40). In the meantime the average duration of life has been considerably lengthened; abundance of food can be obtained in exchange for the increased proceeds of industry; the surplus population has found an outlet and fulfils a beneficent mission in peopling some of the waste places of the earth, while there is a not inconsiderable and an increasing amount of immigration to our own shores.

There was little picturesque about our birth-statistics until the end of the third quarter of last century was reached; a monotonous average annual birth-rate of about 36 per 1,000 recorded the normal and unrestrained fertility of the people. The birth-statistics have changed their character since then, and a rapidly declining rate has furnished us with unmistakable proof of the intention to put a restraint upon the *natural* fertility. The great difference in the average rates of the two periods shows how effectively this has been accomplished, partly by delaying marriage, chiefly by diminishing its fecundity; but though being average rates, they by no means indicate the full extent of the reduction in the normal births that has been effected in some parts of the country.

The reduction might be explained in some localities (such as the rural counties) by the antecedent decline in marriage; the highest point of the marriage rate was reached in 1873, and the lowest in 1886 (17·6 and 14·2). These are the averages for the whole country; in Lancashire it fell from 20·2 to 14·9, and in Staffordshire from 20·8 to 13·2. But the falling off in marriage was but a minor agent in causing such annual losses in the births as 20 per 1,000 in Salford, and 18 in Bradford, Oldham, and other towns—the average of the whole country being 8 per 1,000.

The chief considerations—temporary and permanent—that have to be taken into account, before attempting to explain the past or

predict the future rate of progress of the population, are on the one hand, the increase shown in the single life, the smaller fecundity of married persons, and a diminished drain from emigration; on the other hand, the greater average duration of life, and an increasing immigration. As the average birth-rate has scarcely varied for several successive years, there does not seem any cause for increased apprehension on that score, but it would be too optimistic to look for a continuation of the present extraordinary amelioration in conditions unfavourable to health. Though there is no chance of the expansion of last century being repeated, we have no cause to anticipate danger from depopulation. The margin for natural increase is certainly much narrower, and a smaller surplus available for the further extension of Greater Britain.

CORRECTION FOR AGE.

The results of making correction for age upon these "crude" rates must not be left out of consideration. We see that the prolific years (before 1880) were handicapped, as regards mortality, by a large proportion of the population in childhood; that at present they are favoured, both in respect of natality and mortality, by an unwonted proportion at the prime of life, and that future years will be heavily weighted by a gradual accumulation of old people. This change in age-constitution has been referred to in its relation to the death-rates in the Registrar-General's Reports, and in his latest annual report, as a result of the recent census, he supplies figures giving the death-rates of the country, *corrected for age*, for all years prior to 1901; and he says: "Generally speaking the effect of correction is to lower the rates for 1880 and earlier years by about 1·0 per 1,000, and those of later years by smaller and decreasing amounts" (Reg. Gen. 64th Annual Report, p. xvi.) The result of his corrections upon the death-rates of the ten years, 1871–80, is to reduce the mean rate (previously stated as 21·4) to 20·3 per 1,000. The same report contains many other death-rates corrected for age, and Dr. Tatham says that the changes have involved the re-calculation of many thousands of death-rates relating to the last twenty years.

There is no apparent reason why the same method or principle of correction for age, should not be applied to the birth and marriage rates. It is obvious that the relation of the births to the population is governed by the number as well as the fecundity of the females: it contains who are of puerperal age. Taking between twenty and forty-five years of age as representative of that period of life, and assuming the age-constitution of the population to have been the same at and before 1881 as it was in 1901, their number would have been

99 per 1,000 instead of 181, and the reproductiveness of those years could have been increased accordingly. The age-distribution of males per 1000 persons in England and Wales at the 1881 and 1901 censuses was as follows:—

Age.	1881.	1901.
—5		
5-10	87.9	57.2
10-15	60.8	53.7
15-20	58.8	51.4
	49.8	50.4
20-25		
25-35	46.8	50.6
35-45	75.9	85.2
	58.6	68.5
45-55		
55-65	53.9	46.8
65 and upwards	81.3	81.8
	25.1	26.8
Females		
Males	513.4	516.4
	486.6	488.6
TOTAL	1000.0	1000.0

The marriage rates for 1881 and earlier years would then have been raised about 1.5 per 1,000, and the birth-rates about 3 per 1,000, and in following years in diminishing degrees. If the age-constitution of 1881 had remained the same until now, the proportion of males of puerperal age in the present population would be so much reduced as to lower the present marriage-rate to about 14.5. The apparent recovery it has made since its lowest point was reached (14.2 in 1886) would then be almost wiped out, and last year's birth-rate would be reduced to about 25.5 per 1000.

At the present stage of the age-disturbance of the population, any comparisons between our present rates and those of earlier years are misleading. The gain to life of the last ten or twenty years represented by the death-rates is decidedly over-estimated, and the loss of lives during the same periods, shown by the birth-rates, is considerably under-estimated. This is applicable more or less to all localities, according to the extent of the alteration in their age-constitution. It will continue until the tabulated age-results of the next census are available, and it is essential that the ages of the population should be ascertained in any intermediate census.

SOCIAL ASPECTS OF THE POPULATION PROBLEM.

Though last year's birth and death-rates are closely related to the national aspect of the population problem, it is impossible to refrain

from bestowing some attention on its social side. Morley, in his *Life of Gladstone* (vol. iii., p. 12) speaks of it as "the impracticable question of population, which though rigorously excluded from public discussion, lies at the root of most social questions." This aspect of the problem lies too near the surface to be altogether tabooed, and it has cropped up in the Houses of Parliament on one or two occasions. It was referred to from different points of view and with opposite conclusions by the Medical Officers of Health for Manchester and Leicester in their Annual Reports for 1902; and some reference to the subject seems unavoidable in these reports in order to explain the variations in the annual birth-rates, and the influence this new social departure has had upon them.

There is no doubt that a part of the recent apparent prosperity of the country has been due to the fact that it has been able to divert to other purposes a considerable portion of the previous outlay on educating, clothing, and training the rising generation, and has had more means for personal comfort and adornment. Among the features of the present age are fewer early marriages, and greater independence of marriage among single women. There is, in fact, a more general recognition of the duty of exercising a prudential restraint upon marriage. There is considerable reserve of opinion as to whether the general limitation of the size of the family, which is also a feature of the age—either in substitution for the restraint on marriage, or in addition to it—possesses any advantage that can compensate for its many and obvious objections. No one wishes to interfere in these domestic matters, and in some special instances a restraint on the number of births may be advisable; but much stronger evidence that it is necessary for the public welfare is required, before any one would be justified in advocating the adoption of artificial means of diminishing the family as part of a general policy. Fortunately very little support is given by those who are in a position—publicly or privately—to influence conduct in this matter.

Large families have been held responsible for much of the existing poverty, and it has been recommended as a remedy for it that the poor should limit the number of their children. I regard such a plan as useless and mischievous. The class for whom it is prescribed are most unlikely to change their characteristics, so far as to cultivate intentional barrenness for a great part of the fertile period of their married life, for the sake of what they would save; but it gives an excuse and inducement to others to do so, who have plenty of means to rear a numerous and healthy offspring. To dissociate "homely joys" from "useful toil" would deprive the poor of their chief stimulus to effort, and their efforts would be perverted to less worthy

objects. A writer in *Macmillan's Magazine* says: "The baby is the centre of all that is bright and beautiful in the homes of the people. It is these homes that form the foundation of our national prosperity" ("The London Workman's Wife," Nov., 1903.)

Any prospective advantages resulting from the reduction in the number of competitors in the struggle for existence would be lost, because the field will be occupied by industrious and prolific immigrants.

The many mischiefs attending these relatively unfertile unions have recently been described in strong terms by the Prof. of Gynaecology of Birmingham University (J. W. Taylor). (*B.M.J.*, 1904, i., 427.)

In the United States they are more outspoken than we are upon this subject; the movement is said to have been imported here from across the Atlantic and not from across the Channel. The rate of births among the native women of the United States is stated to be lower than in any other country except France, and the President of the States has spoken very strongly against this "Race-suicide." The following short extract from an article on the subject in the *North American Review* (July, 1903), supplies with unconscious irony some of the motives for this intentional sterility:—

"The young couple who get married at this day have become accustomed to many things with which they are not willing to part; they do not look forward to a life of self-sacrifice. If one or two children are born it is enough; there is no room for more, because there is no money and the wife does not want to care for more. If she is to have a large brood she must give up all expectation of being in the social atmosphere of her friends, or be plunged into debt. The result is, families are small and growing smaller. Until there is some way provided by which every child born into this world has as good a chance as it ought to have in the race for success, the fewer there are in the family the better" (*N. A. Review*, "Race-suicide and Common-sense," July, 1903).

Another American writer says: "As the immense reproduction in the lower classes is unavoidable, the better classes can most effectively serve society by having smaller families, and applying their surplus parental affection and care, and surplus time and money, towards fitting these unfortunates for respectable and useful lives" (*N. A. Review*, "Right of the Child," Jan. 1903, p. 106).

No doubt the frequent coincidence of high birth-rates with high mortality rates, affords a presumption in favour of some relation between them of cause and effect. Infancy is the age most sensitive to over-crowded, poverty-stricken, and unsanitary surroundings; but otherwise the children resulting from normal fecundity are not

more liable to disease and death than those belonging to families whose number is more strictly limited. Greater efforts to preserve the lives of infants can hardly be expected to be made, if the parents and neighbours regard their birth as a mistake, than under old-fashioned domestic arrangements.

I began these remarks by disparaging and asserting the fallibility of crude birth-and death-rates; I hope, however, they have not fallen any lower in your estimation. One annual rate, like a single note of music, is of little account by itself; but when put into relationship and correspondence with others, *provided that they are all in proper tune*, they afford much pleasure and profit from the facts they record and the problems they outline.

The 1903 birth-rate brings us up-to-date in the official and historical record of a very remarkable phase of our modern civilization, and last year's death-rate records how nearly we have approached high-water mark in another remarkable development of modern civilization, the zealous promotion of the public health.

DISCUSSION.

Dr. ROBINSON thanked Dr. May for his thoughtful essay, which showed that the lowered birth rate had altered the age constitution of the population, a most important result from their point of view as medical officers of health. He asked Dr. May if he did not think that, in a few years, the effect of this cause would be that the population would remain stationary.

Dr. MILLARD, whose remarks were read by the secretary, said he had read Dr. May's paper, and he thought that the question of voluntary limitation of the family was of such far-reaching importance that he approached it with much diffidence. Their thanks were due to Dr. May for giving them an opportunity of discussing it. It might be considered from several points of view: (1) that of morality; (2) that of the state; (3) that of the individual; (4) that of the method adopted. With regard to (1), he believed that the orthodox teaching of the various religious bodies was against any limitation of the family, though it was difficult to ascertain precisely on what grounds this teaching was based. On the other hand, there was some ground for regarding it as "immoral" to recklessly bring offspring into existence if there was no prospect of being able properly to support them.

As regards (2), marriage was clearly a matter for individual choice, and it seemed reasonable to claim as much for the higher and more important act of procreation. It was usually thought that a man should not marry until he could afford to support a family. This consideration ended in the postponement of marriage until a later age, with its accompanying evils. At first sight, something certainly might be said in favour of earlier marriage, with limitation of the family, if necessary.

(3) There certainly was the objection that the limitation of the family, calling as it did for forethought and self-restraint, was always more likely to be practised by the careful, prudent, and thinking section of the

community, whose offspring would thus tend to be outnumbered by the offspring of the careless and improvident, but more prolific class. This however, he thought would be largely restricted by the higher mortality among the latter. The great decline in the birth rate during the last thirty or forty years was sometimes regarded as the result of voluntary limitation of the family, but could we be quite sure that the decline was a real evil? Was a continued birth rate of 40 per 1,000 really desirable on economic grounds in the face of the reduced death rate? Was it not probable that voluntary limitation of the family was Nature's method of restraining a highly civilized nation within safer bounds, when the natural checks to population—starvation, disease, war, etc., began to fail? If, however, a higher birth rate were really necessary for the good of the State, then surely the State ought to offer some reward or assistance to those parents who were patriotic enough to bring up a large family, and should tax those who brought up none. As regards (4) he did not propose to criticize it. Some methods were objectionable, but one method, viz., self-restraint, was surely free from objection. In conclusion, whilst he would hesitate to advocate limitation of the family, he would also hesitate to condemn it. The subject required further discussion.

Dr. JOHN ROBERTSON thought the question of the lowered birth rate was mainly an international one. It mainly interested us as a colonizing nation, supplying colonies with our British blood to oust out undesirable people. Therefore, any measures which could be taken to prevent the reduction of the birth rate should be taken. Much information as to the cause of the low birth rate and the remedy for the same, might, he thought, be obtained by a collective investigation by general medical practitioners.

Dr. MALET said that he would pass by the statistical part of the paper, and would speak only of the practical and moral part. This part involved problems which he had never been able to solve for himself. Early marriage had much to be said in its behalf. Late marriage led to too great disparity in age and feeling between father and child. As for the form to be adopted to restrict the family, the subject had been pushed far, and a popular writer, forecasting the future, had shown how far it was possible to discuss the matter in public.

Dr. JOHN ORTON, as a general practitioner, had observed that persons themselves members of large families, were careful to have small families with a view to providing for themselves and their families a greater amount of comfort and luxury than would be possible if their families were larger. The same consideration lay at the root of the great exodus of country people to the towns, where they adopted the methods there in vogue, devoted to the same purpose.

Dr. SNELL confessed that his views on the subject were somewhat ill-formed and nebulous. Dr. May had dealt with the matter in a masterly fashion. The most noticeable result of a low birth rate appeared to be upon the activity of colonization. As an international question, what was to be done? To appeal to a private person to assist in removing an international difficulty would probably be as futile as the appealing to persons' loyalty to make a correct income-tax return. Were not the jealousies of nations extended parochialism after all? Parochialism was disappearing. Was it not possible that in the course of time the relatively more rapid increase of one nation would be of less importance than at present? Would not the breaking down of international barriers and jealousies put a different aspect on the question of the decline of the birth rate? Must it be taken as an axiom, and without careful enquiry,

that the mere increase of the population of the world was beneficial to the human race? Any local increase was always followed by building and commercial activity and so-called prosperity. Was not the prosperity that of the few, and did not poverty increase at the same time? This was a sociological question, and it was for sociologists to answer it.

Mr. HENRY MAY, in reply, said that the subject was a very wide one, as Dr. Malet had said. As for the last four years the birth rate had remained stationary and the death rate was declining, in time the matter would bring its own solution. Considering the postponement of the age of the parents at the birth of the child, and deducting the effect of this upon the birth rate, we see that only a part of the reduction can be due to artificial limitation of the family. The reduction of the birth rate runs in localities. In towns in the West Riding of Yorkshire it is almost as low as in France; in Durham and South Wales the birth rate is scarcely reduced at all. The question is largely one of local custom. In France it is considered "vulgar" to have a family of more than two; no doubt this has resulted from the knowledge of the evil effects of "division of the land." In the towns of the West Riding of Yorkshire the employment of women in factories, etc., is a factor in the problem. The age-figures as shown by the last census, of course, represented only a transient state of things. With respect to the question of early *versus* late marriages, he would say that if a number of experienced medical officers of health could not decide the question, he did not think anybody could. If births became fewer, the population became smaller, unless the losses by emigration became less, or the gains by immigration became greater. Countries with overflowing population, such as Russia, Italy, and Poland, were sending their surplus to keep up our population.

TENURE OF OFFICE.—The following letter has recently been addressed to the Rural District Council of Dolgelly :—

Local Government Board,
Whitehall, S.W.,
March 21st, 1904.

SIR,—I am directed by the Local Government Board to acknowledge the receipt of your letter of the 7th instant, reporting the re-appointment for a further term of three years of Mr. Hugh Jones as Medical Officer of Health for the Dolgelly Rural District.

The Board have had under consideration generally the question of the tenure of office of medical officers of health, and they direct me to state that, where a medical officer of health has been in office several years, and has, so far as they are aware, discharged his duties satisfactorily, they will be prepared to consider favourably an application for their sanction to his re-appointment without limit of time.

If in the present case the District Council are willing to so re-appoint Mr. Jones, the Board would be prepared to sanction the re-appointment accordingly.

A copy of any resolution which the District Council may pass on the subject should be forwarded to the Board.

I am, Sir,
Your obedient servant,
(Signed) JOHN LITHBY,
Assistant Secretary.

EXPERIMENTS ON DISINFECTION.*

By REGINALD GREEN, M.D., D. Hy.

Two or three years ago I devoted my spare time, for some months, to a study of various well-known forms of disinfection. This was chiefly as regards the killing of certain microbes, grown in artificial culture, by physical and chemical means. As my district, after many years of persuasion, was on the point of buying a steam disinfecter, the various methods of using steam were investigated.

Owing to the varied and often interested opinions on the germicidal properties of patent chemical disinfectants, it seemed desirable to make one's own investigations in these important matters.

The microbes used in these various examinations were:—

- (1). *Bacillus typhosus* from a stock agar culture.
- (2). *Staphylococcus pyogenes aureus*, originally isolated from a throat culture, and grown on agar.

Each of these was, when used first, sub-cultured for twenty-four hours in peptone broth at 37° C.

- (3). *Bacillus subtilis* in a sporulating condition, grown as a film on the surface of peptone broth.

In most of the cases, and unless otherwise stated, Koch's method was followed, viz., that of using fairly fine sterilized silk threads soaked in the twenty-four hours' broth culture of the first two microbes, and tested whilst still moist. In the case of the *Bacillus subtilis* spores, the threads were soaked in the culture and allowed to dry; they were used at any time after that.

After exposure of the threads to the disinfection process, each was placed in a sterile broth tube, and incubated at 37° C. for several days, unless a growth occurred previously. Controls were used in cases where it seemed necessary. Where liquid chemical disinfectants were being examined, the threads were, after exposure, gently washed with sterile water from a wash-bottle, in order to prevent any antiseptic action taking place afterwards. In addition, after testing mercury salts, the threads were exposed to the fumes of ammonium sulphide in order to render inert any iodide or perchloride as the case might be. The antiseptic action of perchloride of mercury is so strong that it has been found that one part per million in broth will prevent a growth taking place.

The after-growths of the microbes chosen, where such occurred,

* Paper read before the Midland Branch of the Incorporated Society of Medical Officers of Health, Jan. 7, 1904.

were characteristic enough as a rule to render microscopic examination unnecessary.

SOLAR DISINFECTION.

As a time of continued bright sunshine was then with us, tests were made of the sterilizing effects of sunlight. These are supposed to be due chiefly, I believe, to the chemical rays. Twenty-four-hour broth cultures of *Bacillus typhosus* and *Staphylococcus* grown in petri dishes were exposed to sunshine for four days, about seven hours per day. At the end of that time both were alive, and sub-cultured with ease.

The typhoid culture was examined each evening in the hanging drop, but although the extreme motility became less, at the end of the four days the bacilli were still moving a little, though with some clumping. But in such a culture, even kept in the dark, after a few days, motility would be lessened, and some clumping would occur.

DISINFECTION BY HEAT.

Although it is practically settled that steam disinfection is *facile princeps* when compared with dry heat, in some cases the latter form only can be used. Although saturated steam has been shown to have more penetrating and germicidal power than superheated steam, the former is sometimes objected to as being more liable to damage articles by making colours run; yet the latter may scorch fabrics. In the modern high-pressure stoves with a vacuum apparatus attached, penetration of superheated steam is easily obtained into the interstices of beds, etc.

Dry Heat.—Tests were made in a small hot-air oven as to the germicidal action and powers of penetration into fabrics of dry heat. At 150° C. threads containing *B. subtilis* spores were sterilized in twenty-five minutes, but not in twenty minutes. Moist threads of *B. typhosus* and *Staphylococcus* were sterilized in fifteen minutes at 150° C., and also in the same time at 115° C.

The slow penetration of dry heat was shown by the result that after the oven was at 150° C. for fifteen minutes, a thermometer encased in several layers of flannel only indicated 70° C., and after thirty minutes 108° C.

Current Steam.—Current steam at atmospheric pressure was tested in an ordinary gas-heated metal steamer, as used in the laboratory. Its power of penetration was proved by the fact that after ten to fifteen minutes' full steaming the temperature inside several layers of flannel reached from 103° to 105° C. on some occasions. This occurred whilst the temperature of the steamer was never more than 99° C.

This increase of temperature has been noticed before, but I do not remember the explanation of it that was given.

Five miniature bolsters, 12 inches long by 10 inches diameter, were made, stuffed respectively with straw, fibre, flock, hair, and feathers, these being the materials commonly used in beds and pillows. The thermometer in the centre of the straw bolster after ten minutes' steaming showed a temperature of 100° C., after fifteen minutes 101°. The temperature in the centre of the fibre bolster reached 100° C. in ten minutes, that of the flock 92° in ten minutes, and 99° in twenty minutes. In the hair bolster the temperature in fifteen minutes was 99° in the centre, and 99.5 in the case of the feather one.

The exposed spores of *B. subtilis* resisted the action of current steam for ten minutes, but succumbed in fifteen minutes. *B. typhosus* and staphylococcus were killed in five minutes at the least.

Current Steam from Saturated Solution of Calcium Chloride.—Tests were made in the same steamer of steam derived from a saturated solution of calcium chloride which boiled at a temperature of 118° C. The highest temperature of the steam recorded was 101° after ten minutes at full steam, whereas the temperatures in the centre of the bolsters were similar to those obtained from steam from ordinary boiling water. Apparently the higher temperature of the steam obtained in the chamber of the "Thresh" stove is due to the super-heating obtained from the calcium chloride solution in the jacket surrounding it.

Steam at High Pressure.—Trials were made in a steam autoclave at different temperatures. At 115° C. spores of *B. subtilis* were killed in fifteen minutes even when encased in three layers of flannel, and when exposed were killed in the same time at 105° C.

In a new pattern Washington Lyon stove, with vacuum apparatus, with 20 lbs. pressure in the chamber and 30 lbs. in the jacket, tests were made, 20 inches of vacuum being used in every case. After eight minutes, at 20 lbs. pressure, the temperature in the flock bolster was only 102°, and the spores of *B. subtilis* were not killed then. On a second occasion, after twenty minutes at 20 lbs. pressure, the temperature in the centre of the flock bolster was 117° C., and spores of *B. subtilis* in the chamber were killed. The temperature in the centre of the hair and fibre bolsters was 116° C. in fifteen and ten minutes respectively at the same pressure, that of the chamber being 123° C.

WATER AT HIGH TEMPERATURES.

Boiling water is one of the most usual and most efficient forms of disinfection, especially in domestic operations. *B. typhosus* was killed by boiling in five minutes, but not in two minutes, whereas

B. staphylococcus was killed in two minutes. Threads of *B. subtilis* were not sterilized in either one, two, or three hours' boiling, no longer time being tried. This is strange, when similar threads were sterile after fifteen minutes' steaming. Water at 60° C. destroyed *B. typhosus* in fifteen minutes, and also staphylococcus, which, however, showed growth after five, ten, and twelve minutes' exposure.

LIQUID DISINFECTANTS AT HIGH TEMPERATURES.

The greater efficiency of chemical disinfectants at higher temperatures, as might be expected, was proved in several cases. *B. subtilis* spores, which were not killed by three hours' boiling, were not killed either by thirty minutes' steeping in 1-10 solution of various coal tar derivatives and other disinfectants. Markedly increased germicidal powers were shown by these substances at 60° and 100° C. Even at 100° C. these disinfectants did not kill the spores of *B. subtilis* at a greater dilution than 1-20 in thirty minutes. At ordinary temperature *B. typhosus* and staphylococcus were on an average killed by 1-20 solutions of these in fifteen to thirty minutes.

Corrosive sublimate solution, on the other hand, killed *B. typhosus* in dilution of 1-2500 in fifteen minutes, whereas chinol did the same thing in 1-500 solution only. *B. subtilis* spores were not killed by soaking for thirty minutes in 1-500 perchloride solution, whereas 1-1000 chinol solution sterilized in five minutes. Staphylococcus pyogenes was killed in fifteen minutes by chinol (1-2500), whilst corrosive sublimate (1-1000) took thirty minutes to do the same thing.

This shows a selective action of some disinfectants upon certain microbes. It is a moot point whether the germs of the ordinary zymotic diseases are more resistant than *B. typhosus* and staphylococcus pyogenes aureus. Of course the spores of the bacilli of anthrax and other allied diseases are more resistant. Experience seems to prove that the germs of scarlet fever and diphtheria are more hardy than those of some of the other diseases, the infection of which apparently soon dies out.

FUMIGATION.

Fumigation is one of the most usual and also most ancient forms of disinfection. In recent years it has fallen somewhat out of favour, more especially in the form of burning sulphur, but it has still a number of supporters, and receives the almost unanimous support of the laity. The tests were made in a special "sulphur fuming" chamber, which had preceded the steam stove at our Fever Hospital, and was of 500 c.f. content.

The substances tested were sulphurous acid, both from burning

sulphur and in the liquefied form in sealed tins; formalin vapour generated from paraform tablets in a lamp; and chlorine from chloride of lime and strong sulphuric acid. In each case the time of exposure was twenty-four hours.

The *B. subtilis* spores, exposed on threads as before, were never killed in any experiment, nor were the threads containing *B. typhosus* or *staphylococcus pyogenes*, when placed in pieces of flannel or envelopes, ever sterilized.

Broth cultures of *B. typhosus* and *staphylococcus* in cotton-wool plugged test-tubes were not sterilized in any experiment. Formalin vapour, with 10 and also 16 tablets per 1000 c.f., had no effect on the motility of the *B. typhosus* in the broth culture when examined in the hanging drop. The motility of the *B. typhosus* was lessened by the chlorine gas from 1½ lb. per 1000 c.f. of chloride of lime, whilst sulphurous acid from a sealed tin equal to 5 lbs. of sulphur per 1000 c.f., and the same from burning sulphur equal to 1 lb. per 1000 c.f., caused the bacilli to clump and to be practically motionless.

The exposed moist threads of *B. typhosus* and *staphylococcus* were sterilized by:—

- (1). Chlorine gas from chloride of lime, when both ½ lb. and 1½ lb. of the latter per 1000 c.f. were used.
- (2). Liquefied sulphurous acid (in a tin) at 5 lbs. of sulphur per 1000 c.f. (no smaller amount being tried).
- (3). Sulphurous acid from burning sulphur in proportions of both 1 and 2 lbs. per 1000 c.f.
- (4). Formalin from 16 paraform tablets per 1000 c.f., but not when only 10 tablets per 1000 c.f. were used.

Controls were used in all these tests, and gave a growth in all cases.

There is no branch of our work that is in more constant operation than this one. I am afraid that there is nothing that gives the public more false security than the placing vessels of some more or less puffed disinfectant on the floor of the infectious sick room. If that is done, it is generally considered amongst the masses, and perhaps among some of their social superiors, that the unaffected members of the family may foregather to any extent in the now sterile apartment. Another popular fallacy, and one which must be very annoying to sewage treaters, is that if the drains and sinks are regularly doused with strong disinfectants, no infectious disease can obtain a foothold in a household.

EXPERIMENTS ON DISINFECTION OF BACILLUS PESTIS WITH "CYLLIN," "ABSOLUTE PHENOL," AND "FORMALIN."

By E. KLEIN, M.D., F.R.S.

THE following experiments were undertaken to test and compare the relative actions of "cyllin," "phenol," and "formalin" on *Bacillus pestis* of a virulent strain. This had been originally derived from the bubo of a fatal case of bubonic plague in a man in Cardiff in 1901. The strain had been kept up in the laboratory by continued subcultures till the commencement of this year, when it was used for infecting rats. A trace of an agar culture of recent date (48 hours at 37° C.) inoculated into a superficial incision of the skin of a rat, caused typical fatal plague within three days. The culture actually used in the experiments to be described here was derived from the spleen of a rat dead on March 23rd, 1904, which rat had been cutaneously inoculated on March 20th, 1904. In all our tests of a 48 hours' old agar culture—copious growth over the whole of the sloped surface (6 centimetres by 2 centimetres)—an emulsion was made with sterile distilled water. The emulsion was a strongly turbid fluid. A single platinum loop of this emulsion spread over a sloped agar surface brought forth innumerable colonies of the *B. pestis*. In all instances to 5 cc. of the disinfectant contained in a sterile test tube, five drops (from a definite drop-bottle) of the plague emulsion were added and well shaken, and after the required time of exposure cultures were made; in all instances three loops of the medicated fluid being spread out over a sloped surface of gelatine or agar, or added to nutrient broth, as the case might be. The culture tubes were then incubated at 21° C. (gelatin), or at 37° C. (agar or broth), and inspected from time to time until for some days no further change was noticeable. Amongst the several dozen cultures thus made, in no single instance was there any accidental or stray microbe observed; the tubes contained either no growth at all, or they contained colonies of the *B. pestis* in pure culture only, in varying numbers, as will presently be described. In this connection it will be necessary to bear in mind that three platinum loops of the mixture (5 cc. of the disinfectant and 5 drops of the emulsion of *B. pestis*), yielded in the positive instances innumerable colonies of *B. pestis* in the culture tubes. This disposes at once of an objection that might possibly be raised, viz., that the amount of disinfectant carried over from the mixture to the culture tubes might inhibit the subsequent growth of the microbe, although the latter might still be alive. It also disposes of a further

criticism, viz., that the number of microbes carried over by three platinum loops might not be large enough. As just mentioned, in the fully positive instances the whole culture surface was covered with crowds of colonies.

Series I.—March 25th, 1904.

- A.—Watery solution of pure phenol 1 in 200
 B.—Watery solution of pure phenol 1 in 100
 C.—Watery solution of formalin (40 per cent) .. 1 in 100
 D.—Watery solution of formalin (40 per cent) .. 1 in 50

Time of exposure of *B. pestis*, 5, 10, and 15 minutes.

Cultures after exposure were made on sloped gelatin (21° C.), and inspected on April 5th, with the following result:—

- 1.—Phenol 1 in 200, 5 minutes exposure. Innumerable colonies—
 confluent mass

10 " " " "
 15 " " " "

- 2.—Phenol 1 in 100, 5 minutes exposure. Innumerable colonies
 10 " " About 7 doz. colonies
 15 " " 6 colonies

- 3.—Formalin 1 in 100, 5 minutes exposure. Innumerable colonies
 10 " " " "
 15 " " " "

- 4.—Formalin 1 in 50, 5 minutes exposure. Innumerable colonies
 10 " " " "
 15 " " " "

Series II.—March 28th, 1904.

- A.—Watery distribution of cyllin 1 in 1,500
 B.— " " " " 1 in 1,000
 C.— " " " " 1 in 500

Time of exposure, 5, 10, and 15 minutes.

Cultures after exposure were made on sloped gelatin (21° C.) and inspected on April 10th, when all tubes were found to be free of any growth.

Series III.—April 8th, 1904.

- A.—Watery distribution of cyllin 1 in 1,500
 B.— " " " " 1 in 1,000

Time of exposure, 5, 10, and 15 minutes.

Cultures after exposure were made on sloped agar and in broth, and incubated at 37° C., inspection being made on April 16th, 1904.

Result: All tubes free of any growth.

Series IV.—April 7th, 1904.

- A.—Watery solution of phenol 1 in 80
 B.— " " formalin 1 in 30

- C.—Distribution of cyllin 1 in 2,000
 D.— " " " 1 in 1,800
 E.— " " " 1 in 1,600

Time of exposure, 5, 10, and 15 minutes.

Cultures were made on gelatin (21° C.) and agar (37° C.) and inspected on April 16th, with the following result:—

- 1.—Phenol 1 in 80, 5 minutes exposure. On gelatin 3 doz. cols.
 On agar " "

10 " " In both tubes no growth

15 " " " " "

- 2.—Formalin 1 in 30, 5 minutes exposure. Crowds of colonies in
 both tubes

10 " " Numerous colonies

15 " " About 5 doz. colonies

- 3.—Cyllin 1 in 2,000, 5, 10, and 15 minutes exposure. All tubes free
 of growth

1 in 1,800 " " " " "

1 in 1,600 " " " " "

Series V.—April 11th, 1904.

- A.—Watery distribution of cyllin 1 in 2,400
 B.— " " " " 1 in 2,200

Time of exposure, 5, 10, and 15 minutes.

Cultures were made on agar (37° C.) and gelatin (21° C.), and inspected on April 18th with this result:—

- 1.—Cyllin 1 in 2,400, 5 minutes exposure. Gelatin tube had one
 colony of *B. pestis*.

The agar tube had a small amount of growth in the condensation water; this was allowed to spread over the sloped surface of the agar, with the result that copious growth of *B. pestis* covered the surface next day.

10 " " No growth in any tube

15 " " " " "

- 2.—Cyllin 1 in 2,200, 5 minutes exposure. All tubes free of any
 growth

10 " " " " "

15 " " " " "

From these experiments it follows: (1) That formalin even 1 in 30 failed to disinfect *B. pestis* in 15 minutes; (2) That phenol 1 in 80 failed to disinfect *B. pestis* in 5 minutes, but did disinfect in 10 minutes; and (3) that cyllin 1 in 2,400 failed in 5 minutes, but succeeded in 10 minutes.

From the following tables it will be seen that:—

(1). Phenol 1 in 80 is a stronger disinfectant for *B. pestis* than formalin 1 in 30, and

(2). Phenol 1 in 80 stands in about the same position as cyllin 1 in 2,400, inasmuch as both failed to completely devitalize the *B. pestis* in 5 minutes, though they both succeeded in doing so in 10 minutes. Expressed in a different form, cyllin possesses for watery emulsion of *B. pestis* a disinfecting power which is more than 27.5 (in fact about 30) times as great as that of absolute phenol.

TEST No. 1. (April 22nd, 1904).
B. PESTIS, 48 HOURS AGAR CULTURE AT 87° C.
ROOM TEMPERATURE 15°-18° C.

Sample.	Dilution.	Time culture exposed to action of disinfectant.			Sub Culture.		Remarks.
		5 Minutes.	10	15	Period of Incubation.	Temperature.	
Formalin (40%)	1: 100	+	+	+	7 days	87° C.	Copious growth
	1: 50	+	+	+	"	"	"
	1: 80	+	+	+	"	"	Slight reduction in 15 minutes
Pure Phenol ...	1: 80	+	-	-	"	"	Reduction in 5 minutes

∴ Carbolic Acid Co-efficient of Formalin is under 0.87.*

TEST No. 2. (April 22nd, 1904).
B. PESTIS, 48 HOURS AGAR CULTURE AT 87° C.
ROOM TEMPERATURE 15°-18° C.

Sample.	Dilution.	Time culture exposed to action of disinfectant.			Sub Culture.		Remarks.
		5 Minutes.	10	15	Period of Incubation.	Temperature.	
Cyllin ...	1: 2400	+	-	-	7 days	87° C.	Great reduction in 5 minutes
	1: 2200	-	-	-	"	"	-
	1: 2000	-	-	-	"	"	-
	1: 1800	-	-	-	"	"	-
Pure Phenol ...	1: 80	+	-	-	"	"	Reduction in 5 minutes

∴ Carbolic Acid Co-efficient of Cyllin is 80.0.

* A similar co-efficient for Formalin was obtained with *B. typhosus*, by Mr. Ainslie Walker, Jan., 1904.—ED.

DISINFECTION OF DWELLINGS IN GERMANY BY MEANS OF FORMIC ALDEHYDE.*

SINCE Flügge introduced the use of formic aldehyde, this method has won a scientific foundation, and many towns have adopted it. Flügge's method is shortly as follows:—

1. The room to be disinfected is carefully sealed; the doors and windows by caulking with strips of wadding, in other places by pasting up with paper or putty.

2. The furniture, etc., in the room are so arranged as to facilitate as much as possible the action of the gas on all sides. Beds and clothes are hung up on a line or on a special frame. (Bed-linen, etc., is put in a sublimate solution.)

3. Gaseous formic aldehyde is developed in amount suitable for the size of room from a weak watery solution of formic aldehyde. This may be effected by a special apparatus (Flügge's) in the room itself, or outside the room by an apparatus which transmits the vapour through the keyhole.

4. After the formic aldehyde vapour has acted for 3½-7 hours, ammonia vapour is admitted into the room from a special apparatus in order to remove the formic aldehyde.

5. After the rooms are carefully aired the articles are again put in their places.

It is an essential principle of the system that all the articles to be disinfected are allowed to remain in the dwelling. Since formic aldehyde vapour disinfected the surface only, and attacks only slightly the deeper parts of bedding and clothes, it becomes necessary also to remove to a disinfecting station bedding, clothes, etc., which have become dirty in certain diseases (plague, small-pox, and puerperal fever).

In cholera, dysentery, and typhoid fever it is necessary, Flügge said at first, only to wash the bedstead and immediate surroundings of the bedstead with sublimate solution or carbolic acid solution, and to disinfect privies, etc., with milk of lime. Now, however, a preliminary disinfection with formic aldehyde vapour is ordered for cholera, and Flügge told Petruschky recently that in dysentery and typhoid the disinfection of the bed and its neighbourhood with formaldehyde vapour was not sufficient. Hence Flügge's system postulates a different treatment according to the disease—not as hitherto a mere mechanical washing with disinfecting solutions.

A second difference from the prevailing method is this: the disinfection by formic aldehyde does not remove the filth present. Layers of filth which are apparent must be washed with sublimate solution, but must not be removed. The removal of filth is no part of the process of disinfection, but is part of the cleansing which the occupier himself has to perform.

A third difference is the relatively longer duration of the disinfecting process. The room cannot be used for 10½ hours when disinfection lasts 7½ hours; no slight hardship when, as in Dantzic, a room may contain 15 inhabitants. A further difficulty is the hanging up of bedding, etc., in a small room, so that no soiled surfaces may touch, but that all may be surrounded on all sides by formic aldehyde vapour.

* Leipzig 1903.—Der Kampf gegen die Infektionskrankheiten ix. Bericht über meine Informations-reise zum Studium der Wohnungs-disinfection mittels Formaldehyd in Halle, Berlin, Dresden, München, Breslau und Posen.

Shortly after the introduction of formic aldehyde disinfection in Breslau in the spring of 1899, Petruschky considered whether it would be advisable to introduce it into Dantzic. From 1897 formalin has been used to disinfect articles which would be spoilt by steam sterilization. The objection to Flügge's method was the impossibility of hanging up in a small room of many articles, as in Dantzic. These conditions did not prevail in Breslau. It was not possible to keep people out of their rooms in Dantzic, nor to leave the filthy articles in the rooms. The occupiers when the disinfecting process were over, were not likely to undertake the necessary scrubbing. In the three years that have elapsed, much experience has been gained in various towns as to Flügge's system (the injury to clothes, the odour of carbolic acid, etc.) Petruschky's visits were made in the autumn of 1902, and Halle was visited first.

Halle.—Flügge's system is in use as much as possible. Prof. Fraenkel informed the author that some rooms are too small to allow the apparatus to enter, and also the various articles to be hung up properly. Many rooms have wooden partitions which cannot be sealed; in these, often the dirtiest, old methods of cleansing were used. Beds were taken out to disinfect with steam in many cases, because there was no room to hang them in the room, or because the smell of formic aldehyde remained too strong for them to be slept in the same night.

Petruschky in six cases of actual disinfection with formaldehyde examined test objects, and in two cases the disinfection had failed.

The disinfecting station at Halle has the usual steam apparatus. The disinfector as a rule did not take the prescribed bath at Halle, as at other places. An essentially new technical proceeding was injection of petroleum into the boiler, thus hindering completely the deposit of lime in it.

Berlin.—Disinfection procedure was being reorganized during his visit, under Dr. Strassmann, with the scientific assistance of Profs. Proskauer and Elsner of Koch's Institute. Lantenschlager's apparatus was used for formaldehyde disinfection.

In Berlin only a small proportion of dwellings is disinfected with formaldehyde, because many of the dwellings are not suited for disinfection with it owing to their being too filthy, or being unable to be sealed, or having no special window opening outside so that they could be aired, or to the impossibility of keeping in the street inhabitants of single rooms the necessary time while the room is closed.

As a rule only the better-class rooms and "front houses" are disinfected with formaldehyde. In the small filthy "back houses" containing many goods, etc., soap and carbolic acid solution are almost universally used. The goods, etc., are almost entirely disinfected with steam. (In many cases injury is done by this disinfection, and is paid for by a uniform scale.)

The Berlin method is: Soot, dirt, and dust on stoves, pictures, clocks, etc., also behind vessels, and the usual furniture, must be carefully wiped up with dusters moistened with a 3 per cent carbolic acid solution. The bedstead is then to be carefully scrubbed with soap, and excreta, mucus, pus, and blood are to be carefully removed as above directed with carbolic solution from the walls and the bedstead. The floors are scrubbed with soap and carbolic solution and left slightly damp. Before the formaldehyde disinfection, carved work and furniture must be rubbed thoroughly with a duster damped in 3 per cent carbolic lotion, and rubbed dry. The disinfectors then fix a clothes line on which to hang things which cannot be disinfected with steam; leather, skin, or vulcanized articles, books, playthings, etc. Wooden furniture, cushions in wooden frames, feather

beds, and spring mattresses remain in the room. The latter are removed from the bedsteads. Disinfection is done by means of current steam, and therefore before the disinfection of the dwelling the things to be disinfected must be taken to the disinfecting station; viz., cushions not in a wooden frame, beds, straw beds, soft mattresses of all kinds, pillows, carpets, clothes, covers of all kinds, clean linen, unwashable curtains, portières and fabrics. When these things are removed little remains in the room, so that what is left can be easily arranged that the formaldehyde vapour has free access to each article. The Berlin disinfectors carefully pack with wadding articles of artificial bronze before the formaldehyde gas begins to act. They have remarked that it is not the formaldehyde but the ammonia which follows, may determine a blackening of such articles.

Munich.—Disinfection is not pursued so vigorously as Petruschky had conjectured, judging by the population. This was owing to disinfection being obligatory only for typhoid fever, cholera, and small-pox. Disinfection was done for tuberculosis, scarlatina, and diphtheria only by request. Some days there are no disinfections, on others there are three. Private dwellings are always disinfected by a Flügge's apparatus. As a rule, however, the things are not, all of them, left in the room. Beds are usually taken to the disinfecting station, where two Schimmel's steam apparatuses are at work. This apparatus also can be used as a formaldehyde chamber for the disinfection of articles which would be destroyed by steam. Schoolrooms closed on account of infectious disease are alone disinfected by scrubbing with solutions of sublimate or carbolic acid.

Dresden.—The disinfection is undertaken privately by the Messrs. Lingner. Herr Lingner instituted the first station, and conducts it at his own expense. The receipts come from disinfection fees, which are remitted to the poor only. Dresden pays the contractor yearly 6,000 marks (£300). Everything is disinfected with Lingner's apparatus, glycoformal not being used, but formalin as a rule, except where the penetration of the fabrics is required as in typhoid. Everything suitable for steam disinfection is disinfected at the disinfecting station; the better kinds of clothes as well as uniforms. In the latter case the apparatus is first heated by a previous disinfection in it, so that little condensed steam is precipitated, because it is this condensed water which spoils clothes, etc.

At the Dresden disinfecting station there is also a formalin chamber consisting of two parts. One part contains a Lingner's apparatus, the other holds the hanging-up articles to be disinfected. An opening between them allows the vapour to pass from one part to the other. In this cupboard only the clothes of the persons who are on the disinfecting staff are disinfected. In Dresden there are females engaged in disinfection, and they apparently give satisfaction. They, under the orders of the chief disinfector, clean and scrub the room after formalin disinfection. The occupants will not do it for themselves, as they do in Breslau and Halle. In Dresden the work is always done by the disinfecting staff. Four women are regularly employed for scrubbing out rooms. Tuberculosis, scarlet fever, and diphtheria are diseases in which disinfection is compulsory, and hence more disinfections are performed in Saxony than in Munich. When persons occupy a single-roomed tenement, shelter is found them while disinfection is being done, at lodgings where fourteen persons, male and female, can reside. This is at the disinfecting station. So far as Petruschky knows this is the only German town where such a

provision is found. This arrangement has the drawback of herding together too many poor people.

Breslau.—The birthplace of Flüge's method of formalin disinfection. The motto is "Disinfect everything in the room *in situ*." In typhoid and dysentery, however, the bed is disinfected in steam, only the neighbourhood of the bed is mechanically disinfected. In disinfecting small dwellings the clothes were hung up, but only a small portion could possibly undergo a free surface disinfection.

In two interviews Petruschky had with Flüge, the latter appreciated the drawback of hanging up clothes too thickly, whereby some part might escape disinfection; also mentioning that he modified the procedure by a "combined method" of disinfecting the bed by steam and the room with formaldehyde, this method being also used for cases of tuberculosis, typhoid, and dysentery. The difficulty found in Danzig of turning people from single-roomed houses during disinfection is not solved at Breslau. The chief disinfectant at Breslau says no such difficulty is ever felt; those turned out go and stay with their neighbours, after they are "brushed down" with sublimate lotion. "I cannot, however, say that this procedure is worthy of imitation."

Posen.—Prof. Wernicke, Director of the Hygienic Institute, tries to carry out thoroughly Prof. Flüge's method. The difficulties found at Breslau are reproduced. In Posen the "combined system" is coming more and more into use.

CORRESPONDENCE.

"ALLEGED TAMPERING WITH DEATH CERTIFICATES."

To the Editor of Public Health.

SIR,

I observe in *Public Health* for the month of May a letter signed "Rural M. O. H." referring to alleged tampering with Death Certificates by Registrars, and I think it well that your readers should know that the information contained in the Certificate of the cause of death is only binding upon the Registrar so far as the cause of death itself is concerned. The Regulation of the Registrar General is to the following effect. "The Medical Certificate is to be used by the Registrar solely for the purpose of filling up Column 6 in the entry relating to the cause of Death. The name, age, and other particulars must in all cases be ascertained from the informant, and must not be copied from the Medical Certificate."

Having been connected with the Poor Law service for some years, I know it used to be the practice for persons upon entering the Workhouse to give their age in excess of what it actually was, as they had an idea that it improved their status, or gave them a better diet or something of that kind after becoming inmates. Under these circumstances it seems to me that the Registrar has but very little choice in the matter. I am quite prepared to admit that if the Registrar knew that an informant was about to make a false entry, it would be within the Registrar's power to submit the question to the Registrar General for his instructions. I write this merely to show that the Registrar cannot be held responsible unless he has actual knowledge of the facts.

• May 24th, 1904.

Yours, etc.,

A REGISTRAR.

PLAGUE AT SYDNEY.

To the Editor of Public Health.

SIR,

In the notice of a Report on a Second Outbreak of Plague at Sydney, 1902, which appeared in the March issue of *Public Health*, it seems to me that two points were spoken of under some misapprehension; and, as they are of great importance, I beg leave to remark upon them.

The first of them relates to place-infection as a factor in epidemic plague. It was said, "overwhelming evidence points to its importance in Indian and Chinese epidemics, and, though the circumstances of persons living in Sydney are such as to minimize its dangers, the grounds on which its existence is denied are not quite clear." The grounds were set out in paragraphs 36 to 44 of the work referred to, and, very briefly, were as follows. Whereas 221 houses were the adjudged places of infection for 255 cases in 1900, only eight of them even harboured cases in 1902, while only four of the eight were again adjudged places of infection for the cases which occurred in them; further, while all of these four were used in ways specially likely to attract rats to them and actually were rat-infested, plague-rats were identified in one of them, dead rats in numbers were found in another in the immediate neighbourhood of which plague-rats had been identified, plague-rats were found in adjoining and closely adjacent premises to the third, and at the fourth neither plague-rats nor dead rats in number were found. These grounds may or may not be deemed sufficient to support the inference drawn by me, but I think they will be generally considered to be clear and full as far as they go.

The second point is the following: It was said, "The weakest link in the chain is in reality the absence of any proof that the rat-flea is, under any circumstances, so commonly parasitic to human beings as to become an ætiological factor of any epidemiological significance whatever." I cannot tell to which of several species of flea reference is here made, nor whether the writer intended to exclude *P. serraticeps*; but the hypothesis of the flea as supported by experience at Sydney requires that the incriminated species should not commonly infest man. This was very fully explained in paragraph 299. I am, Sir,

Faithfully yours,

J. ASHBURTON THOMPSON.

Sydney, April 19th, 1904.

TO PREVENT PITTING IN SMALLPOX.—Dr. Marshall (Ann. Rep., Lowestoft) maintains that he has found the plan advocated by Dr. Neech of Halifax to be very successful; no marks or pits occurred. The method consists in painting the spots over daily (or every other day when the treatment becomes painful), with almost pure carbolic acid.

KLEBS-LOEFFLER BACILLUS IN NURSES' THROATS.—Dr. F. C. Eve reports an interesting and important fact (*Brit. Med. Jour.*, May 21st, 1904) in connection with an outbreak of diphtheria in the children's ward of Hull Royal Infirmary. Two children developed the disease, a week after another case occurred, and in a month two more children sickened with it. There were only twenty-six cots in the ward. The throats of nine nurses were examined, and in six the bacillus was found, and one had a slight membrane, but no complaint had been made by any nurse of not feeling well. All their throats, as well as the throats of the children, were sprayed with free chlorine spray twice a day for a week, apparently with satisfactory results, as no further cases occurred.

LAW REPORTS.

HIGH COURT OF JUSTICE.

KINGS BENCH DIVISION

Feb. 4th and 5th, 1904.

BEFORE LORD ALVERSTONE, L.C.J., WILLS AND KENNEDY, J.J.

CENTRAL LONDON RAILWAY CO. v. HAMMERSMITH BOROUGH COUNCIL.

Public Health (London) Act, 1891. Sections 4 and 5—Smoke Nuisance—
Form of Prohibition Order—Specification of Works—Evidence.

When a magistrate makes an order prohibiting the recurrence of a nuisance from black smoke and is asked by the defendants to specify works, they ought not to object to his hearing evidence as to what works are necessary, but if without hearing such evidence, he either gives no directions or general directions the order will not be invalid.

This was a case stated by a Metropolitan magistrate on the hearing of six informations against the appellants for sending forth black smoke so as to be a nuisance, from a chimney at the generating station of the company. During the hearing the company stated that the emission of the black smoke might have been due to two furnace doors being open at the same time. The magistrate held that the Borough Council were entitled to a prohibition order under Section 5 (1) and (2) of the Public Health Act, 1891. Thereupon counsel for the appellants required under Section 5 (5) of the said Act that the said prohibition order should specify the works to be executed by the appellants. No suggestion was made by either party as to the works necessary, and the counsel for the appellants insisted that, the case being closed, the magistrate was precluded in law from hearing further evidence as to the works necessary. The magistrate made an order specifying certain works of a kind to prevent two furnace doors being open at the same time, and ordering the appellants to adopt all other means necessary to prevent the emission of black smoke.

Rathill, K.C., and T. Mathew appeared for the appellants, *Macmorran, K.C., and Bodkin* for the respondents. The appeal was dismissed.

LORD ALVERSTONE, L.C.J., said, the magistrate has rather complicated the matter by putting in directions which I have called the directions of a mechanical engineer, for instance, directions to place a horizontal bar on a centre pivot put between the doors, and the order, in my opinion, would have been better if it had been in one of two forms, either "I tell you not to be negligent in the matter of stoking the furnaces, and not to do it again," or, "I direct you to put up apparatus which will prevent your being able to stoke two furnaces at the same time." But when we look at what happened, I think it would be wrong, and it would be contrary to the first principles of justice, to allow such an objection to prevail. In the first place, the respondents denied black smoke coming out at all, and when their witnesses were in the box, what they said was that the emission of black smoke might have been caused by two furnace doors being open at a time. The Borough Council of Hammersmith, having proved their case as to the emission of black smoke, they were not then and there prepared with evidence as to how it best could be remedied; and the prohibition order being about to be made, counsel for the railway company was within his rights in saying, "Will you be good enough to tell us the

works which we are to do." The magistrate, being in a difficulty, appears to have asked the respondents whether they had any evidence there, but no suggestion was made, and then when the question arose of an adjournment for evidence, the railway company's ingenious counsel says, "You must not hear evidence at all now the appellants have closed their case (which they had closed long before the request had come), and therefore you are not entitled to hear any evidence." All I can say is (and I do not wish to say anything which goes beyond this case), that that is not the way in which such a point should be raised if objection is afterwards going to be taken to the magistrate having said in his order something which he ought not to have said. Now as to specifying works. I think that "Millard v. Wastall," (1898,) 1 Q.B., 342, decided under the Public Health Act, 1875, was rightly decided, and applies under the London Act, and that in a smoke nuisance case it is not necessary to specify the works to be done in order to prevent the recurrence of the nuisance. It is also argued that this order is bad because it does specify works, and it specifies works without sufficient evidence. I think if that were really what the order did, it might be open to some objection. But the fair reading of this order is, "I direct the railway company to fit the doors of the furnaces with apparatus to prevent the doors being open or kept open simultaneously. I cannot help thinking that the form of this order has been largely brought about by the respondents taking an objection which, in the ordinary conduct of litigation, I think they ought not to have taken. If they were going to raise the point that the magistrate could not make a proper order at their request without evidence, they ought not in the same breath to have objected that he was not entitled to hear evidence. I think such tactics were obviously adopted for the purpose of preventing any order being made at all. I therefore think this appeal fails.

WILLS and KENNEDY, J.J., concurred.

March 2nd, 1904.

BEFORE LORD ALVERSTONE, L.C.J., WILLS AND KENNEDY, J.J.

WING v. EPSOM URBAN DISTRICT COUNCIL.

Public Health Act, 1875, Section 96—Nuisance—Order to Abate—Signature of Order.

An order of a court of summary jurisdiction requiring an owner to abate a nuisance arising from defective drains made under Section 96 of the Public Health Act, 1875, must be signed by two justices.

This was a case stated by the Surrey Quarter Sessions. The appellant had been ordered by a court of summary jurisdiction to abate a nuisance by reconstructing certain defective drains. The case was heard by three justices, but when the order was drawn up it was signed by one justice only. The appellant appealed to Quarter Sessions, alleging that the order was bad on the face of it, inasmuch as it was made under the hand and seal of one justice only. The court of Quarter Sessions was of opinion that the order was valid, but stated this case for the opinion of the High Court. *Low, K.C., and W. Mackenzie* appeared for the appellant, *Avory, K.C., S. G. Lushington, and Swinburne Hanham* for the respondent Council. The court allowed the appeal.

ALVERSTONE, L.C.J., said the point raised was a purely technical one, but was important. It was necessary that the order should be drawn up and served, and should be good upon the face of it. The form of order for

abatement or prohibition of nuisance is Form C in Sched. iv. of the Public Health Act, 1875. That form recites the whole proceedings, and indicates in the plainest way that the order is to be made and signed by two justices. The order in this case is signed by only one justice, and is therefore bad on the face of it.

WILLS and KENNEDY, J.J., agreed.

April 28th and 29th, 1904.

BEFORE MR. JUSTICE RIDLEY AND A SPECIAL JURY.

WRIGHT v. THE MANAGERS OF THE METROPOLITAN ASYLUMS DISTRICT.

Negligence—Infectious disease—Patient discharged from hospital before being free from infection—Liability of Hospital Managers to persons infected.

This was an action for damages by the plaintiff caused by reason of his son Arthur Wright, having been discharged from a hospital of the defendants in an infectious condition, whereby other members of the plaintiff's family were infected with scarlatina.

Moyes and *Cairns* appeared for the plaintiff; *Dickens*, K.C., *C. Herbert Smith*, and *J. A. Theobald* for the defendants.

Mr. Moyes, in opening the plaintiff's case, said: Before March 29th the plaintiff was living at Putney with his family, and one of his sons had symptoms of scarlet fever. On March 29th the plaintiff's son, Arthur Wright, was taken to the Grove Hospital, Tooting, suffering from scarlatina. Six weeks was the limit of time during which a person suffering from scarlatina should be isolated. Arthur Wright was let out too soon, and other members of the plaintiff's family caught the infection. All the boy's clothes had been fumigated by the local authority. On May 9th notification was made to the plaintiff that the child could come home, and plaintiff's daughter Rosina brought him home. The boy, therefore, was only at the hospital five weeks and four days. The mother, Selina Wright, on May 16th sickened of the fever, which she caught from her son, and was removed to the Western Hospital, Brompton, on May 18th. On May 19th, a son, Frederick, 19 years of age, sickened, and was removed to the Western Hospital. The plaintiff noticed that when Arthur came back he was still peeling about the palms of his hands and soles of his feet. That was a highly dangerous thing. The plaintiff then thought that the infection was to be attributed to Arthur coming back too soon; and he wrote to the hospital complaining that his son Arthur had spread the infection by being sent back too soon. The hospital authorities replied on June 16th that the matter had been investigated by a sub-committee, and that the plaintiff's son was only discharged after all risks of infection or contagion had gone. On May 23rd the boy, Arthur Wright, had a nasal discharge. The boy said that when he was discharged he had a soreness in the nose, which continued till the end of June. On June 10th William Wright, aged 8, and Walter Wright, aged 12, were taken ill and removed to the hospital suffering from scarlatina.

These facts were deposed to by the plaintiff and various members of his family.

Arthur Wright, examined, said when he came away from the hospital he had a sore throat and a nasty substance in his nose, and his hands and feet were peeling. He had the nasty discharge from the nose when in the hospital. In cross-examination he said his nose was running two or three

weeks while he was in the hospital. His nose and throat were examined the day he left the hospital. There was no discharge then. The discharge had stopped. He was taken home outside an omnibus. The discharge came on when he was on the omnibus. He told the doctor that his discharge came on two or three days after he got home.

Dr. Ernest Alfred Miller said he saw Arthur Wright on March 29th and directed him to be removed. He did not see him again till May 23rd. He was still peeling from hands and feet, with a purulent discharge from throat. The tonsils were swollen. The mother caught the infection from Arthur. Arthur was the source of the infection to Frederick. It was improper to let the patient out while there was a nasal discharge. Infection might be communicated from desquamation. Six weeks was the minimum time for a patient to be isolated.

Cross-examined by *Mr. Dickens*.—With lingering desquamation about him, there was no reason why he should not be discharged. If the bed-card was correct it was quite proper to discharge him on May 9th. He did not think it a risky thing to allow the boy to return home on the top of an omnibus, when the wind was in the east and the temperature 3 deg. below the average.

Dr. P. Caldwell-Smith said he was the medical officer of health of the borough of Wandsworth. On March 30th the case of scarlatina at the plaintiff's house was notified to him. The sanitary inspector called, and the plaintiff's premises were disinfected properly. On May 18th the mother's illness was notified. On May 20th Frederick's was notified. On June 11th he visited the house, and afterwards wrote to Dr. Beggs. It was possible that the infection came direct from the boy Arthur. The boy was suffering from adenoids and enlarged tonsils. Slight desquamation was no evidence that the boy was infectious. Sometimes lingering desquamation might go on for weeks. The doctor attending the patient was the only person who could say when the patient ought to be discharged. It was not true that bedding and clothing were spoilt when returned after being disinfected.

The case for the defence was opened by *Mr. Dickens* who said that there was no negligence, and that if the bed-card was correct, it was proper that the boy should have been discharged.

Dr. Beggs said he was the medical superintendent of the Grove Hospital. Seven to eight thousand persons had passed through his hands while he was at the hospital. There were seven doctors at the Grove Hospital. He had no recollection of Arthur Wright's case, except from the bed-card. He produced the actual bed-card in Arthur Wright's case. Looking at the card it was an ordinary simple case. The entry "rhinitis" with a query meant that there was a suspicion of a discharge from the nose. The boy got up on April 14th, and was put on full diet. On May 7th the card showed that the boy was in a fit and proper condition to be discharged on May 9th. The entry on the 9th showed that no complications had supervened since May 7th, and he was in a proper state to be discharged. Doctors had not been able to discover any specific germ for scarlet fever. Fever sometimes broke out after the patient had been discharged. Taking the boy home on an omnibus would be likely to give him a cold. The cold might light up infection again. There was no other way of testing whether the boy was in an infectious condition than that used in this case.

The jury intervened and said they considered there was no case of negligence made out.

MR. JUSTICE RIDLEY.—You are quite right.

A verdict and judgment were entered for the defendants.

BEFORE LORD ALVERSTONE, L.C.J., WILLS AND KENNEDY, JJ..

February 3rd, 1904.

TREASURE AND SON v. BERMONDSEY BOROUGH COUNCIL.

Metropolis Management Act, 1855—Drainage Byelaw—Pipe from every Lavatory.

Messrs. Treasure and Son constructed under the London School Board certain additions to the Alexis Street Board School, and on each of three floors constructed a set of lavatories. These consisted of basins fixed in slate slabs, each basin having a short length of lead pipe connected to the waste and discharging into the open trough. These vertical pipes were not trapped, the open trough collected the waste from each lavatory basin, and conveyed the water to the outside wall, discharging into a gully in the room on the level of the floor. This trapped gully was connected to a waste pipe on the outside of the building, and thence to the sewer.

A summons was taken out by the Borough Council for non-compliance with section 10 of the London County Council Drainage Bye-laws, inasmuch as each pipe was not trapped immediately beneath such lavatory.

On behalf of the defendants (Messrs. Treasure and Son), who were represented by the School Board, it was contended that the whole set of nine basins formed one lavatory, and that a sufficient trap was constructed so as to intercept any sewer gas.

The Magistrate found for the Borough Council, with costs against Messrs. Treasure & Son, and held that each basin was a separate lavatory. The School Board appealed against the Magistrate's decision, with the result that the verdict was given against the Borough Council with costs.

The LORD CHIEF JUSTICE, in giving judgment, said that the London County Council in framing this bye-law, viz., "He shall cause every pipe in such building for carrying off waste water to a sewer to be taken through an external wall," knew perfectly well what they were talking about. They were talking about the pipes which lead to the sewer from the lavatory, or, if you like, from the basin. The ordinary reader would take this to mean from the lavatory and not from each basin, yet what is far more important is that even if you take it from each basin they have not told the people that they are not to use an open trough; but they have told the people that if they do use a pipe to the sewer it must be of a particular construction. To say a short end of pipe which runs into an open trough which opens through leads into a pipe, to call that a pipe leading to a sewer would be simply an abuse of language. Of course, it is a pipe which takes the waste water to the sewer in the same sense that the housemaid may take the waste water into the sewer when she empties the basin into a slop pail, and pours the contents of the slop pail down the water closet or sink. No reasonable man reading that bye-law would understand he was told you are not to be allowed to use the system of having no closed pipe at all, but an open trough which can be cleaned out every day if you like, and to have no possibility of any foul connection between the open trough and that basin by simply having a short length of pipe open, but you must use a closed pipe with the elaborate system suggested as the alternative. He expressed no opinion as to which is the best; he did not know; but all he could say was that if the local

authority desire to say our sanitary regulations shall be such that there all always be a pipe from each basin to a sewer trapped in this way, they must say so. They are not entitled by describing how such a pipe to be constructed and trapped to read into that a prohibition that nobody shall do it in any other way. He was therefore clearly of opinion that the magistrate came to a wrong decision in this case, and that what was done here was not within the words of this bye-law, construing it in the most liberal way in order to carry out the views of the Sanitary authority.

WILLS and KENNEDY, JJ. concurred.

REVIEWS.

OYSTERS AND ENTERIC FEVER.

The fourth report of the Royal Commission on Sewage Disposal (in 3 vols.) is devoted to the question of the pollution of tidal waters, with special reference to the contamination of shell-fish, and the consequent communication of disease to man. Vol. i. gives briefly the conclusions of the Commission; vol. ii. the detailed evidence taken on the subject; vol. iii. a report by Dr. A. C. Houston on an exhaustive series of bacteriological investigations undertaken by him.

The conclusions of the Commission are clear and definite. They are satisfied that a considerable number of cases of enteric fever and other illness are caused by the consumption of shell-fish which have been exposed to sewage contamination, and that the evil is sufficiently grave to demand a remedy. The measures which have been suggested and considered are: (1) Purification of all sewage before its discharge into tidal waters; this cannot be relied on, inasmuch as the purified effluent of sewage must be regarded as potentially dangerous. (2) Seizure of unwholesome shell-fish; this is practically unavailing, as there is nothing characteristic in the appearance of shell-fish which has been exposed to sewage contamination. (3) Supervisory control of the beds, etc., in which shell-fish are laid.

The Commission are strongly of opinion that the only effectual way of dealing with the evil is by setting up a competent authority to control all tidal waters, with power to prevent, where necessary, the taking of shell-fish for human consumption, and to enforce restrictions concerning the waters, beds, layings, etc., in which shell-fish are fattened or stored. This controlling power should, it is recommended, be vested in the Rivers' Boards, the creation of which was proposed in the third report of the Commission, and suggestions are now made as to the procedure to be adopted by such controlling authorities. With regard to foreign shell-fish the Commission thinks it would be a sufficient precaution to require a guarantee from the exporting Governments, somewhat similar to the certificates at present issued by the American and Dutch authorities relative to the oysters which are despatched from their countries.

Of great importance and interest is the volume of reports made to the Commission by Dr. A. C. Houston on the bacteriological examinations carried out on their behalf. More than 300 folio pages, with a great

number of diagrams and maps, are necessary to give the results of the labours of Dr. Houston and his assistants, yet so admirably planned that clearness and ease of reference are secured. The work may almost be designated a treatise on the scope and limitations of bacteriology in its application to the subject in hand, while Dr. Houston is to be congratulated on the manner in which he has given us the facts arrived at without in any great degree allowing the present inadequacies of bacteriology to be obscured by any "enthusiasm of results."

Bacteriology of Oysters.—Over a thousand oysters have been examined from various layings, and nearly all of them contained the *B. coli communis* or other *B. coli* closely allied to it. The numbers per oyster varied from 10 to 10,000, being as a rule very much smaller in the case of oysters stored in pure waters than in those from polluted beds. The *B. enteritidis sporogenes* was also found in oysters, and sometimes in those from beds of first-class purity judged topographically.

Comparing oysters from apparently unpolluted layings in the Helford River with those from obviously contaminated waters of the Penryn River, Dr. Houston's results may be roughly summarized as follows:—

	Helford River, (pure water).	Penryn Oysters, (polluted).
No. of oysters containing 1,000 or more coli or coli-like microbes per oyster	12 per cent.	96 per cent.
No. of oysters containing 100 or more spores of <i>B. enteritidis sporogenes</i> per oyster	4 ..	88 ..

The above results refer to the whole contents of the shell, the liquor and cut-up body being mixed together. From other experiments it would appear that the number of coli per unit of volume is greater in the stomach-contents of the oyster than in the shell-liquor.

With regard to the waters overlying the oyster-beds a parallel investigation gave the following results:—

	Helford River waters (pure).	Penryn River waters (polluted).
No. of samples containing one <i>B. coli</i> per c.c.	32 per cent	84 per cent
No. of samples yielding positive result when tested for <i>B. enteritidis sporogenes</i> in 10 c.c.	None	56 ..

Examination of deep-sea oysters and of sea waters remote from sewage pollution showed that *B. coli* and *B. enteritidis sporogenes* are absent or seldom detectable.

The Commission recognize that at present no bacteriological standard can be accepted, that it is impossible by such means to attempt to condemn shell-fish in the market, and that bacteriological results must be interpreted in the light of topographical examinations. They are hopeful, however, that a way will eventually be found of defining the elements of danger, and to this end they are in favour of further research.

Thames Estuary and Water Supplies.—Dr. Houston's report deals at great length with several other interesting investigations having a bearing on the important questions of water-borne disease and the pollution of estuarial waters. A great amount of work has been expended on the

examination of the River Thames above and below London, and of some of the metropolitan water supplies. The bacteriological character of the river water above the intakes near Sunbury and Hampton is shown to be bad, while the results yielded by the filtered waters afford food for reflection. As regards the pollution of the estuary by London's enormous effluent and sewage-sludge, it appears that the natural purifying agencies are such that after a flow of some twenty-five miles the water is practically unobjectionable from a bacteriological standpoint.

Sewage Treatment.—Some very convincing experiments are described showing the easy passage of pathogenic microbes through sewage-filters which, judged by ordinary chemical and practical standards, were giving satisfactory effluents. These experiments, carried out on the Ducat continuous filter at Hendon and on the Cameron installation at Leeds, consisted of the inoculation of the sewage with *B. pyocyaneus* (the bacillus of green pus) and its subsequent isolation from the effluent. At Hendon the microbe appeared in the filter effluent within ten minutes of the start of the experiment, and though the filter eventually got rid of it, the bacillus continued to pass through (presumably in decreasing proportions) during the five hours over which the experiment was continued. Somewhat similar tests were made at Leeds, with the result that the bacillus appeared in the effluent from the septic tank two hours after inoculation of the sewage, and was still present at the end of twenty-four hours. The effluent from each of the six contact beds also yielded the *B. pyocyaneus* at the earliest possible opportunity, and on the fourth day the microbe was still present. At each place previous control experiments demonstrated that this organism was absent from the normal sewage, while subsequent tests show that it ultimately was got rid of after its experimental introduction.

It is pointed out that these results in no way imply that the sewage works referred to are not yielding chemically satisfactory effluents fit for ordinary rivers, but they certainly indicate that the effluents from septic tanks, contact beds, and continuous filters may be associated with danger to health if discharged into *drinking-water* streams.

It will be gathered that the interest attaching to this and other sections of the report is not by any means limited to the special question of shell-fish contamination. Many of the facts cannot fail to have a much wider application, and the whole of Dr. Houston's contribution must form a valuable addition to the literature bearing on water-borne disease in general.

UNVENTILATED GAS STOVES.—In a discussion on coal-gas poisoning in the State Medicine section of the Royal Academy of Medicine in Ireland (April 22nd, 1904). Dr. Delahoyde expressed the opinion that a good deal of the ill-health among the working classes was to be put down to the use of penny-in-the-slot meters and gas cooking stoves not connected with a flue.

HOMES FOR INCURABLE CONSUMPTIVES.—At Kirkintilloch, Dumbarton-shire, has been opened the Lanfine Home for incurable cases of consumption. The donor, Miss Martha Brown, recognizing that the ordinary sanatorium could only be of use in cases in the first stage, felt that there was a need for homes for advanced cases who were liable to become centres of infection:

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1836. RECONSTRUCTED, 1888. INCORPORATED, 1891.

Northern Branch.—An ordinary meeting of the Branch was held in Dr. Armstrong's office, Newcastle-on-Tyne, on the 22nd April, when the following members were present, viz., Dr. Jackson (Chairman), Drs. Stainthorpe, Thomas Wilson, Boyd, Trotter, Mostyn, Renney, and Taylor.

Resolved, that the Branch considers July 2nd a convenient date on which the Provincial Meeting of the Incorporated Society should be held.

Resolved, that the selection of a suitable place of meeting, and the local details, be left with Drs. Hembrough, Armstrong, and Taylor.

Resolved, that the Secretary expresses to the relatives of the late Dr. Hepburn the sympathy of the Branch at the loss sustained through the death of Dr. Hepburn.

Dr. Stainthorpe read a paper on "The Teaching of Hygiene: Some suggestions," and a discussion ensued.

Yorkshire Branch.—A Meeting of this Branch was held in the Library at the County Hall, Wakefield, on Friday, April 29th, 1904. Dr. Scatterty, in the absence of the President, occupied the Chair. There were also present: Drs. Neech (Halifax), Moore (Huddersfield), Gibson (Wakefield), Housley (Retford), Riddell (Rotherham), Smith (York), Porter (Leeds), English (Swinton), Burman (Wath-on-Deane), McLean (Doncaster R.), Sourfield (Sheffield), Hunter (Pudsey), Forayth (Birstall), Mitchell Wilson (Beverley), Milburn (Wakefield), Craig (Thurnscoe), Angus (Bingley), Anderson (Wortley), Lambert (Farsley), J. Spottiswoode Cameron (Leeds), and J. R. Kaye (*Hon. Sec.*, Wakefield).

A discussion on the "Practical Difficulties in the Restriction of Diphtheria in its Epidemic Form" was opened by Dr. Scatterty, in a short paper in which he ably described the difficulties he had had to contend with at Keighley since 1898, with regard to Diphtheria.

The next item on the programme was "Epidemic Jaundice." Dr. Craig, of Thurnscoe, gave a very detailed and interesting history of a localized outbreak amongst a population of 6,000. Altogether he treated 252 cases, so that it might be reckoned that 1 in 20 suffered from the disease. He was of opinion that the disease was spread by personal contact, assisted by damp houses and sloppy yards.

Then followed some remarks upon "Miner's Disease, (ankylostomiasis)." *Tuberculosis Animals Compensation Bill.* Dr. Kaye, the County Medical Officer, strongly urged opposition to the Bill, and amongst other things pointed out:—

1. That the Bill was not intended for the benefit of the public, and therefore the public ought not to be asked to contribute.
2. That the meat trade, like all others, ought to incur the risks incidental to the trade.
3. That compensation would not decrease tuberculosis, and the money proposed to be spent on compensation would be far better utilized in the improvement of cowsheds.

4. Such a Bill would tend to remove the stimulus to proper trading, and there would be a danger of creating speculative trade in low grade animals.

5. The Bill was impracticable, e.g., the markets just inside the borders of the County would render the County Council liable for animals which had only been a few hours within the county. Moreover, there would be incessant wrangling as to the appearance of the animal before slaughter, and it appeared absurd that a Magistrate should be asked to give his opinion as to the condition of a live animal, having only the carcass to judge from.

Dr. Cameron, of Leeds, was of the same opinion, but thought that if anything could be done to promote an improvement in cowsheds, some compensation might be given on that condition.

The following resolution was then passed, "That this Meeting of the Yorkshire Branch of the Incorporated Society of Medical Officers of Health is strongly opposed to the principle of the Tuberculosis Animals Compensation Bill, 1904, as at present drafted."

The Honorary Secretary then drew attention to the report of Dr. Bruce Low, of the Local Government Board, on the arrangements made in Germany for the isolation of smallpox, and also the Fourth Report of the Royal Commission on Sewage Disposal, particularly with regard to the contamination of shell-fish.

West of England and South Wales Branch.—On Thursday, 17th March, this Branch paid a visit to Hereford. Dr. Herbert Jones, Medical Officer of Health for the combined sanitary district, with Mr. H. Cecil Moore, Medical Officer of Health for the city, and Mr. J. Parker, C.E., City Surveyor, gave the members a hearty welcome. Brakes and other conveyances were in readiness at Barr's Court Station to convey the party to various places in the city prior to their assembling at the Guildhall for the formal meeting. There were present: Drs. Tubb Thomas, J. M. Martin, Read, Symons, Darcy Ellis, Thomas (of Merthyr), Robinson, J. Howard-Jones; Mr. C. J. Waterfall, Analyst of Bristol; Mr. A. P. J. Cotterill, M.I.C.E., Bristol; Dr. C. S. Morrison, Supt. of Burghill Asylum; Councillor H. Rogers, Chairman of the Sanitary Committee, Hereford; Councillor W. Hewitt, Chairman of the Electric Lighting Committee; Councillor E. C. Gurney, Chairman of the Estates Committee; Mr. H. Ronalds and Mr. E. Shaw, members of the Hereford Rural District Council; Mr. H. E. Jones, member of the Abbeydore District Council; Mr. S. Prothero, Sanitary Inspector, Hereford; Mr. J. Pember Weobley; the Rev. C. A. Treherne, of Hereford, and others.

The party were first taken to the slaughter-houses, in Stonebow Road, and, after some inspection of the yard and buildings, were much interested in the explanation of Greener's Killer for the slaughter of cattle, which is used to some extent here. It is an instrument containing a small cartridge, which is placed against the forehead of the animal. Mr. Parker, in the Corporation Yard, afterwards showed in operation a rotary sludge elevator, used in sweeping the streets of the city. The Sewage Works at Eign were next visited, then St. Owen's Gate Dwellings and the Water-works.

On arrival at the Guildhall at half-past three, for the purpose of holding a business meeting, the members were received by the Mayor (Alderman Beddoe) and several members of the Corporation, and others who had been unable to accompany the party during the day.

The business on the agenda included the reading of two papers, one by the City Surveyor (M. J. Parker) on Municipal Undertakings in Hereford, with special reference to the system of sewer ventilation by means of gas destructors, and one by Dr. Moore, the Medical Officer of Health, entitled "The Jubilee of the Hereford Improvement Act, 1854."

After votes of thanks had been passed to these gentlemen, the President briefly but sincerely expressed the thanks of the members to the Mayor and Corporation in allowing them to visit the various public institutions, adding that all had much enjoyed the time they had spent in Hereford. He moved a formal vote of thanks to them.

Dr. Martin seconded, and it was carried.

The Mayor, responding, remarked that their thanks were especially due to the City Surveyor, who had done such excellent work for the city, and who was held in the highest esteem by the members of the Corporation and citizens for his great abilities. They were also indebted to Dr. Cecil Moore, who also had displayed marked ability and energy in his position as Medical Officer of Health.

GOATS AS A SOURCE OF MILK.—Sir James Crichton-Browne, in his presidential address to the Sanitary Inspectors' Association, draws attention to the desirability of fostering the use of goats as a source of supply of milk. In many counties devoted to the dairy industry, the villagers and cottagers can get no cows' milk, as it is all sent to the large towns. A goat can be cheaply kept, and will provide milk under the most varying conditions. In Ireland, the keeping of goats among the small peasantry is said to be on the increase.

STAGES OF PULMONARY TUBERCULOSIS.—The Committee on Nomenclature of the American Climatological Association has suggested (*Med. News*, April 30th) the following classification for cases of pulmonary tuberculosis:—
Incipient.—Slight physical and subjective signs, with history indicative of pulmonary tuberculosis. Sputa, if present, without bacilli.

First Stage.—Definite physical signs of localized infiltration; total involvement less than half a lobe, whether at one or more points; cough and expectoration with bacilli; constitutional symptoms slight. (In disseminated cases expectoration and bacilli may be absent, with constitutional symptoms more severe).

Second Stage.—Infiltration of single or multiple areas approaching or equal in amount to one lobe; or smaller area in stage of softening; cough and expectoration with bacilli; constitutional symptoms severe.

Third Stage.—Infiltration in excess of one lobe, or if less in stage of well-developed excavation; more severe constitutional symptoms. They also suggest a classification of results of treatment as follows:—

Progressive.—All essential symptoms and signs continue unabated.

Quiescent.—Constitutional symptoms slight or entirely absent; physical signs improved or unchanged; cough and expectoration with bacilli still present.

Arrested.—Absence of all constitutional symptoms; expectoration and bacilli still present; physical signs may or may not persist; foregoing to have existed for at least three months.

Apparently cured.—All constitutional symptoms and expectoration, with bacilli, absent for a period of two years under ordinary conditions of life.

CURRENT PUBLIC HEALTH LITERATURE.

Transactions of the Highland and Agricultural Society of Scotland. FIFTH SERIES. VOL. XVI.

Influence of Food on Milk. A. B. Graham.

Rural Depopulation in Scotland. J. W. Paterson.

Anthrax Precautions necessary to be taken. F. N. A. Marshall.

Milk Records. John Speir. (This is the first report resulting from a decision of the Society to assist local societies for the purpose of having tests of milk produce carried out systematically, with a view to the elimination from herds of cows of animals which are not paying. The present report deals with 1,800 cows of the Ayrshire breed during a period of six months. Comparison was made between the 10 best and the 10 worst cows in each herd, and even with the latter the legal standard for milk was more than complied with. The point was also clearly settled that skilled milkers get more and better quality milk than the unexpert).

La Presse Médicale.

(February and March). Each issue contains articles dealing with the decrees as to the provision of special hospitals for consumptives in Paris.

(No. 24, 28rd March.) Variations in Body weight in the course of Scarlet Fever. MM. Garnier and Sebaréanu.

Semaine Médicale, VOL. XXIV.

(No. 6.) Isolation of Tuberculous Patients in French Hospitals.

(No. 7.) Comparison of Mortality in Russian, French, and German Armies, 1889-1900. (Abstract).

(No. 8.) The Role of Animals in the Propagation of Tuberculosis and other Transmissible Diseases. L. Bard (Lyons.) (He thinks this factor is rather over-estimated at present).

Preservation of Milk with Formalin from the standpoint of Science and Law.

"La Clinique Infantile." PREMIÈRE ANNÉE, No. 1-4 (PARIS), 1903.

(Issued Bi-monthly.)

(No. 1.) La Goutte de Lait; Aperçu historique, Fonctionnement. Dr. G. Variot. (An illustrated article on public installations for supplying milk).

(No. 2.) Some Cases of Relapse in Scarlatina. MM. Richardière and Kaufmann.

(No. 3.) Statistical Study of the Mortality from Tubercular Meningitis. Dr. G. Variot.

(No. 3.) La Goutte de Lait de Saint-Pol-sur-Mer.

SECONDE ANNÉE, 1904.

(No. 1.) L'avenir des Gouttes de Lait dans les Centres Industriels. Dr. G. Variot.

(No. 2.) Infantile Mortality at Boulogne-sur-Mer; two aggravating factors. Dr. Chislain-Houzel.

Model dairy attached to the Goutte de Lait at Rouen.

(No. 8.) Statistical Study of the Mortality from Measles in the New Pavillion of the Hospital des Enfants-Malades in 1908. Dr. G. Variot.

(No. 4.) The Choice of Milk for Artificial Feeding: the useful and the harmful degrees of dilution. Dr. G. Variot.

(No. 6.) The Benefits of Maternal Feeding of Infants. The essential rules of Artificial Feeding. A popular lecture to mothers. Dr. G. Variot.

(No. 8.) The Goutte de Lait at Rouen. Raoul Brunon.

Reflections on Infantile Atrophy and the "gouttes de lait."

Münchener Med. Wochenschrift, Vol. LI.

(No. 8.) Koplik's Spots, Diazo-reaction, and Fever in Measles. O. Müller. Prognostic Significance of the Pulse in Tuberculosis. S. Sterling. (A normal pulse is a favourable sign; a regular acceleration in a febrile condition is a bad sign, and has special significance in the early stages of the disease.)

(No. 4.) Vaccination in Bavaria. L. Stumpf.

(No. 6.) Glass Blowing and Lung Disease. Pretti. (Emphysema is not met with oftener than usual, but there is an unusually large proportion of tuberculous lesions.)

(No. 7.) Improved Tests of Chemical Disinfection. G. Bellei.

Surgical Interference, as an aid to the Healing of Apical Lesions. A. Hofmann. (Freund noticed that the first costal cartilage was exceptionally short and rigid in 80 cases of pronounced tuberculosis, while in the healed cases there was a movability amounting to an actual joint formation in some. He, therefore, suggested the severing of the first costal cartilage to give the lung more space, in cases of recurring apical affections. Hofmann's experience has confirmed these assertions, and he even goes beyond Freund in advocating the severing of the cartilage as a still earlier precaution, not waiting for the disease to progress to such lengths. He also states that the joint can be made as far along as at the junction of the cartilage and rib. The benefits of the chondrotomy are not restricted to abnormally short cartilages, but the operation is destined to aid in every case, as air and oxygen can reach the apex more freely, and the lung can expand better and aspirate larger quantities of blood into the apex.)

Centralblatt f. Bakteriologie. Vol. XXXV.

(No. 1.) Behaviour of Various Tissues of Animal Organism in Respect to Tetanus Toxin. Ignatovsky.

Successful Attempts to Exterminate Mice by Means of Bacillus Cultivated from the Marmot. S. S. Mereshkowsky (St. Petersburg.) Corroborated by official experiences in Japan.

Study of Poultry Diseases. Calamida.

Colour Differentiation of Typhoid Colonies. S. Endo.

Disinfecting Power of Painted Walls. G. C. Ghiglione (Genoa.)

(No. 2.) The Streptothrix Lingualis in the Mouth in Health and in Diphtheria. A. Bajardi (Rome.)

Gas-forming Bacteria. A. Schittenhelm and F. Schröter.

Bacteriology of Para-typhoid. H. Kayser.

Behaviour of the Tissues in respect to Tetanus Toxins. A. Ignatovsky.

Anthrax Bacillus in Domestic Animals. J. Bougert.

The Diphtheria-Toxin Curve. F. Murillo.

The Bacterial Content of the Milk Ducts of Cows, Goats, and Sheep. O. Uhlmann. (He found numbers of bacteria and streptococci constantly present.)

Natural and Artificial Immunity to Anthrax. O. Bail and A. Petterson.

Disinfection with Russian Naphtha. J. Kupzis. (The alkaline by-products said to possess high disinfection power. These products diminish in power in proportion as their boiling point rises.)

Cultivation of Bacteria in a Native Mucoid Solution. L. Langstein and M. Mayer.)

Wiener Klinische Wochenschrift, Vol. XVI.

(No. 50.) Differentiation of Cholera Vibrio. R. Kraus. (The cholera vibrio does not produce hæmolysins, while all the other allied vibriones do produce them.)

Pseudo-Diphtheria Bacilli. J. Schwoner. (He separates these bacilli into two groups; one includes the Hofmann bacillus and the other the xerosis and Pfeiffer urethra bacilli.)

Bacterio-Hæmolysins. R. Volk and B. Lipschütz. (They claim existence of lysinoids, the result of the decomposition of lysins, partaking of the nature of a virulent toxin. They announce that it is possible to induce effectual immunization with these toxoids.)

(No. 52.) Improved Technique of Sputum Examination. J. Sörgo. (He breaks up the sputum with hydrogen dioxide and alcohol and then centrifugates. The sediment is not examined, but the supernatant fluid is decanted, mixed with equal parts of lime water, and centrifugated again. This sediment is then examined for bacilli as usual. By this double sedimentation a much larger proportion of bacilli is saved for the microscope, and they are preserved in better shape than by other methods. He describes the technique in detail.)

Vol. XVII.

(No. 2.) Preventive Serum Treatment against Diphtheria. K. A. Zuppinger. (Out of 1,000 children exposed to diphtheria and treated by preventive injections of antitoxin, only 18 developed the disease later. Of this number 11 had evidently already contracted the disease, as the symptoms developed almost at once. There were thus only 7 cases in which the preventive injections failed to protect, and some of these had extenuating circumstances.)

Zeitschrift für Hygiene und Infektionskrankheiten.

Vol. XLVI. HEFT I.

- Contributions on the Preparations of Nutrient Media and Culture of Bacteria. Dr. Med. Gust. Hesse (Dresden). (This is an enquiry into the changes injurious to bacterial growth, which nutrient media undergo during preparation and sterilization; their causes and the methods of prevention.)
- The Ætiology, Incubation Period, and Clinical Phenomena, in an Epidemic of Typhoid. Dr. Priefer (Reports of 8th Army Corps.) (This is an account of an epidemic of typhoid which broke out suddenly

in the last half of February, 1902, in the 2nd battalion of the infantry regiment. The majority of the cases occurred between the 17th and 20th of this month, about which time 80 men were reported ill with similar symptoms, viz., those of typhoid. The outbreak was traced to a man, who, in the first half of January went on leave to Godendorf, a village on the Luxembourg border, where typhoid epidemics were frequent, the last of which was in November, 1901. This man was known to be ill on January 27th with diarrhoea, but did not report himself till February 18th, when increasing weakness compelled him to do so.

The outbreak occurred in a building of the barracks four stories high, including a basement, occupied by the 2nd battalion. It was shown that the soil-pipe of the w.c. on the first floor three or four weeks previous to the outbreak had been stopped, and that the soil in consequence of a crack in the pan of w.c. had percolated the neighbouring wall and ceiling, and come in contact with a defective supply-pipe of the w.c. flush on the ground floor. The man who was ill first was known to have used this w.c. about the time of the stoppage.

From this defective supply-pipe the *materies morbi*, as was proved by experiments with a solution coloured with methylene blue, made its way into the water-pipes of the building, which supplied the ordinary taps for drinking and culinary purposes.

The mechanism of the entrance of the poison into the water supply was as follows:—

The barracks are situated on a hill facing the town of Saarbrücken. On the hill behind them is the large water reservoir which supplies both the barracks and the town. Owing, however, to the height of the former the upper stories do not receive a constant supply on those days (viz., Saturday and Wednesday), when owing to increased use of water in the town the level of the reservoir is lowered. As a result negative pressure occurred in the water pipes supplying the upper stories, and this was only relieved by emptying the cistern on the top, when it was found that air was sucked in, and the water not replaced. It was experimentally proved that in these circumstances coloured water was actually sucked up into this pipe through an experimental opening made into it just below the supply pipe of the ground floor flush cistern, which was defective at the time the pan of the first floor w.c. was leaking.

From enquiries into the movements of the first case, the date of the pollution can be fairly accurately ascertained, and the incubation period of the remaining cases calculated. This may have varied owing to the difficulty of determining the actual date of commencement of the illness; but despite this the author considers that it was from thirteen to fourteen days.

After dealing with the etiology, he analyses the clinical symptoms, which were practically those of ordinary typhoid, and deals fully with the bacteriological aspect. The bacillus does not appear to have been the true bacillus of Eberth, but a variety, as was shown by systematic agglutination tests.

3. On Bacterial Hemolysin and Anti-Hemolysin. 4th communication. Drs. Kraus and Lipschütz (Vienna.)

4. In what Relationship do the Clinical Affections of Meat-Poisoning and Para-Typhoid stand to one another? H. Trautman (Hamburg.) (He concludes that meat-poisoning is an extremely acute, and para-typhoid a more sub-acute manifestation of an etiologically uniform infectious disease.)
5. The cancer mortality in the Petersburg City Hospital, from 1890 to 1900. A. Maunilow.
6. Clinical and Experimental Studies on the Etiology and Pathogenesis of Yellow Fever. Ivo Bandi (Brazil.) (This is a long article on the above subject, in which the author endeavours to substantiate the claims of the bacillus *icterohæmolyticus* of Sanarelli, as the cause of yellow fever. He calls in question the rôle played by mosquitos, and states further that "innumerable writings" prove clearly and distinctly that the poison is conveyed by men, clothing, and in goods. The results of his experiments and enquiries are at complete variance with those obtained by the American physicians in Cuba, and later by the French mission sent to Brazil (recorded in the *Annales de l'Institut Pasteur*, 1903.)
7. Comparative Enquiries on the Bactericidal and Growth-retarding Properties of the Alcohols of the Methyl, Ethyl, Propyl, Butyl and the Amyl series. Geomund Wirgin (Stockholm.)

His general conclusions are:—

- (a) That as regards their disinfecting capabilities the alcohols range themselves according to their molecular weights, methyl alcohol being the weakest and amyl the strongest. The tertiary alcohols furnish exceptions to the rule. Tertiary butyl alcohol acts more weakly than propyl, and tertiary amyl alcohol weaker than the butyl alcohols.
- (b) The isomeric normal, and iso-alcohols of the propyl and butyl series, approach one another in their disinfecting power.
- (c) The ability of alcohols to dissolve the red blood corpuscles of rabbits varies with their molecular weights.
- (d) On dried micro-organisms, the methyl-series acts best in a water solution of 60% to 70%; in the ethyl series in a 60%; and in the propyl series in a 80%.
- (e) All the alcohol mixtures act better than a 1% solution of acid carbol. and approach more nearly to the power of a 3% solution.
- (f) None of the alcohols destroy spores at the ordinary room temperature.
- (g) All absolute alcohols are almost inactive towards dried micro-organisms. The same applies to the highest concentrations of the watery solutions.
- (h) On damp micro-organisms the highest concentrations of the watery solutions of the alcohols, appear to act as strongly as the medium concentrations.
- (i) The most active alcohol mixtures surpass considerably some of the weaker antiseptics, such as 4% Acid Boric, 4% Borax, 4% Pot. Chlor., 2% Pb. Acet, 2% Zn. Sulph., 2% Cup. Sulph.
- (j) Under certain conditions (on pyogenic organisms dried in serum), the alcohols have stronger disinfecting power than 2% Hyd. perch. and 5% Formalin sol., which circumstance depends on the greater

penetrating power of the alcohols. Under the conditions mentioned they approach in power a 2.5 % solution of Cresol, a 1 % of Iodin. trichlor. and a 5 % of Acid carbol., without however reaching the disinfecting power the last named solution.

8. A Case of Peri-Uterine Exudation caused by a hitherto unknown Bacillus. Drs. K. Kisskalt and Herm Pape (Giessen.)
9. Experimental Contributions to the Theory of Immunity. Dr. Carl Brock (Berlin.)
10. On Influencing the Agglutinability of Bacteria, especially of Typhoid Bacilli. Dr. Fritz Kirstein (Breslau.)
11. Agglutination of the *Micrococcus meleusensis*. Fr. Konrich (Berlin.)
His conclusions are that:—
 1. The normal animal sera have none, or very slight, influence in the agglutination of this micrococcus.
 2. Many normal sera of men agglutinate it in a dilution of 1-500. Therefore this test for Malta fever must be accepted with reserve and many precautions.
12. The Question of Auto-Infection. W. Wladimiroff (Institute Pasteur.)
(This is a discussion on the question of auto-infection and bacterio-infection in the puerperal condition. The second part of the paper details the results of experiments on pregnant guinea-pigs and rabbits, to find out how long pathogenic microbes can exist in the vagina before and after parturition, and what influence the vaginal secretion has on their growth. The general conclusion seems to be that the secretion of the vagina tends to inhibit the growth, and finally to destroy pathogenic bacteria, e.g. anthrax, by phagocytosis, but that injury to the passages can cause infection from bacteria existing previous to parturition.)
13. Yeasts which Ferment Milk Sugar. Dr. Bethold Heinge and Erch Cohn (Halle.)

CAUSES OF INFANT MORTALITY.—Prof. Glaister, at a meeting of the Glasgow Medico-Chirurgical Society (March 4th), divided the causes of infantile mortality into (a) unavoidable, (b) preventable. Unavoidable included (1) premature birth, (2) injury at birth, (3) congenital defects, etc. Some of the above causes were the result of the marriage of people in poor health. Preventable causes were chiefly (1) insanitary domestic surroundings; (2) vicious and objectionable habits and modes of life of parents; (3) effects of parental poverty; (4) occupation of mothers during the early months of child nursing; (5) wilful or compulsory abstinence on the part of mothers from nursing their offspring; and (6) physical unfitness of mothers for that duty. As preventive measures, he recommended that child-bearing mothers employed in certain industries should not be allowed to resume work until the completion of a full month after delivery, and greater care should be exercised during the later months of pregnancy. In considering this problem, due weight must be given to the potent influence of alcoholism, syphilis, and tuberculosis. Mothers should be supervised by women inspectors in poorer districts. Municipal crèches should be established, also municipal depôts for the supply of pure milk.

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JULY, 1904.

EDITORIALS.

THE LOCAL GOVERNMENT BOARD AND PUBLIC HEALTH.

THE report of the Parliamentary Committee appointed to consider the position and duties of the Board of Trade and the Local Government Board, was issued on June 13th. The Committee appears to have had under consideration a suggestion by Sir Michael Foster to the effect that the whole of the matters at present dealt with by the Local Government Board, in regard to public health, should, in future, be entrusted to a special staff under the direction of a Parliamentary Secretary, and of a Permanent Secretary for Public Health. The suggestion was put forward principally on the ground that the work of the department was so heavy that the staff had not time to "look adequately ahead." In the opinion of the Committee, however, such a separation of duties would in practice be attended by considerable difficulty. They also consider it probable that the questions connected with public health which come before the Board (other than those which require the personal consideration of the President) would not be sufficiently numerous to occupy the time of an additional Parliamentary Secretary. The Committee also draw attention to the fact that under the existing system, the President has the advantage not only of the professional opinion of the Medical Officer of the Board, but also of the general administrative experience of the Permanent Secretary. They consider that this advantage would be materially diminished, if not entirely lost, under the arrangement suggested by Sir Michael Foster, and are therefore not prepared to recommend the adoption of the proposal.

PREVENTIVE MEASURES IN RELATION TO SMALL-POX.

WE publish in the present issue a paper purporting to deal with what has been called the "Leicester method" of dealing with small-pox. We do not propose to deal at any length with the subject, as the paper in question contains within itself refutation of most of the fallacies into which the author has fallen. In writing a paper of this kind, it is absolutely necessary that sufficient and proper premises be obtained, before any attempt can be made to deduce arguments therefrom, and a further necessity is a thorough grasp of statistical methods. We can make a shrewd guess as to what was the original intention of Dr. Millard, but if it were not that he has a paragraph or two in which he expressly states he thinks general re-vaccination is too drastic a remedy, one might almost conclude he was advocating this measure in his paper, and that its proper heading should be "A Plea for Re-vaccination," rather than what it is.

Shortly, Dr. Millard says that Leicester is a very badly vaccinated town, and that the authorities there can control small-pox without the aid of general vaccination, better than other towns, by what has been called the "Leicester method."

Now, we are not prepared to admit that either of these propositions has been proved. Is Leicester such a badly vaccinated town? Since 1898, some twelve or fifteen thousand children seem to have been vaccinated there, and we have even heard of adult residents taking the opportunity of a visit to neighbouring towns to be re-vaccinated.

Whether Leicester be well or ill vaccinated, however, need not trouble us; let us see what the results are of the so-called "Leicester method." Leicester is protected to a large extent by its inland position; it is not exposed like Liverpool or Glasgow, and other seaport towns, to the constant risk of imported cases. It is an inland town far removed from such influences, so that should small-pox be introduced it ought to be quite a simple matter to check its spread. Dr. Millard says the outbreak stopped in 1903, but the weekly returns show that even yet it is going on. Dr. D. S. Davies, the Medical Officer of Health for Bristol, comparing that town with Leicester, says that while Bristol is not so well vaccinated as Leicester, "In the first six months of 1903 small-pox was introduced into Bristol on sixteen occasions—that is, on an average, oftener than once every fortnight—but was kept under absolute control by common-sense methods, and only caused three deaths. In Leicester during the same period, under the operation of the 'Leicester method,' small-pox assumed epidemic spread, and caused more than 300 cases and 21 deaths—i.e.,

seven times as many deaths as in Bristol, although Leicester is a comparatively small town of 220,272 persons."

Evidently, then, whatever method they pursue in Leicester, it cannot be called a successful method.

Dr. Millard suggests that in the old days small-pox was not so fatal in unvaccinated people as it has been in late years among the same class. He comes to this conclusion from an outbreak of a very mild type of disease. There is no evidence to support such contention; on the contrary, all the evidence available is against him. Warrington furnishes a useful comparison in this respect, as we have a very complete account furnished by medical men* of the conditions existing at the end of the eighteenth century, and we can get therefrom a clear picture of small-pox uninfluenced by vaccination or other sanitary measures. Then, as now, the death-rate of unvaccinated persons was between 30 and 40 per cent of those attacked, and moreover it was never absent. The bills of mortality of other places all tell the same story.

Finally, we are forced to conclude from careful consideration of the whole subject, that Leicester has no occasion to boast of the manner in which she deals with small-pox.

SCHOOL TEACHERS AND HEALTH NURSES.—It appears that the public school principals and the nurses employed by the Board of Health in New York do not get on well together. The school principals do not always approve the methods of the nurses, and the nurses have declined to receive instructions from the school authority on the ground that they are responsible only to the Board of Health. The upshot of the matter is that the City superintendent has sent a letter to each of his school principals pointing out that the work of the nurses benefits not only the children and the community, but also the principals of schools, because the nurses, if given proper opportunity, can aid the principals in maintaining a high percentage of attendance. He therefore begs that the latter will co-operate with the nurses in the proper discharge of their duties.

MINERS' PHTHISIS.—Mr. T. J. Britten, formerly manager of the Wolhuter Gold Mines, has been awarded the first prize of £500 and the gold medal offered by the Transvaal Chamber of Mines for the best appliance for the prevention of miners' phthisis. Miners' phthisis is caused by the inhalation of the fine particles of angular dust given off in the process of metalliferous mining, and so serious is the evil in the Transvaal, that the death-rate among white miners from this cause alone is said to be 70 per 1,000.

When the quartzite is drilled and blasting takes place, the atmosphere is filled with these particles. The suggested remedy is damping the dust by means of a water jet while drilling is in progress and while the blasting is taking place.

* Transactions of the Royal Society, quoted by Dr. James Wallace in "Small-pox, how it is Spread and how it may be Prevented." 1902.

THE PHTHISICAL CONSTITUTION A DIETETIC DISEASE*.

By A. W. MARTIN.

Medical Officer of Health, Gorton.

IN the course of a lengthy paper, statistics of the disease were entered into both for this and other countries, and a comparison of its mortality with other diseases also made. Its universal distribution was commented upon, as having brought forth the statement "Half the human race has tubercles and lives without knowing it." Also whether the disease was transmissible from animals to man and from man to animals, at present being a debatable point and under investigation. The generally accepted view of the present day regarding phthisis was that the tubercle bacilli had become the one fixed fact in the pathology of the disease, the acknowledged centre about which all the phenomena revolve; "the study of the etiology of tuberculosis has become that of the life history of the bacillus; the symptomatology becomes the effects of the bacillus in the body; the definite diagnosis becomes the recognition of the bacillus in the discharges or the tissues; and the therapeutics become resolved into the use of agents which destroy or prevent its growth" (*Med. Ann.*, 1894). "Other views than these are now looked upon as obsolete lumber," (*Med. Sci.*, Sept. 2, 1893).

On the other hand questions relating to predisposition—susceptibility and soil—have been much discussed of late. Nothing can be more evident in medical literature than that the tuberculous question is assuming a new aspect. There is every indication of a return to some of the ideas which existed in medicine before the announcement of the discovery of the tubercle bacillus. Opposition is being raised in various quarters, to the present-day tendency to attribute to the tubercle bacillus the whole and only influence in causing tuberculosis. Many able clinicians in various parts of the world do not believe that it has been proved that the tubercle bacillus is the only cause of phthisis.

The least impartial must confess that tuberculosis is not contagious for all men alike, but broadly speaking only to those who, as it is expressed, have a predisposition towards the disease. Tuberculosis is contagious under special conditions only; a special predisposition is acquired unless it has been inherited. The clinical evidence of

* Abstract of a paper read before the North Western Branch of the Incorporated Society of Medical Officers of Health, March 18, 1904.

contagion has always been weaker than the experimental, and has accounted for the fact that medical men have reluctantly accepted the idea that phthisis should be classed amongst the diseases which are undoubtedly and demonstrably contagious. Dr. Ransome even classifies it as one of the filth diseases.

The almost universal distribution of the bacillus of tubercle, and the accumulating evidence that it possesses a spore form in which it may remain active for a long time outside the animal body, and has great powers of resistance, renders it reasonable that we should for practical purposes neglect contagion as a means of diffusing the infection. The limitations of the contagion are such that few of those who may be exposed to it are found to be favourable soil; if the contagion of phthisis were necessarily fatal, if no organism could escape it, then humanity itself would have been long since destroyed. It is hopeless to think of destroying the external sources of infection, since they are too widely distributed. We must rely chiefly on the removal of the special predisposition, and counteract the causes responsible for such predisposition.

Transmission of the disease from parent to child was dealt with at length, and statistics bearing upon it. Nocard, in his *Animal Tuberculosis*, demonstrates contagion in bovine tubercle, and Scurfield, in his translation, observes that if children of tuberculous parents were protected from infection by cohabitation or ingestion, the importance of heredity as a cause of the disease would dwindle away into insignificance.

The whole question of phthisis resolves itself into a phthisical constitution, and the tubercle bacillus; there are two factors in the causation of the disease, namely, the seed and the soil; and the soil is of much more importance than the seed.

In other words, phthisis is not one disease but two; the first is the phthisical constitution, the second is the bacillary invasion. The bacillary invasion cannot take place without the necessary constitution, and the problem of phthisis is narrowed down to the determination of the phthisical constitution, and the tubercle bacilli may be ignored altogether.

The body is built up and maintained by the mode of living of the individual, influenced by the vital potentialities transmitted by the parents, such vital qualities transmitted to the offspring having been influenced by the mode of living adopted by the parents and their ancestors. Whatever physical tendencies or qualities are inherited, they can be vastly modified by environment, either for better or for worse. Individuals inheriting the constitutional peculiarities of parents who were phthisical, are more easily and quickly influenced

and affected by the mode of living necessary for the development to that stage at which the bacillus can gain a footing in the tissues. That the phthisical constitution is a common one, is evidenced by the statement that fully one half of the human race is or has been affected by the disease; also the mode of living necessary for the development of such constitution must necessarily, if the argument be correct, be equally common. The question of phthisis, according to this reasoning, now assumes the aspect of discovering the particular mode of living which is necessary for the development of the phthisical constitution. The term "mode of living" is not restricted simply to articles of diet, but includes everything in our environment affecting us physically and mentally.

One thing which at present attracts the particular attention of sanitarians, and through them the world at large, is the importance of fresh air. It has been said that fresh air is the most important article of diet. That it is so is evident from the part it plays in the animal economy, and the astonishing amount required for life. We require but three pints of liquid per twenty-four hours, but on an average one thousand pints of air are inhaled each hour, or twenty-four thousand pints per day; its importance is more forcibly expressed by stating that one thousand pints of air are required each hour to oxygenate one thousand pints of blood, which are forced through the lungs each hour. No need for astonishment, then, that fresh air is looked upon as the one thing needful in phthisis, the preventive and the cure. But experience in the daily practice of medicine, and the close observation of a disease which is never off the list of medical men in large towns—especially amongst the working classes—forces the opinion that although fresh air is of vast importance, and the *most* important means yet discovered in combating the disease, yet it is not the end and the all in connection with phthisis; for innumerable cases occur where there has been no lack of fresh air, pointing to something else still lacking in the building of the phthisical constitution. As far back as 1887, I took up the subject of phthisis for investigation as to its causes, and began the search on the lines, if it were possible to find something, or a combination of things, which was common to every case. I went over everything which had been laid down as potent factors in the causation: occupation, clothing, localities, sites, habitation, drink, light, air, ventilation, food, inheritance, previous diseases, etc., and in each case of phthisis which came under my personal observation the patient was carefully plied with questions bearing upon the particular point I had in mind. It was during the same year I discovered what appeared to be a point of agreement in all the cases in one particular only, and that was in the proportions which the

food elements bore to each other. Bearing in mind that the percentage of food elements for the average man is; albuminous substances 4, fats 3, carbo-hydrates 12, and minerals 1, the point observed was the excess of carbo-hydrates and the deficiency of fat, the latter so much so as wherever possible to preclude it in every possible form.

The text books state that fats and carbo-hydrates are to a large extent interchangeable, and perform very similar functions in the body; the relative proportions of the two depending to a large extent on the tastes and habits of the individual, except that fats are more efficient than carbo-hydrates, one part by weight of fat being equivalent to about four parts of carbo-hydrates.

One table gives the isodynamic qualities of the different food elements as

1	gramme of	Albumin	produces	4.1	Calories.
1	"	"	Carbo-hydrates	4.1	"
1	"	"	Fats	9.1	"

(A calorie or thermal unit is the quantity of heat necessary to raise the temperature of 1 kilo (= 2.2 lbs) of water through 1° C (= 1.8° F).

The substitution of fats by an increase of 50 to 100 per cent of carbo-hydrates, continued year after year, must result in great and profound changes in the whole constitution. Carbo-hydrates and fats may be interchangeable, and perform similar functions so far as heat production is concerned, but they are not interchangeable totally. As in the case of scurvy fresh vegetables possess some quality absent in the dried form, and different vegetables possess that quality in varying proportions, so there is some quality imparted to the cells of the body built up by fat in due proportions, which is different or absent in one constructed by carbo-hydrates in excess, with a deficiency of fat, the different fats even producing different results.

What that particular quality is which is imparted to the cells, or wherein it differs from that produced by carbo-hydrates in excess, I know not except by clinical results. We see it daily in the case of hand-reared infants fed on diluted (adulterated) milk, with starchy foods, particularly with barley water—presenting an abnormally fat appearance, but rickety, and with wheezing, bronchitic chests.

My observations have now extended over a period of seventeen years, and during that time every case of consumption which has come under my care or observation has been examined upon this one particular point of diet; and the first exception to this dietetic error has yet to appear. I do not positively state that all phthisical patients object or refuse to eat fat; but what I do state is that exception has not occurred in my experience, and I have searched carefully for the last seventeen years; and the same has been the experience of some few

medical friends with whom I have discussed the subject for the purpose of enlarging the field of investigation.

Further, I do not imply that all persons in whose dietary there is a deficiency of fats will become tuberculous, just as all temperate drinkers do not become drunkards; but as all drunkards are drawn from the temperate drinkers, so also all phthisical patients are drawn from those constitutions built up with a deficiency of fat and excess of carbo-hydrates. It also gives us a clue to the reputation which cod-liver oil possesses for the prevention and cure of consumption; and the remedy prescribed in olden times for its cure, to get up in the early morning whilst the dew was on the grass and gather young snails and eat them raw, had in it the elements of fresh air and fat.

Fresh air plays an important part in the tissues of the body, in its construction, in digestion, and the maintainance of health, and its substitution by foul air is a grave factor in diseases of all kinds; and scurvy and rickets, which are also diseases of ill-balanced diets, are greatly aggravated by insanitary conditions.

I have noticed particularly that certain persons require a much larger proportion of fat in their diet for producing a constitutional change than others, which gives some explanation why some individuals begin to mend from a threatened attack of phthisis, whilst in the case of another one the same change has not produced the same favourable result. It is the same in this particular as in drugs, a much smaller dose producing results in one person than in another. The inherited phthisical constitution also confirms the food origin of the disease, the special type of build of the parents, moulded by whatever mode of living, tending to be transmitted to the offspring. That which is of still greater importance, however, is that the dislike to fatty foods in the parents produces the same dislike in the children, through this particular class of food being withheld from them by their parents, on the principle that what they dislike is not good for their children, and so the phthisical constitution is begun in infancy in the families of phthisical parents.

I have repeatedly found that weakly children of phthisical parents, if brought up with an abundance of fat in their food, present a marked contrast in their development to other children, older, of the same parents, whose dietary had in no way been regulated.

The work which the different institutions in this and other countries are doing to cope with the disease, is as but a drop in the ocean; to cope with a disease so widespread and so insidious, must be by prevention and not by cure. The eyes, the hopes, and the yearnings of the human race are upon the medical profession, and on preventive medicine in particular, to deliver them from this dread disease, this white plague, this present-day scourge of humanity.

I have endeavoured to give to you the results of seventeen years careful and prolonged investigation without a break in its continuity, in this question; the conclusion being that fats play a much more important part in the animal economy than has hitherto been accorded them, and that they fulfil a function almost unknown at present, but altogether different from and above that simply of heat production; and that a deficiency of fat in the dietary is the principal cause and the prime factor in the production of the constitution necessary for the bacillary invasion. In other words, the phthisical constitution is a dietetic disease.

ERRATA.—The paper on page 545 of the June issue of *Public Health* was read before the North-Western Branch, and not before the Northern.

On page 547, four lines from the bottom of the page " $\frac{1}{2}$ lb." should read " $\frac{1}{4}$ lb."

THE NOTIFICATION OF MEASLES.—The Wigan Sanitary Committee has adopted for a further period of three years the following recommendation of the Medical Officer of Health as to the voluntary notification of first cases of measles in a household: "Notification of the first case of measles occurring in any house shall be made to the sanitary authority on the same terms as compulsory notification of other infectious diseases."

PERSISTENCE OF DIPHTHERIA BACILLI.—In some cases the bacillus of diphtheria was very persistent, and required the examination of ten or more preparations at intervals of a week, before they were found to be absent. This was the case not only with patients treated in hospital, but also in cases treated outside; apparently, therefore, this persistence is not due to re-infection of one case from another, but to a predilection of the organism for the throats of a certain class of patient. These usually were such as have enlarged tonsils, and adenoids, and chronic granular pharyngitis. The organisms in such cases flourish in the deep lacunæ traversing these tissues, where no antiseptic application can reach them. In an occasional case the tonsils (after tonsillotomy) were examined and found to contain myriads of typical virulent diphtheria organisms deep down in the cavernous tissues of the tonsils, and this notwithstanding the fact that the patient had had large doses of antitoxin, was in other ways quite well and able to get about, and had had his throat treated with copious applications of lotions and paints. This persistence for months of virulent organisms of diphtheria, notwithstanding treatment, is an indication of how cases convalescent from an infectious disease, in all other respects quite healthy and normal, can still for long periods afterwards act as a source of infection to others who are not protected by a previous attack, or who by ill-health cannot withstand a moderately small dose of this poison. Knowing as we do the poison of diphtheria, we are able to appreciate the length of time, and also the variability of such time, that a case convalescent from diphtheria may act as a source of infection to other susceptible persons. (M. Richards—*Annual Report*, Croydon.)

TREATMENT AND PREVENTION OF CONSUMPTION IN COUNTRY TOWNS.*

By JOHN R. STEINHAEUSER, M.B., B.S. Lond.,
Medical Officer of Health for the Borough of Lewes.

CONSUMPTION has received so much attention of late years, has been so fully discussed in all its bearings, and has been the target of every shaft which all the wit and ingenuity of men of sanitary science could devise, that it would be almost presumptuous in me to attempt to add to the sum of knowledge or forge another weapon.

But I think that most of the enquiries into the subject, and the measures, proposed and adopted, for dealing with it, have been for the most part general so far as locality is concerned; and I have endeavoured in this paper to deal with the question in a specialized manner as regards the way in which it affects country towns. For I think there are special features in the latter which may possibly deserve attention.

The impression first given by a country town to a visitor versed in the knowledge of the causes of consumption would, I think, be that it was a place inimical to tuberculosis, a place to be shunned by that unclean spirit. The pleasant air, the cleanly streets, allowing vistas of open country with green fields and wooded slopes, the picturesque red-roofed houses, would give him a feeling of cheerfulness and health and security from disease. And this impression would be strengthened by the faces and appearance of the people he met: here a group of bronzed, hearty-looking farmers stand talking outside the Corn Exchange: there a cricket team starting for an out-match from the hotel in the principal street, or a few people casually shopping: in everyone an absence of that hurry and bustle which is so characteristic of life in a large town, and which is, no doubt, conducive to disease.

Is Mortality Higher?—Enquiries might tell the visitor that the sanitary record of the town was good, that it was well scavenged and drained, that it was provided with a good water supply and efficient sanatorium for infectious diseases, that its incidence of enteric fever and infant mortality were low, and deaths from senile decay many; yet when, well satisfied, he came to look up statistics of mortality from tuberculosis, it is possible that he would find them, to his surprise, to equal, if not exceed, those for some of the industrial centres, at all events, those for the country at large.

* Paper read at a meeting of the Southern Branch of the Society of Medical Officers of Health, on March 25th, 1904.

For here is an anomaly: one would expect to find a comparative immunity from tuberculosis in country towns. *ipso facto*, possessing all the advantages of country and town with the disadvantage of neither—i.e., abundance of pure air, fair drainage, good food supply as regards milk and meat, comparative absence of poverty and slums, and a fairly sanitary-intelligent community.

No doubt in some cases, as I have been able to ascertain, the death-rate is lower; this, however, often coincides with a low county rate, while in others the rate is really higher (from 1.5 to 1.9 per 1,000) than that for England and Wales.

To consider now the common causes of consumption so far as they affect country towns.

In most country towns there are many old houses—red-roofed, picturesque old houses—which are veritable death-traps; damp, badly lighted, badly ventilated, badly drained, sometimes back-to-back, with rooms low pitched, devoid of fireplace; lattice windows—made so as *not* to open—niggardly admitting a few rays of the sun which has looked down on the dying faces of successive consumptive tenants. Houses decaying, damp, and deadly. It is sad to visit a consumptive patient in such a house, in such a room. I have seen a mother lying in the last stage—emaciated, breathless, whose every frequent cough emitted a spray teeming with bacilli—with one of her children actually in bed with her, while the others were playing in the room.

As elsewhere, these houses play another part in furthering the incidence of consumption by driving men to the public-house. I may, perhaps, quote Professor Brouardel, who said at the Congress on Tuberculosis in London, 1901, "Unhealthy dwellings cause other disasters: dark and crowded as they are, cleanliness is difficult, if not impossible, to preserve; they are not pleasant to pass the time in, and the workman stays in his home as little as possible: he eats there and sleeps there, but the rest of his time is spent in the public-house. J. Simon was right in saying, 'The wretched lodging is the purveyor of the public-house,' and we can add that the public-house is the purveyor of tuberculosis."

Inherited Tendency.—One finds a remarkable consanguinity amongst the inhabitants of country towns. There seems to be less tendency, than exists elsewhere, to emigrate to other districts. Consequently intermarriages in the same comparatively limited community are frequent, and there is, therefore, a greater probability of any consumptive tendencies being handed down to posterity.

Alcohol.—I do not say that there is more intemperance in country towns, but there is an absence of facilities for evening amusement,

which is not felt in large towns, and which, in default, brings men to the public-houses. Only too often, glad to get away from his uncomfortable cottage, the working man goes to his favourite beer-house to drink and talk and incidentally expectorate. We know how large a part the public-house plays in the incidence of tuberculosis: first, because alcoholic excess is one of the chief predisposing causes; and, second, because the existing cause, the bacillus, is so frequently found there; since nowhere is expectoration so largely indulged in as in the crowded, dusty bars.

As a rule there are no particular dusty occupations in country towns; yet work places, e.g., printing offices, like dwelling houses, are often old, badly ventilated, and badly lighted.

Prevention and Treatment.—The treatment of consumption has as one of its aims the securing for the sufferer of fresh air (sterile, so far as it is possible, of tubercle organisms), and, from a consumptive's point of view, one of the chief advantages of a country town should be the facility with which he can obtain this blessing. In a town like Lewes, for example, surrounded as it is by downs, there should be no difficulty in the consumptive spending the whole day in the most excellent air, and during the warmer months there is no reason why he should not camp out during the night, thereby gaining health for himself and averting the polluting of his home which his presence therein entails. At the present time it is so difficult to persuade the less-informed classes as to the importance and harmlessness of fresh air, that treatment on these lines is seldom taken advantage of; they err through ignorance. It would be an excellent thing if consumptives could be hunted up in the early stages, and induced to undergo treatment without waste of precious time.

Two measures could, I think, be easily and with little expense taken in every town.

1. Formation of a committee composed of benevolent men and women genuinely interested in prevention of tuberculosis, whose object it would be to visit the houses of the poor, find out any cases of chronic cough, debility, etc., and tactfully put them in the way of obtaining advice and treatment; also to look after their families while husband or wife were undergoing treatment. I am sure that a great work could be accomplished by district visitors alone, who, by making themselves acquainted with the well-known causes and means of prevention of tuberculosis, and armed with printed cards of instructions to that effect, could impart their knowledge to the poor people they visited, and ensure that the latter should not, through ignorance at all events, drift into advanced consumption. In work places the same function might be undertaken by foremen or fore-

women. Alive to the danger of badly-kept workrooms, they would see that the latter were kept clean and as well ventilated as circumstances permitted; moreover, they could impress upon the employés under them the danger of neglected colds, and tell any sufferers where to seek advice.

2. *Anti-Tubercular Dispensaries, as in France.*—Such a dispensary could be easily and cheaply run in a country town. A couple of rooms in a cottage would be sufficient as waiting and consulting rooms, while the scullery could be fitted up as a dispensary. The mere fact of its institution would attract attention, and patients, who would receive necessary medical attention and be cautioned as regards dangers of communication of disease by sputum. If funds permitted they could be helped in the way of suitable food, and their homes, from a hygienic point of view, looked after.

The addresses of consumptive patients being thus known, rooms could be from time to time disinfected by the Sanitary Authority.

Sanatorium Treatment.—The difficulties met with in providing sanatoria for the poor are too obvious to require comment. The supply is fearfully inadequate to the demand. Many sanitarians have declared a really adequate provision to be impracticable; yet perhaps the difficulty of dealing with individual cases without such provision is really greater, and one only appreciated by the medical man-of-all-work. The poor consumptive, under existing conditions, obtains with much difficulty a letter of admission to one of the well-known free sanatoria, and then—even if accepted—finds he must wait ten or twelve weeks before he can hope to go into hospital; meanwhile, he too often becomes so much worse as to be ineligible when his turn does come, or else dies.

In a small country town I think the institution of a sanatorium ought to be practicable. Here the inhabitants generally know something of each other, and more interest is probably taken in individual consumptives than in larger communities. And this being the case, I think the richer members are more willing to help their poor consumptive brethren, knowing something about them and their belongings and antecedents. I believe a site might be given by a benevolent landowner, and a hospital, containing four beds (for a town of 10,000 population), should not cost more than £800 to build and equip. This sum once obtained, two guineas per head per week should keep the establishment going. No patient would be admitted unless this sum were guaranteed (by his friends) and the hospital would be only available for the really indigent: for those in receipt of parish relief the Guardians might be reasonably expected to pay three instead of two guineas per week.

I believe that such a sanatorium, for "clan" reasons which I have tried to explain, could be conducted upon very economic lines; that, for instance, neighbouring farmers would supply milk, butter, eggs, etc., at the lowest possible prices; in its aid bazaars and entertainments would be organized and church offertories given.

Another alternative for a town so small would be—as in Westmoreland—an amalgamation with other town or towns. In this case the sanatorium would of course be larger, but with less cost per patient on that account.

Or a fund might be raised to retain one or more beds for the special needs of the town in some large, well-known sanatorium.

Hygiene should be taught in Elementary Schools.—The first step is of course to ensure that all classes of the community should thoroughly understand the causes working for consumption—which none can afford to ignore—and thus their co-operation might be gained. It is a national disease, and all classes should combine to resist it.

The few simple elementary rules of health, e.g., importance of cleanliness, ventilation, physical exercise, and temperance—the very safeguards against tuberculosis—should, without doubt, be specially taught in our elementary schools. A generation will then at last arise who, freed from the ignorance of its predecessors, will unite to throw off the yoke of consumption.

Failure of Laity to appreciate Consumption as Infectious Disease.—Meanwhile, consumption as a communicable disease should be dealt with on the same lines as other infectious diseases. The apathy displayed by sanitary authorities in this respect is quite remarkable. In a small country town a single case of scarlet fever or diphtheria will create a small panic, whereas the fact that there are perhaps forty cases of consumption at the time produces little interest, certainly no alarm. It is significant that in one country town statistics for the year showed that there was not a single death from all the notifiable diseases put together, whereas from consumption there were nineteen.

Notification, in a country town at the present state of affairs I regard as unnecessary. I think the Sanitary Authority should notify all medical men in the town that it is willing to disinfect, from time to time, free of charge, any rooms occupied by a consumptive tenant. In this way a knowledge of a very large proportion of the incidence of consumptive houses would be obtained and dealt with. Precautions as regards dangers of infection can, I think, be safely entrusted to the medical attendant, who is probably more likely than the sanitary official to exact obedience from his patient. I am persuaded that disinfection of rooms, i.e., thorough cleansing, washin

and spraying of walls and ceiling with disinfectant, ought to be practised if possible at least every two months.

I have stated that I believe the condition of the houses of the working class—upon whom the incidence of consumption chiefly falls—to be the chief factor in keeping up the death-rate from consumption in many country towns; it is a condition which urgently demands improvement. And here we are in the hands of the Sanitary Authority and the landlord.

Improvement Scheme.—The most satisfactory way of dealing with some of the worst of these houses would be a comprehensive improvement or reconstruction scheme sanctioned by the Local Government Board. No doubt the financial burden imposed on a small town thereby would be very heavy and likely to meet with much opposition in a small community, which is often already heavily taxed. There would also be, in a small town, the difficulty of finding accommodation for the dispossessed tenants without causing overcrowding in other districts. However, such a scheme once effected, the thing would be done with for good and all. There would be an end to the everlasting supervision and tinkering up of decayed houses, which is all that the most active Sanitary Authority can otherwise accomplish, and which never fully effects the desired object.

House-to-house Inspection Committee.—Failing this it is necessary that all the meaner streets should receive *seriatim* a very rigorous inspection, and notices be served on owners to remedy all sanitary defects (amongst which should be included unopenable windows). In Lewes a Sub-Committee of the Sanitary Committee has been formed, called the House-to-House Inspection Committee, which, during the two years of its existence, has done really excellent work; thanks to its efforts many of the poorer houses have been drained or re-drained, cesspools and wells abolished, new w.c.'s have been provided, and portable ashbins supplied in place of the old ashpits.

Necessity for Radical Structural Alterations.—But, so far as consumption is concerned, it should be possible to go farther than this: to insist on radical structural alterations in houses needing them, such as provision for really sufficient light and ventilation, ensuring of damp-proofness, providing in all rooms a fireplace and chimney, removal of any obstructions to light and ventilation, etc.

Improved Housing by Private Enterprise.—In a country town wages are low, and low rents are therefore necessary. It is impossible for a man earning from 14s. to 16s. a week to pay much rent, and landlords are not likely to do more than they are obliged to a cottage only bringing in 3s. 6d. to 5s. weekly. At the same time, I am glad to say that in this town a certain amount of improvement of such property

has been undertaken voluntarily by owners. Here, again, philanthropy might come to the aid of public health. A capitalist, content with 2 per cent on his outlay, could buy up old property, demolish it, and re-build quite good cottages at a rental of 4s. each weekly, and he would be rewarded by seeing the certain improvement in the health of the locality as the result of this action.

Insufficient Air-space in Workshops.—As regards factories and workshops in all places, I venture to give my opinion that 250 cubic feet minimum air space per worker is absolutely insufficient to secure 3,000 cubic feet of fresh air per hour per worker, except under the infliction of an unbearable draught. One so often finds in workrooms windows closed, ventilators pasted over even, and consequently exceeding stuffiness.

Touching alcohol, I think it most desirable that more efforts should be made to take people out of public houses, and that more entertainments should be organized in country towns. I may say that in Lewes social clubs in various parishes are doing good work in this respect, and that the younger men are really improved physically and mentally since these institutions have been started. Out-of-door recreations should be encouraged by institution of cricket and football clubs and athletic associations.

I have not dealt with soil and site and wind as causes affecting the incidence of tuberculosis, and I am not sure that the relation between them has been satisfactorily worked out. In this town I find that the incidence is quite as heavy in the upper and drier parts of the town as in the alluvial district near the river.

Advanced Consumptives.—These are the source of most danger, and are the most difficult to deal with. Their friends are naturally unwilling for them to go away to die, even if there were a hospital to receive them. All that can be done is to try to enforce isolation, so far as is practicable, in their homes; they should of course occupy one and only one room, which none else should share.

Steps taken for dealing with Consumption in various Country Towns.—Through the kindness and courtesy of their Medical Officers of Health, I gather that:—

In most: Houses are disinfected after the death of consumptive tenant.

In several: Voluntary notification is practised.

In very few: Is there special sanatorium treatment.

To recapitulate measures to be taken:—

1. Committee for prevention of tuberculosis to visit, advise, and help financially consumptive patients.

2. Institution of dispensary, and subsequently, if funds permit, of sanatorium, under auspices of:—

(a) Private generosity.

(b) Local Sanitary Authority.

(c) Local Poor Law Authority.

(d) Local Friendly Societies.

3. Instruction on elementary hygiene in schools.

4. Sanitary Authority to undertake periodical disinfection of rooms occupied by consumptives.

5. More strenuous exercise on part of Sanitary Authority of statutory powers, enabling them to deal with unhealthy areas and houses, and supervise workshops.

6. Legislation against spitting in public places.

7. Facilities for amusement, formation of social clubs, etc.

Finally, while sorrowfully admitting that I have shown you nothing new, that my observations are well-worn and commonplace, and suggestions often rather impracticable, I hold that the subject, at all events, of this paper is an all-important one, and one never to us devoid of interest; and I hope—and that is my excuse for writing the paper at all—that from the discussion which may follow I may gather some crumbs of knowledge which will enable me in my own district to deal better with the difficulties of treatment and prevention of consumption in our pleasant country towns.

WE regret to have to record the somewhat sudden death of Charles Kelly, M.D., F.R.C.P., Medical Officer of Health for West Sussex, at the age of fifty nine. Dr. Kelly was for a number of years Professor of Hygiene in King's College, London.

GENERAL MEDICAL COUNCIL.—The following report of the Public Health Committee was presented and adopted at the recent meeting:—

1. The Committee reported that it had considered a communication from the Advisory Board of the War Office, and had unanimously agreed to advise the Council to add to the present list of districts and commands recognized as suitable for the purpose of outdoor training in hygiene under Rule 3 (e) of the Council's Resolutions and Rules for Diplomas in Public Health, the following additional military commands, namely: Madras, with a civil population of 72,000; Bengal, with a civil population of 38,000; and the Punjab, with a civil population of 42,000.

The Committee had also considered an application from Dr. Pinching, Director-General of the Sanitary Department of the Ministry of Interior of Egypt, for recognition as competent to give the certificates required by Rule 3. The Committee recommended that this application should not be granted. The Sanitary Department of the Ministry of Interior Egypt, is not under the control of the Director-General of the British Army Medical Department, and is in no sense comparable with the districts and commands as defined in Rule 3 (e) of the Council's Resolutions and Rules for Diplomas in Public Health.

IS THE AIR EXHALED BY PHTHISICAL PATIENTS DURING QUIET RESPIRATION COMPLETELY FREE FROM TUBERCLE BACILLI.*

By WILHELM KOELZER, M.D.,

THE writer begins by stating that his remarks are more of scientific than practical interest, since the number of bacilli exhaled during quiet expiration must be very small. After citing the various experiments by Cornet and others which seem to prove this, he states that he got fifteen patients with phthisis to breathe quietly for seven to fifteen minutes on to open petri dishes with nutrient media placed at a distance of from 5 to 8 c.m. from the mouth, carefully avoiding all coughing and sneezing during the experiments. Out of these one only became inoculated with tubercle bacilli, as proved by inoculating the contents of the dishes into guinea pigs. The patient, in this case, was in an advanced stage, and had laryngeal ulceration. He assumes that the bacilli can only be thrown off a moist surface by agitation, such as occurs in the bursting of minute bubbles, or as probably occurred in this case by the vibration of the ulcerated vocal cords during expiration. We have to do with extremely small particles and extraordinarily fine physical phenomena, so that bacilli may be given off from the bursting of bubbles in the fine bronchi which we hear on auscultation.

Since bacilli can find their way against the air current into the alveoli, there is nothing to prevent the reverse taking place.

He summarizes his conclusions as follows:—

"1. The aphorism that 'The air exhaled by phthisical patients during quiet respiration is completely free from tubercle bacilli' should be altered in this wise, 'The air of quiet expiration in phthisical patients is not germ-free, nevertheless tubercle bacilli are only exhaled under special conditions and then only in small numbers, and that in practice we cannot consider the expiratory air as an essential source of infection.'

"2. The cause of the infectivity of the expiratory air is the formation of spray from muco-pus in the lungs, which we plainly hear as crepitations.

"3. The bacilli exhaled during quiet expiration are so few in number that they can easily escape exact experimental proof.

"4. The possibility of infection by the air of quiet expiration must be extremely remote, compared with that offered by the pulverization of sputum, and the production of spray during the act of coughing.

"5. Severe tuberculosis of the larynx favours the infectivity of the air of quiet expiration quantitatively, so that the number of bacilli exhaled is capable of experimental proof."

MILK EPIDEMIC OF SCARLET FEVER AT GLOUCESTER.—During the first three months of this year there was very little scarlet fever present in Gloucester, an average of about three cases being notified each week. In April 65 cases occurred, and in 58 instances the infection was traced to a milk-supply obtained from a farm situated outside the city boundaries and within the area of the Gloucester Rural District Council. Two of the farm hands who were milkers had recently had scarlet fever in their houses.

* *Zeitschrift für Hygiene und Infect. Krankheiten*, vol. 44, pt. 2.

THE LEICESTER METHOD OF DEALING WITH SMALL-POX.

By C. KILLICK MILLARD, M.D., D.Sc.,
Medical Officer of Health for Leicester.

OBJECTION is sometimes taken to the term "Leicester Method" as applied to small-pox prevention, on the ground that there is nothing sufficiently distinctive in the method of controlling small-pox in Leicester to warrant the assumption of a distinctive title.

The term, however, has found its way into literature; it is frequently made use of by a not inconsiderable section of the community; and inquiries with reference to it are not infrequently received. I feel justified, therefore, in helping to perpetuate the term in the title of this paper.

There is a very good reason why the "Leicester Method" is so often quoted by those who are opposed to compulsory vaccination; for the essential characteristic of the "Method"—that indeed which constitutes its most distinctive feature—is that it professes to suffice for the control of small-pox without resort to universal vaccination, the one measure which is regarded as all-important in most places.

It follows from this that any discussion of the "Leicester Method" must necessarily involve the question of the practicability or otherwise of dispensing with universal vaccination.

I am aware that this opens up a highly controversial subject, which it will be difficult—indeed, impossible—to deal with adequately in the space of one short paper. It is desirable, however, that the question should be discussed, for the epidemic of small-pox which occurred in Leicester last year, and which was successfully controlled by the "Leicester Method," constituted a fresh test of the efficacy of the "method," and throws some additional light on the subject.

In order to prevent misapprehension, I wish to make it quite clear that the issues which will be raised have no reference whatever to vaccination as an operation, but only to vaccination as an institution. It is important to keep the distinction quite clear between these two meanings of the term "vaccination," as much confusion is otherwise apt to arise.* Vaccination as an operation has reference to the individual, whilst vaccination as an institution has reference to the community.

* Thus it is sometimes argued that as a community is composed of individuals, then, if "vaccination" can be shown to protect the individual it necessarily follows that "vaccination" must also protect the community. But a possible fallacy is involved here by the double sense in which the term "vaccination" is used.

I will say at once that I regard it as absolutely proven that the operation of vaccination confers on the individual complete, though temporary, protection against small-pox, and I accept, without reservation, the finding of the Royal Commission on Vaccination as to the duration of this protection.

It is also accepted, of course, that the protection conferred by vaccination can be renewed from time to time by re-vaccination.

Also let it be understood that the "Leicester Method" has never attempted to do entirely without vaccination. Vaccination has always been used to protect the small-pox staff, and such actual "contacts" as were willing to submit to it. The object is to use vaccination as little as possible, instead of as much as possible as would often seem to be the case elsewhere. Indeed, with some, vaccination almost seems to have become an end in itself rather than a means to an end, and the doctrine "the more vaccination the better" is therefore accepted as a guiding principle. In order to place my own personal belief in vaccination as an operation beyond the possibility of question, I have not only had my own two children vaccinated, but I have publicly taken them into the Leicester Small-pox Hospital, and have photographed them there by the bedside of a small-pox patient. This step may not have had much scientific value, but it constituted a useful object lesson, and the photograph obtained has been, I believe, of far more use to me in making converts to vaccination, than would have been many pages of vaccination "literature" or columns of statistics.*

Of much more scientific value is the fact that out of sixty-three persons engaged at the Leicester Small-pox Hospital in 1903—during which time nearly 400 patients were treated—not one contracted the disease, the only precaution taken being that all (with the exception of those who had already had the disease) were recently vaccinated.

The effect of vaccination as an operation in temporarily protecting the individual being, then, admitted, any arguments merely tending to confirm this will be superfluous.

Leicester and Vaccination.—The town of Leicester holds a pre-eminent position as a stronghold of anti-vaccination. Indeed, owing to its importance as a municipality and to the extent to which the

* If any doubt exists as to the sincerity of the writer's advocacy, the following resolution, passed last year by one of the Anti-vaccinators' Defence Clubs in Leicester, should serve to dispel it:—"That this meeting of the Anti-vaccinator's Defence Club strongly condemns the action of the Medical Officer of Health and his system of tricking the public into being vaccinated; and advises the public to decline his pure glycerinated corruption, and also to ignore the photographs of horrors he is exhibiting, and copies to be sent to the Chairman of the Sanitary Committee, the Councillors of the Ward, the Medical Officer of Health, and the Press."

vaccination laws have been openly set at defiance, it is usually regarded as the Mecca of the anti-vaccinationists.

Prior to 1883 Leicester ranked as a well-vaccinated town. In that year, however, owing to a deep-rooted and widespread popular agitation against vaccination, which had resulted from a bitter and determined policy of compulsion accompanied by repeated prosecutions,* the new Board of Guardians, which had been largely elected "on the anti-vaccination ticket," decided to cease prosecuting, and, soon afterwards all attempts to enforce vaccination were openly abandoned. The extent to which vaccination fell into disuse is shown in Diagram I. It reached its lowest point in 1895, when only 75 vaccinations were registered out of 5,000 births.

This abandonment of vaccination is not to be regarded as so much the result of the cessation of prosecutions, as of the intense popular agitation engendered by compulsion, which made further compulsion impracticable.

Some increase of vaccination has occurred during the past three years, partly owing to the Vaccination Act of 1898, and partly to the presence of small-pox in the Borough in epidemic form. The number of vaccinations, however, is again falling.

The Present Vaccinal Condition of Leicester.—As the result of a census which I had taken, I found that of the inmates of 1,000 houses in working-class districts 35 per cent were unvaccinated, chiefly children and young adults. On this basis there would be at least 60,000 or 70,000 unvaccinated persons in Leicester.†

In accordance with the accepted theory that the vaccinal condition of a community is the predominant factor in determining the incidence of small-pox, prophecies have been freely made as to the disastrous results which would speedily follow on what the late Mr. Ernest Hart called Leicester's "gigantic experiment." Retribution, in the shape of a dire epidemic and a terrible "massacre," especially of the children, has been repeatedly and confidently foretold. The highest authorities shared in these gloomy forebodings. Thus McVail, in his *Vaccination Vindicated* (published 1887), wrote as follows: "The 'immunity of Leicester' from small-pox is an everyday subject of anti-vaccinating gratulation. But . . . in Leicester, when its time arrives, we shall not fail to see a repetition of last century experiences, and certainly there will afterwards be fewer children left to die of diarrhoea. It is to be hoped that when the catastrophe does come, the Government will see that its teachings are duly studied and recorded."

* In 1881 there had been no less than 1154 prosecutions in Leicester.

† This is allowing for the probability of there being a smaller proportion of unvaccinated persons in residential districts.

It is unnecessary to enlarge further upon this aspect of the case. It is a mistake either to prophesy or to scoff at prophecy. It was desirable, however, to make some reference to it, for the fact that these prophecies, which were first made nearly twenty years ago, have as yet been unfulfilled, is one of the strongest reasons for re-examining the question of the influence of the vaccinal condition of a community in determining small-pox incidence.

The History of Small-pox in Leicester.—Leicester's mortality records go back to the year 1838 when systematic death registration first began.

In Diagram I, the small-pox mortality per 1,000 population for the sixty-six years, 1838–1903, is shown graphically by the pyramids, whilst the line represents the number of primary vaccinations per 500 births.

It is at once apparent that terribly fatal epidemics occurred in the earlier part of the period, culminating in the great conflagration of 1872–3. Since then the pyramids are conspicuous by their absence. Taking the average small-pox mortality for the thirty-one years, 1873–1903 (i.e., since the great epidemic), we find it is an insignificant 1·2 per 100,000, as compared with 44·6 per 100,000 for the preceding thirty-five years, 1838–1872, a reduction of 97 per cent!

Such a transformation is certainly remarkable. For practical purposes it is as striking as the change which has occurred in the German small-pox statistics (excepting, of course, that it only refers to a single town), and it merits our careful consideration.

To what has it been due? That is a question of considerable importance, because, obviously, it may have some bearing upon the decrease in small-pox mortality in the country generally.

Leicester, indeed, by abandoning vaccination, has performed a "control" experiment of some value in considering the influence of vaccination in other parts of the country.

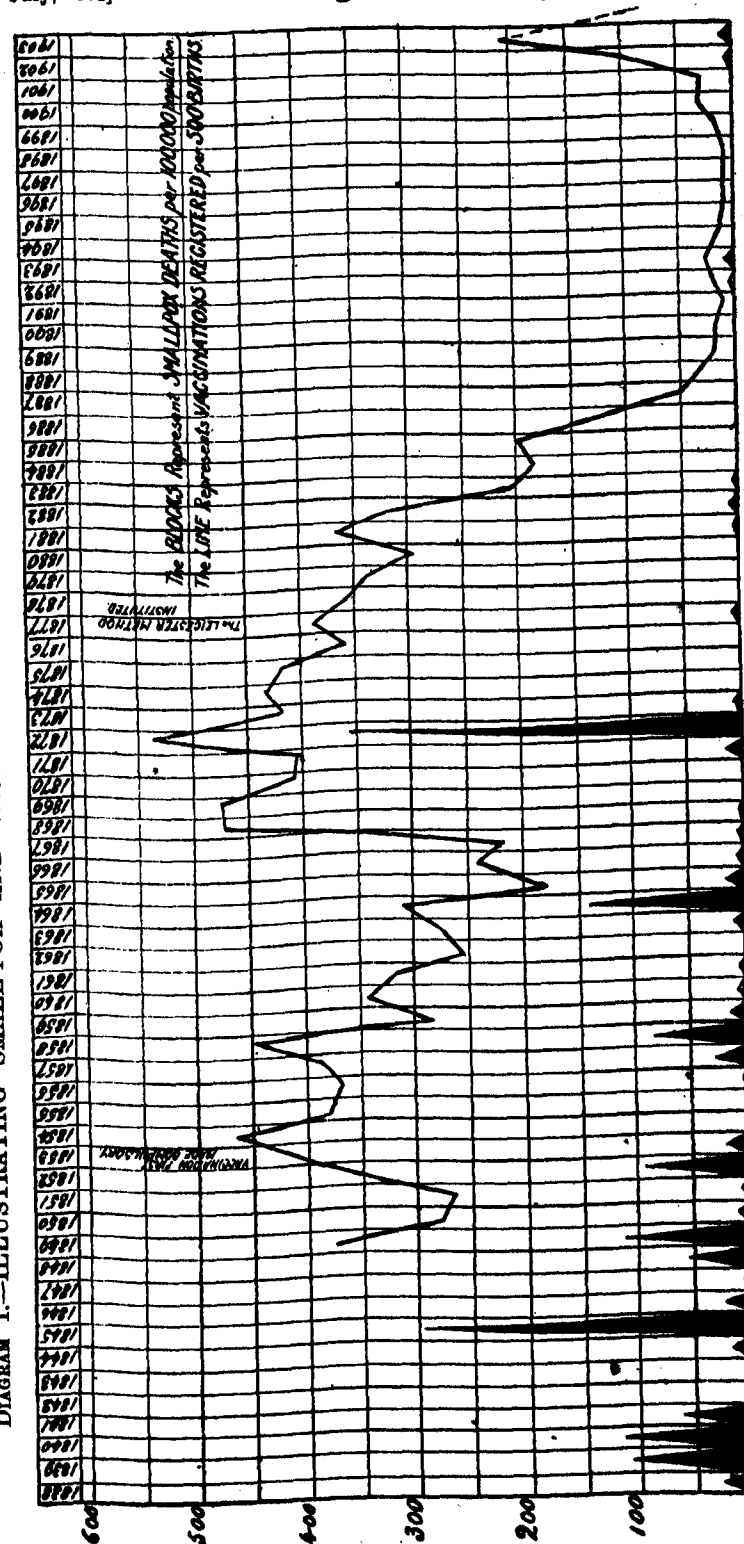
It is clear that the decrease in small-pox mortality in Leicester cannot be ascribed to systematic vaccination or re-vaccination of the inhabitants. Some of it no doubt may be due to the reduced prevalence of small-pox in the country generally, which in turn may be the result of systematic vaccination, but at the most this can only be a partial explanation.

I think we may attribute it chiefly to two causes, viz. :—

- (1). To improved measures for controlling the spread of the disease.
- (2). To an alteration in the type of the disease, which, in Leicester at least, has become less virulent.

It has been suggested that this reduced virulence in the type of the disease may be the result of systematic vaccination in the preceding generation, the parents of the present generation; but there is little,

DIAGRAM I.—ILLUSTRATING SMALL-POX AND VACCINATION HISTORY OF LEICESTER, 1838–1903.



Prior to the year 1880 the figures are taken from tables 5 and 6, App. 3, 4th. Rep. R.C.V. prepared and handed in to the Royal Commission on Vaccination by Mr. J. T. Biggs. The line represents registered vaccinations only. It does not include 4870 "extra" vaccinations performed by the Medical Officers to the Guardians in 1883-4. These were almost entirely the vaccinations of children omitted in former years. The rates per 500 births for these "extra"

if any, evidence to support such a theory, and we know that similar inexplicable alterations in type have taken place in the case of other zymotic diseases, *e.g.*, scarlet fever.

As regards the measures for controlling the spread of the disease, there can be no doubt that enormous advances have been made. We are so accustomed now to compulsory notification, followed by immediate removal of the patient to hospital and by disinfection of all infected articles, that it is difficult to realize how recently these measures have come into general use. Leicester was one of the pioneers, a local Act providing for the compulsory notification of infectious disease coming into force as early as the year 1879.

The abandonment of vaccination a few years later and anxiety to escape the predicted "retribution," led Leicester to devote special attention to prompt notification and isolation, together with close surveillance of "contacts." It was attempted, indeed, at first to isolate "contacts" in hospital, and the "Leicester Method," a term which originated about this time, is still supposed by some to include this measure. As a matter of fact, however, isolation of contacts in hospital was abandoned over ten years ago, as it was found to be unnecessary and, indeed, impracticable. Experience has shown that it is sufficient to keep contacts under surveillance at home.

As to the small details of the method of small-pox prevention now pursued in Leicester, I will not trouble you with them here. They will be found in my report on the epidemic of small-pox in Leicester in 1903. It will suffice to repeat that the essential characteristic of the "Leicester Method" is the absence of compulsory vaccination of the population, and the concentration of attention upon those other measures—notification, isolation, and surveillance of contacts—referred to above. It is of some significance to note that almost all towns are now attaching greatly increased importance to these other measures.

The relative importance, however, of the latter and of compulsory vaccination is still a moot point. It will be well, therefore, to consider what the influence of compulsory vaccination (*i.e.*, infantile vaccination as provided by law) really is.

The Effect of Infantile Vaccination on Prevalence of Small-pox.—I will repeat that it is not the value of vaccination as an operation which is in question. Such vaccination is undoubtedly of immense value in protecting individuals whose duty it is to go amongst small-pox, *e.g.*, nurses and doctors, and it is also of very great value in protecting other individuals who have accidentally been exposed to infection.

Nor am I now considering the question of re-vaccination. The

point at issue is, *what is the value to a community at the present day, in preventing the spread of small-pox, of infantile vaccination of the population as provided by law?* This is clearly a very important consideration, because it raises the whole question of the necessity of a compulsory law.

In order to simplify the issue I will say at once that it has been abundantly proved that infantile vaccination reduces the *fatality* of small-pox as regards the individual. But when we come to the all-important question of the influence of infantile vaccination upon the *prevalence* of small-pox, it is by no means easy to give a definite answer.

It is rather surprising to find that whilst there is an enormous volume of evidence to prove that vaccination temporarily protects the individual against small-pox, reduces the fatality of the disease in the individual, and alters the age-incidence of the disease, there is comparatively *very little* evidence which indicates the effect of vaccination upon the prevalence of the disease. If we turn to the report of the Royal Commission on Vaccination, which took some seven years of hard labour to produce, and which represents the highest authority to which we can refer, we find that they avoid this aspect of the question almost entirely. In their summary of conclusions all that they venture to say, which at all bears on the point at issue, is, "We think: (1) That it (vaccination) diminishes the liability to be attacked by the disease."

It may possibly be thought that to diminish liability to attack is tantamount to reducing prevalence. Indeed, I know that many argue as if it really were so. But, if we consider, we must see that it certainly is not. For liability to attack has reference merely to the individual, whilst prevalence has reference to the community. To take an analogous case, inoculation greatly reduced liability to attack (in the individual), but it was found that it tended to actually increase prevalence by introducing the disease into districts previously free from it.

I think it is just possible that infantile vaccination may have a similar tendency, *through the medium of unrecognized cases*, and that it is conceivable that it may actually increase the difficulty of stamping out the disease when it has been introduced. This is a point which I think calls for further investigation.

Not only did the Royal Commission on Vaccination avoid stating in their conclusions that vaccination reduces prevalence, but after searching through their final Report (in which the evidence taken is summarized) I have failed to find any direct evidence that vaccination does so. The kind of evidence which is required is evidence

showing that in communities where infantile vaccination is systematically performed, small-pox is little prevalent, whilst in comparable communities where it is neglected small-pox is much more prevalent.

If infantile vaccination really has any marked effect in reducing prevalence, we should certainly expect that there would be a very substantial difference in the amount of small-pox in well-vaccinated and in badly-vaccinated communities. Can such evidence be adduced? In the absence of it we can scarcely say that the contention that infantile vaccination reduces prevalence has yet been proved.

The Epidemic of Small-pox in 1903.—Some light is likely to be thrown on the subject by a study of the etiology of small-pox in a badly-vaccinated community. Leicester, as we have seen, is a notoriously badly-vaccinated community, and probably contains a larger proportion of unvaccinated persons than any other large town. The facts of last year's epidemic should therefore be of interest. The outbreak began at the end of December, 1902, and may be considered as terminating in October, 1903, the last patient having been discharged and the hospital closed. The statistics were briefly as follows:—

AGE-DISTRIBUTION OF SMALL-POX CASES AND DEATHS. CASES, 1903 EPIDEMIC.

Age Period.	Under 1 year.	1 to 5	5 to 10	10 to 15	15 to 20	20 to 30	30 to 40	40 to 50	50 to 60	Over 60	Total.
Vaccinated	...	...	...	2	9	60	65	88	11	8	194
Unvaccinated	4	29	58	43	40	14	6	4	...	...	198
Uncertain	...	...	...	...	...	...	1	...	1	...	2
Total	4	29	58	45	49	74	78	42	12	8	394

DEATHS.

Age Period.	Under 1 year.	1 to 5	5 to 10	10 to 15	15 to 20	20 to 30	30 to 40	40 to 50	50 to 60	Over 60	Total.
Vaccinated	...	...	...	...	...	...	...	8	...	1	4
Unvaccinated	2	2	4	2	2	1	1	2	...	...	16
Uncertain	...	...	...	...	...	...	...	...	1	...	1
Total	2	2	4	2	2	1	1	5	1	1	21

There were ninety-one cases, or 23 per cent, in children under ten, all unvaccinated. Four of these cases were infants under one.

None of the vaccinated cases had been vaccinated within ten years.*

The four deaths among the 194 vaccinated gives a fatality of 2.06 per cent., the sixteen in the 198 unvaccinated gives 8.08 per cent.

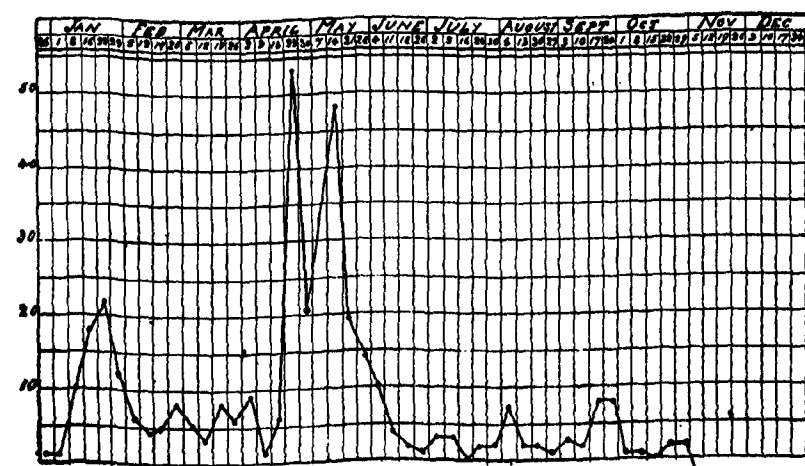
* It is only fair to point out, however, that the proportion of the population in Leicester vaccinated in the last ten years is very small.

The cases occurred in 255 houses in 174 different streets. In 81 per cent of the invaded houses only a single case occurred, i.e., no spread took place to other inmates. And in 72 per cent of the invaded streets only a single house was attacked, i.e., no spread occurred to other houses in the street. All these streets abounded with unvaccinated children.

As regards the incidence of the disease upon the vaccinated and the unvaccinated sections of the community, it is interesting to note that 50 per cent of the cases were in unvaccinated persons, whereas probably not more than 35 per cent of the population were unvaccinated. There was, therefore, a somewhat increased incidence upon the unvaccinated class, but it was not nearly so great as I had expected.

DIAGRAM II.

SHEWING NUMBER OF CASES OF SMALL-POX REMOVED TO HOSPITAL EACH WEEK DURING THE EPIDEMIC.



The Easter Outburst.—The most striking feature of the epidemic was a sudden and inexplicable outburst which took place just after Easter. During the four weeks ending May 14th no less than 157 cases occurred, or very nearly half the total for the epidemic. For the preceding fortnight the town had been almost clear of the disease.* Without warning, the cases began to pour in. The first week there were fifty-three, followed by twenty-one, thirty-four, and forty-eight in the following weeks. Then the outburst subsided almost as quickly as it began. The largest number notified in any one day was fourteen.

* Only two houses were infected during this fortnight, and one of these had been previously infected. I am quite satisfied that the cases from neither of these houses could possibly account for what followed.

The cause of the outburst is still a mystery. In the great majority of the cases, in spite of careful inquiries, no clue whatever could be obtained as to any possible source of infection. Indeed, during the first eleven days, April 15th to 25th, out of sixty-five cases which occurred, the source of infection was only discovered in a single instance. In one other case there was a remote clue, and one case was imported. The remaining sixty-two cases were absolutely untraced. In the latter part of the outburst, as might be expected, a certain number of secondary cases arose, traceable to the cases which had already occurred, but there were still a great many untraced cases. To simplify the problem we may confine ourselves to the first eleven days. The following are the particulars of the sixty-two untraced cases which occurred during this short period:—

AGE AND SEX DISTRIBUTION.

Under 10 years.		10 to 20 years.		20 to 30 years.		30 to 40 years.		40 to 50 years.		50 to 60 years.		Over 60 years.	
M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
6	5	9	18	2	5	6	4	1	6	1	3	—	1
11		22		7		10		7		4		1	

There was thus some excess of adult females, but I am quite unable to explain it, and it may only be a coincidence.

Twenty-eight of the cases were vaccinated and thirty-three were unvaccinated, one being uncertain.

The cases occurred in sixty-one houses in fifty-eight streets, in an area including about two-thirds of the town.

Thirty-seven of the cases went to work in thirty-two different work-places and factories. Fourteen school children attended eleven different schools. None of the cases at this period occurred in common lodging houses.

Efforts were made to ascertain if the persons attacked had been together in any common building or crowd, such as theatre or music-hall, church or chapel, market, etc., or if any one had visited the various houses attacked, but nothing at all in common could be discovered. The infection, indeed, appeared veritably to have "dropped from the clouds."

It is very difficult to account for such a large number of cases occurring in so short a space of time without leaving any clue to their origin, and with so wide-spread and impartial a distribution. Only two theories seem tenable, viz., aerial infection, and the existence of a number of unrecognized cases.

The Borough Small-pox Hospital is situated a mile from the town

to the north-west, in a very isolated position, and during the time the infection must have been disseminated (i.e., the first fortnight in April) there were about thirty small-pox patients under treatment, who had been admitted from two to five weeks previously. The wind (as recorded once in each twenty-four hours) was in the right direction, i.e., north-west, on April 2, 5, 7, and 8.

The chief fact against a theory of aerial infection is the great distance of the hospital from the town, and the comparatively small number of patients under treatment during the critical time. This, however, like other negative evidence, does not entirely exclude the possibility of aerial infection, the vagaries of which are notorious. Assuming that aerial infection can occur (and the writer is one of those who believes that it can), it would seem that certain subtle, imperfectly understood but apparently transient conditions, meteorological or otherwise, are a necessary concomitant.

The fact that there was no specially-marked incidence upon that portion of the Borough nearest the hospital is not of much significance, because at a distance of a mile incidence would naturally become diffused.

On the whole, however, I think we must conclude that the theory of aerial infection is in this case improbable and difficult to sustain.

The alternative theory is that a number of unrecognized cases of a highly infectious type were going about the town. At other periods of the epidemic these unrecognized cases were frequently discovered, and they were responsible for much spread of infection. But at this period none came to light. It certainly seems strange, if this theory be correct, that they should have left no clue whatever as to their existence.

Whatever the cause, the outburst served one good purpose. Hitherto it had often been alleged that the "Leicester method" had never been adequately tested, and that Leicester had always been "lucky." This outburst, it will be admitted, I think, afforded a very severe test; 157 cases occurred in four weeks in 128 houses in 103 streets, from some cause or causes quite beyond control, and without warning. If ever the "Leicester method" should have broken down it was then. I do not think many towns of the size of Leicester during the last few years have had to deal with a much larger number of cases in so short a space of time. The success with which the disease was stamped out is indicated by the fact that in successive weeks the number of fresh cases dropped from 46 to 22, 14, 10, 4, 2, 1, and a fortnight later none were reported. Even a so-called well-vaccinated town could scarcely have done much better.

Such a result seems to indicate that provided the task of stamping

out small-pox is a straightforward one, the "Leicester method," in Leicester at least, is adequate for the purpose without recourse to universal vaccination.

If, however, cases occur so slight that no doctor is consulted, or if the doctor fails to recognize the disease owing to his never having been taught as a student that the diagnosis of small-pox was of special importance, or if the disease is being continually re-introduced by tramps from other parts of the country, then the task is not a straightforward one and the "Leicester method" may fail.

The Influence of Unrecognized Cases.—As regards the rest of the epidemic, a fruitful source of the spread of infection, as I have said, was the occurrence of very slight cases in which the eruption was so slight and so modified (in some cases there was none) that they were not recognized as small-pox until they had given rise to further cases. We discovered twenty-two of such cases, and eighteen were never removed to hospital. I believe there were many other cases which never came to light at all, and that these accounted for the occurrence of many of the cases in which the source of infection could not be traced. If this view is correct, these unrecognized cases played a very important part in the spread of the epidemic.

This trouble with slight unrecognized cases is by no means peculiar to Leicester. It is a well-known difficulty everywhere.

It is a point of very considerable importance, however, that these very mild, modified, and therefore unrecognized cases, usually occur in persons vaccinated in infancy (*i.e.*, many years before), and *because they were so vaccinated*.

These very slight cases in vaccinated persons are not so infectious probably (other things being equal) as well-marked cases of the disease in unvaccinated persons, and, in the old days, when disease had to be treated at home and little or no attempt was made at isolation as we now understand it, these latter cases were doubtless a more important factor in spreading infection than the former.

But now, under modern conditions, it is different. The experience of Leicester seems to show that *provided cases of small-pox are promptly recognized and reported*, so that modern measures of prevention can be put in operation, the disease can usually be stamped out quickly, even though the general population is largely composed of unvaccinated persons.

If, however, cases are not recognized, modern measures are obviously useless, as they cannot be put into operation.

Now, whereas small-pox in unvaccinated persons is a disease which can almost always be easily recognized, small-pox when it occurs in

vaccinated subjects is often exceedingly difficult to recognize, even by medical men. Moreover, many of the cases are of so trifling a nature that medical assistance is never sought. Infantile vaccination may thus be regarded as encouraging the occurrence of unrecognized cases, and in this way it may be an indirect cause of the spread of small-pox.

I am inclined to believe, from my experience of small-pox in Leicester, that the importance of this factor has hitherto been much underestimated. Indeed, the occurrence of these highly modified cases has not infrequently been used as an argument in favour of vaccination with no hint as to any possible disadvantage. It is only after careful attention has been directed to this aspect of the case that we shall be able to appreciate its full significance.

It may be that we shall then find that this unthought-of effect of infantile vaccination goes a long way towards neutralizing the advantages of the measure, and that anti-vaccinators, when they allege that vaccination tends to spread small-pox, are not quite so wide of the mark as we usually believe them to be, albeit the true explanation of the phenomenon may not be such as they would care to accept.

The danger of Unvaccinated Persons contracting Smallpox.—Moreover, the experience of Leicester during the recent epidemic, as in the previous epidemic* ten years ago, seems to show that where modern measures are carried out, unvaccinated persons run less risk of contracting small-pox, even in the presence of an epidemic, than is usually supposed. It was predicted that once the disease got amongst the unvaccinated children of Leicester it would "spread like wild-fire." I certainly expected this myself when I first came to Leicester, and it caused me much anxiety all through the epidemic. Yet although, during the ten months the epidemic lasted, 136 children (under fifteen years) were attacked, infected largely by once-vaccinated adults, it cannot be said that the disease ever showed any tendency to "catch on" amongst the entirely unvaccinated child population. These 136 children lived in seventy-three streets, and most of them attended school. They were surrounded by other un-vaccinated children, yet little or no spread resulted from them. The explanation, I believe, is that when an unvaccinated child is attacked with small-pox it is usually sufficiently ill to have to be kept at home and to necessitate a doctor being called in. Provided he recognizes the nature of the illness early enough, the proper steps can be taken, the rest of the

* Dr. Coupland, who investigated the 1892-3 epidemic for the R.C.V. stated (p. 8 of his report) that: "*in this epidemic, at least, the natural liability to smallpox, unaffected by vaccination, was not so great as has been supposed.*"

household can be protected by vaccination, and the disease will probably go no farther. The same explanation holds good also in the case of unvaccinated adults. Indeed, under modern conditions of small-pox prevention it seems probable that there is less risk of the infection being spread by well-marked cases of the disease, than by very slight and easily overlooked cases.

It may be urged that very slight and easily-overlooked cases do sometimes occur in unvaccinated subjects. This is true, but they are relatively very much less common than amongst vaccinated persons. Moreover, *the type of disease spread by them is usually of a very mild type.*

The Effect of Vaccination upon Type of Disease.—This raises rather an important consideration. I put it forward with some diffidence, because at present it is merely a suggestion, but it is only by looking at every possible aspect of a question that we are likely to arrive at the whole truth.

The point I would submit for consideration is this: Is it possible that the type or "strain" of disease propagated by vaccinated cases of small-pox differs at all from that propagated by unvaccinated cases?

We know that the severity of an attack of small-pox varies greatly in the same epidemic in different individuals. This, no doubt, is due to differences in the "soil," i.e., the constitution of the individual. But beyond this, the severity of different epidemics, or, as we say, the "prevailing type" of the disease, varies greatly even in the same locality and amongst the same population. This must be due to differences in the "seed."

It is obviously of the highest importance that the type of an epidemic should be kept as mild as possible; but whilst a very great deal of attention has been devoted to studying the influence of vaccination upon the individual (i.e., upon the "soil"), very little has yet been directed to the possible influence of vaccination upon the character of the "seed." The experience gained in the days of inoculation taught that a careful selection of very mild cases from which to obtain the infective matter with which to inoculate, was of much importance in securing a mild type of the disease in the person inoculated.

At the present day, as we have seen, infection is very largely spread by slight unrecognized cases. Now, should such cases occur in unvaccinated subjects, it implies the very mildest type or "strain" of the disease which it is possible to obtain—just the kind of case which we should choose if we could select our source of infection.

On the other hand, slight unrecognized cases occurring in vaccinated

subjects do not by any means necessarily imply a mild strain of the disease, as the mildness of the case is usually artificial, being produced by vaccination, and thus the type of disease conveyed may be severe.

It is conceivable, therefore, that vaccination, whilst it undoubtedly reduces the fatality of the disease so far as the individual vaccinated is concerned, may have an ultimate and unsuspected effect in another direction. Of course, if the great majority of the persons attacked in an epidemic are vaccinated subjects, the net result of the vaccination would be (other things being equal) to lower the fatality of the whole epidemic, but, if this theory be correct, it would nevertheless make the disease tell rather heavily on those who were unvaccinated, who thus get all the disadvantages with none of the advantages of vaccination.

This leads us to a point in connection with vaccination statistics which I must confess I have never seen quite satisfactorily explained, viz., the excessively high fatality of small-pox amongst the unvaccinated in most modern epidemics. Take, for instance, the Sheffield epidemic of 1887-8, which was specially reported on for the Royal Commission on Vaccination. Out of 4,703 cases, 4,151 were vaccinated and 552 were unvaccinated. The fatality of the disease in the vaccinated group worked out at 4.8 per cent, whilst in the unvaccinated it was the truly appalling figure of 49.6 per cent.

Or, take the Glasgow epidemic of 1900-1: 1,643 cases were vaccinated with a fatality of 9.1 per cent; and 122 were unvaccinated with a fatality of 51.6 per cent! Or, again, consider the epidemic in London in 1902: 5,663 cases were vaccinated—a fatality of 10.2 per cent; and 1,906 were unvaccinated—a fatality of 33.2 per cent.

Many other epidemics show similar figures, and we are usually led to infer that the difference is due to the beneficial effect of vaccination in reducing fatality, and that if all the cases had been unvaccinated *the same high fatality would have prevailed for all.* But it has sometimes been alleged by those who are opposed to vaccination that there is no reason to think that the fatality of small-pox in the pre-vaccination days, severe though it may have been, was nearly so high as 30 or 40 per cent. If that is so, it looks as if amongst the unvaccinated the severity of the disease had in some way been increased.

If, however, we turn from Sheffield, Glasgow, or London, which were accounted comparatively well-vaccinated towns, to Leicester which is just the opposite, we find, in the epidemic of 1892-3, that there was no evidence at all of such a high fatality amongst the unvaccinated, the figures being: Vaccinated, fatality 1 per cent; unvaccinated, fatality 12 per cent. The experience of the 1903

epidemic has been similar: Vaccinated, fatality 2 per cent; unvaccinated, fatality 8 per cent.*

Of course, this surprisingly low fatality may be merely a coincidence, and it would be dangerous to count upon its always remaining the same; but, on the other hand, it may conceivably be more than a coincidence.

In any case it affords some excuse for suggesting that the ultimate effects of vaccination on the community may be somewhat more complex than is usually supposed.†

The Vaccination of "Contacts."—This is a measure which I believe to be of great value, and which I therefore freely resorted to during the epidemic.

Thus, out of 1,084 persons living in 233 houses (excluding houses where the first case was not recognized), 794 (or 73 per cent) were induced, as the result of great efforts, to get vaccinated.

As regards the definition of a "contact," I usually class them for convenience into "inside contacts," i.e., persons living in the same house with the patient, and "outside contacts," i.e., persons not living under the same roof, but who have been in the same room with the patient after he was taken ill. The risk of "outside contacts" developing the disease is, as a rule, comparatively slight, and the need for vaccination proportionately less. In the case where a patient has been at work or at school after being taken ill, the other employees or school-children were not treated as ordinary contacts and were not asked to get vaccinated, but the school or factory was kept under surveillance and any absentees immediately visited. In some cases a school (or a particular class) would be closed.

My experience is that the risk of infection being contracted under such circumstances is scarcely great enough to make vaccination worth while. Had vaccination been performed in all such cases it would have involved several thousands of vaccinations, and at the most it would have prevented about a score of cases.

It is quite otherwise with close contacts, such as the inmates of invaded houses. As the result of very careful comparison I find that

* During 1904 the fatality has been much lower still.

† It is taking a very narrow view of all the possible influence vaccination may have upon fatality, merely to compare the relative fatality of the vaccinated and unvaccinated groups in an epidemic.

Let us assume, for the sake of argument, that vaccination whilst reducing fatality in the vaccinated individual, does nevertheless tend, by some subtle unsuspected influence, to increase the severity of the prevailing type or "strain" of the disease. It would then be conceivable that vaccination might increase the fatality of an epidemic, although an examination confined merely to a comparison of the relative fatality of the vaccinated and unvaccinated groups would confirm the belief that the vaccination was actually having a very beneficial effect.

amongst those who get vaccinated only 2·3 per cent of contacts develop the disease, as against 12·4 in those who do not get vaccinated. When the vaccination is performed not later than the third day after the appearance of the eruption in the patient, the proportion who develop the disease is reduced to an insignificant 1 per cent, and this irrespective of whether the contacts have been previously vaccinated or not.

The remarkable success with which the other inmates of an invaded house can be protected from taking the disease by means of vaccination after exposure to infection, *provided the disease is promptly notified*, as it should be, robs small-pox of one of its greatest terrors. This seems to indicate that it is more practicable to deal effectively with small-pox without recourse to universal vaccination than is usually supposed.

For a detailed account of the recent epidemic and of the procedure adopted in dealing with it, I must refer readers to my report. I have said enough, I think, to show that the "Leicester Method" in Leicester has succeeded better than was anticipated.

It is true that there is still a large proportion of the population in Leicester (over 60 per cent probably) who have been vaccinated at some time or other in their lives. We cannot say precisely what effect on the spread of the disease this vaccinated section of the community may have had, and therefore we cannot be certain that the "Leicester Method" will be equally successful should practically the whole population become unvaccinated, as there seems a possibility that it may do.

Judging, however, from the comparatively small difference in the incidence of the disease on this vaccinated section and on the unvaccinated, and bearing in mind the deleterious effect of unrecognized cases which are liable to occur in the former, it might be argued that Leicester gains comparatively little advantage from the existence of this class. I feel justified, therefore, in hoping that Leicester's prospects for the future are not so gloomy as many people appear to think.

Re-vaccination.—So far we have simply considered the question of infantile vaccination, i.e., vaccination as provided by law, and which has been created by law into a state institution operating through elaborate machinery which entails a heavy expense on the community. It is this institution of vaccination which has aroused such deep-rooted and intense hostility in some quarters, and which has brought a number of otherwise law-abiding citizens into a conflict with the law. Nevertheless, I firmly believe that it has in the past served a most useful purpose in helping to lessen and mitigate the

ravages of what undoubtedly was the most dreaded, and rightly dreaded, of all epidemic diseases, at a time when other adequate means of checking the disease were unknown. Even though the value of the institution may to some extent have been over estimated, owing to the whole of the reduction in small-pox mortality which has occurred having been attributed to its agency alone, I believe that the institution of vaccination has, nevertheless, in the past been of immense value to the country.

When vaccination was first introduced a century ago, preventive medicine, as we now know it, was non-existent. At that time almost everybody suffered from small-pox, and the discovery that an attack of vaccinia could be temporarily substituted for an attack of small-pox must indeed have been a boon to humanity.

But the chief question which now concerns is this: Is the institution of vaccination helping us so very much at the present day? There certainly exists a strong feeling in some quarters that it is not doing all that it ought to do, or all that it is expected to do, and hence the agitation for a radical alteration in the shape of compulsory re-vaccination.

It must be admitted, in view of the fact, now so clearly recognized, that the protection conferred by vaccination is only temporary, that re-vaccination is only the logical sequel and complement to infantile vaccination. The pity is that this was not recognized when the latter was first made compulsory, and when general vaccination of the population was practically the only weapon of defence against this loathsome disease. If re-vaccination as well as infantile vaccination had been made compulsory, very many of the thousands of deaths from small-pox in vaccinated persons which have since occurred would have been prevented.

But to introduce compulsory re-vaccination now, in the twentieth century, is rather like locking the stable door after the horse has been stolen. In my opinion, never, in the whole history of this country, since the days when small-pox first appeared on our shores, has a compulsory re-vaccination Act been less necessary than at the present time. Our machinery for controlling small-pox by other means has never before been so perfected, and it is being improved every year. Almost every town and district now possesses a skilled Officer of Health, with a staff of skilled Inspectors under him. Almost every town now possesses an isolation hospital to which every case of small-pox can be removed immediately it is reported. Throughout the country compulsory notification of infectious disease is in force, and medical men are becoming more expert in small-pox diagnosis. Medical students are no longer turned

loose on the country as "qualified" medical men without receiving some instruction on the subject, as was formerly the case.* Improved methods of disinfection are available. An elaborate system of surveillance of contacts is being more and more employed, accompanied by daily and even hourly communication (by post, telephone and telegraph) between different sanitary districts.

The result is that we have so far learnt how to control the disease, that, apart from the question of vaccination, it is ceasing to be the serious danger to the community that it once was.

In all probability the near future will show even better results. Our methods are still capable, no doubt, of considerable improvement in many directions, and as the improved methods become more generally adopted and more efficiently carried out, the whole country will benefit, and the disease will become less and less formidable.

The *tramp question* still remains to be solved, but when it has been solved, as no doubt it will be when once attention is seriously directed to it (by labour colonies or otherwise†), one of the most potent factors of small-pox dissemination will largely disappear.

In the face of these considerations I venture to suggest (with much diffidence on account of prevailing opinion) that the case for compulsory re-vaccination is not quite so strong as many think. We may have to come to it, but let us make quite sure first that it is really necessary. Let us think what it means. At least two re-vaccinations in a life-time will be required, as in the German Army, if we are to get the German results; a single re-vaccination would have a very uncertain effect. A single revaccination was in force in the German Army prior to the great epidemic of 1871-2. Think what it will cost the community. Think of the aggregate of pain and suffering and temporary ill-health, for after all vaccinia is a disease; the heavy annual expenditure on vaccination fees‡ and lymph; the loss of time from work. Think of the friction it is certain to cause, and the bitter animosity it will certainly arouse. It is a heavy price to pay. And then consider the evil it is hoped to avert. For years together whole towns remain entirely free from small-pox; it is only now and again that it gives serious trouble. What a fuss is sometimes made over a single case of small-pox; a whole district is scared about it, and if as

* There is still room for improvement in this respect. I should like it to be obligatory on all medical students to receive *practical* as well as theoretical instruction. In no other disease is early and accurate diagnosis of greater importance to the public.

† Some system of voluntary re-vaccination of tramps seems to be desirable. An adequate pecuniary inducement would probably be more efficacious than a compulsory law.

‡ In Germany the fees for vaccination are very much less than is the case in this country.

many as half a dozen cases occur it is written up in the papers under prominent head-lines as though it were a national calamity, and serious injury to trade may easily result. The most trifling small-pox outbreak is apt, under such circumstances, to prove altogether disproportionately costly.

There is certainly something to be said in favour of the course pursued in Leicester. During the whole of the recent epidemic, with the one exception of the Easter outburst (when things certainly did look serious for a few weeks), there was nothing approaching public alarm, and I believe the trade of the town was quite unaffected. The money cost of the epidemic to the rates, I estimate at about £2,300, probably not much more than would have to be spent *every year* on vaccination if vaccination and re-vaccination were systematically carried out on the whole population, though in the latter case no expense would be entailed for the up-keep of the small-pox hospitals.

In Leicester during the twenty-four years that notification has been in force, the average annual number of cases of small-pox has been only thirty-seven. The average number of children born annually has been over 5,000, so that (allowing for probable deaths) at least 8,000 vaccinations (including revaccinations) would have to be performed each year in order to prevent thirty-seven cases of small-pox; even if small-pox becomes four times as prevalent as it has been in the past twenty-four years, fifty vaccinations would be required for every case of small-pox prevented. (This is allowing for one revaccination only.)

Bearing in mind the mild type of small-pox which has prevailed and still prevails in Leicester, it can be understood that the people of Leicester will require a good deal of persuasion to convince them that, *so far as their town is concerned*, universal vaccination and re-vaccination are either desirable or necessary.

In conclusion, I wish to suggest that if the "Leicester method," after all possible improvements have been effected, could be made sufficient for the control of small-pox without resort to universal vaccination, then it would have to be regarded as a higher and more ideal method of disease prevention, and one more in keeping with the principles of true preventive medicine than is the present system of preventing a little small-pox by the substitution of a great deal of vaccinia.

POSTSCRIPT.

As it is possible that some portions of the above paper may cause misapprehension, I wish to make it clear that I am *not* advocating the

abandonment of infantile vaccination as a State institution. In the present state of our knowledge, I dare not take that responsibility.

I do feel, however, that owing to the great development of other preventive measures, the *necessity* for *compulsory* vaccination is a question which may reasonably be discussed, especially in the light of the unexpected experience of Leicester.

The people of Leicester, by abandoning compulsory vaccination, have taken the law into their own hands, and have set expert medical opinion at defiance, but that is no reason why we should refuse to study their experiment, and learn from it all we can.

I fully realize that the results of the experiment in the future may be very different from those achieved in the past. Moreover, it may have been merely a lucky coincidence that the two epidemics which have occurred since vaccination has been abandoned, have been of such an exceptionally mild type. The epidemic at Gloucester* was far more fatal.

It is possible also that if practically the *whole* population becomes unvaccinated, the "Leicester method" will prove insufficient to keep the disease in check.

I quite admit that, even if the "Leicester method" continues to succeed in Leicester, it still does not follow that it would be safe to adopt it everywhere.

I would point out, however, that others besides myself incline to the view that it might be possible to control small-pox effectually without recourse to compulsory vaccination. Thus my predecessor, Dr. Joseph Priestley,† who was Medical Officer of Health for Leicester at the time of the 1892-3 epidemic, writes as follows in his report on the epidemic in Lambeth in 1902, p. 26: "What has to be realized to-day, however, is that a Sanitary Authority must be prepared to fight an epidemic of small-pox without too much reliance upon vaccination and re-vaccination. It is an uphill fight, but that it can be done will be admitted after the perusal of this report. It is unfortunate that it has to be done, as compulsory vaccination and re-vaccination rapidly stamps out small-pox, though the days of compulsion in any shape or form are rapidly passing away, and the action of the future must be based on non-compulsion—at least so far as vaccination and re-vaccination are concerned."

Re-vaccination.—As regards re-vaccination, it is quite certain that persons who are vaccinated and re-vaccinated *often enough* will not take

* The experience of Gloucester is frequently held up as a "set-off" to that of Leicester. But can it fairly be said that the "Leicester Method" was carried out at Gloucester. Hospital isolation completely broke down almost at the very outset.

† Now Medical Officer of Health for Lambeth.

small-pox. For practical purposes it would no doubt suffice if *everyone* was vaccinated in infancy and *twice* re-vaccinated afterwards, as in the German Army; but it is highly improbable that the German system could be successfully applied in this country, for England is not Germany.

Moreover, I cannot help believing that in places such as Leicester, where popular feeling against vaccination is so strong, any attempt at a further extension of compulsory vaccination would almost certainly prove a legislative fiasco, and would only increase the intense antipathy of the people to vaccination in any form.

I am of opinion that it is the disbelief of the people in vaccination, rather than their neglect of it in the past, which constitutes Leicester's chief danger for the future, for it is calculated to prevent their resorting to it should real necessity arise.

I feel, therefore, that the first step is to convince them that whatever may be said about vaccination, it can at least be depended upon to give temporary protection against small-pox. Personally, I have done my full share in this direction. For nearly eighteen months I have been almost continuously engaged in endeavouring, quietly but insistently, to persuade the Leicester people that vaccination does protect. The fact that in one year (1903) I induced nearly 800 persons (living in invaded houses) to submit to vaccination, almost all of whom were disbelievers in and actively hostile to vaccination in any form, is a tangible proof of my success; but it has been a heavy and thankless task*, and has entailed many long hours of patient and persistent effort.

I would say here that from what I have myself seen of vaccination in Leicester, I cannot quite regard it as the trifling operation so many medical men appear to think it. It constitutes a very definite, though usually only temporary, interference with health, and occasionally it is responsible for much more serious ill effects.

In conclusion, I wish to suggest that if compulsory re-vaccination be introduced, it might be practical and desirable to make it a matter for local option, as was formerly the case with the compulsory notification of infectious disease. This would enable communities such as Leicester, so long as they desired it, to obtain exemption without bringing the law into contempt. If the advantages of re-vaccination to a community prove to be as great as is hoped, it is reasonable to think that most communities, from motives of self-interest, would gradually come to adopt it, and the law could then be made general with a minimum of friction and opposition. In the meantime those communities who were in favour of re-vaccination, being themselves protected, would suffer little from the neglect of it elsewhere.

* Some even of those who believed in vaccination disapproved of my efforts, as they regarded them as "helping to defeat the course of justice"!

THE INFANTS' DEPARTMENTS OF PUBLIC ELEMENTARY SCHOOLS.*

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I WILL offer no apology for bringing this subject before a meeting such as this, since I deem it one of the utmost importance, and one which I am somewhat surprised has not been discussed before and some action taken with reference thereto.

When visiting the Elementary Schools in my district I have often thought that the educational or other advantages to the children attending the Infants' departments must be very great indeed, if they are to equal the obvious disadvantages and the danger to the public health, which ensue upon the aggregation in ill-lighted, worse ventilated, and often dirty rooms, of children at the most susceptible ages for becoming infected with such diseases as scarlet fever, measles, whooping cough, and such ailments as ringworm, ophthalmia, and itch. Let me shortly remind you of some facts well known to all of you. The deaths from measles are practically all of children under five years of age; and in the oft-recurring epidemics of this disease, in nine cases out of ten the Infants' departments of schools are largely to blame for the spread of the disease. For the last three years I find that in my district 40 per cent of the scarlet fever cases treated in hospital have been between the ages of three and five (229 out of 914), and about 50 per cent between five and ten; i.e., at a moderate estimate about 70 per cent of scarlet fever cases occurred among the children who would attend the Infants' departments of the schools. About 25 per cent of the diphtheria cases are between the ages of three and five, while nearly all the cases of whooping cough occur in children who attend Infants' departments. The greatest incidence of the above diseases is therefore in the earliest years of life; the longer children escape them the less likely are they to contract them, and not only so but less likely also to succumb when attacked.

I do not suggest that the disease is contracted in schools in every instance, but that it is so in very many instances no one can doubt. I can recall several instances where children have had no ailments whatever until they commenced to attend school, and then they have quickly contracted in turn scarlet fever, measles, and whooping cough.

* Paper read before the North-Western Branch of the Society of Medical Officers of Health, on March 18, 1904.

One case last year particularly impressed itself upon me, when a child, aged three, was sent to school on a Monday; three days afterwards was taken to hospital suffering from scarlet fever, and died.

It is common knowledge that the incidence of diphtheria has wholly changed since the passing of the compulsory Education Act. Before that it was a disease principally affecting country districts; now it is a disease principally of urban districts. There can be no doubt whatever that public Elementary Schools wield a potent influence for evil in the spread of infection, and that the particular portion of such schools mostly to blame is that devoted to the infants. Can one wonder at it when one considers the conditions? The children aggregated together in those ill-ventilated rooms come from all kinds of homes, from the most depraved and filthy to the most highly respectable. Some of the children are clean, some the reverse; many are half starved, and in a condition to contract any disease with which they may come into contact, and many are not physically fit enough to acquire any knowledge. All of these are huddled together, and this fact alone is, to my mind, sufficient to condemn all Infant schools. There are other conditions short of actual disease which ought to be mentioned, viz., the slow undermining of the health of these young infants in the crowded rooms, at a time at which, perhaps, more than any other they need fresh air and plenty of it.

Now what are the advantages to be derived from the attendance at school of children of such tender years? I confess I know of none. Children are not compelled to attend school before the age of five, but as a matter of fact the ages of school children attending Infants' departments are between *three* and seven, sometimes even younger than three. They are supposed to come clean; if not, I believe in some instances (i.e., in schools where they *have* lavatory accommodation) their hands and faces are washed in cold water. I may add here that I recently visited a school where two roller towels per week were provided for three hundred girls.

Children are kept at school for three hours in the morning and two and a half hours in the afternoon.

The Clerk to our Education Authority has kindly provided me with a syllabus of the work done in the Infants' departments of the Corporation Schools. It is as follows:—

Secular Instruction.—For infants: Reading, writing, and counting; kindergarten (including modelling fruit, leaves, etc., in clay, pea and wire work, forming little chairs, tables, etc.); pricking patterns on paper; embroidery (outlining coloured figures in wool on paper); weaving mats and baskets in paper; drawing straight-lined figures; and paper folding; object lessons, games, and recitation; and for

the girls, knitting and sewing; and for the boys, drawing. Musical drill and physical exercises and games, and also of recent years what is known as brush-work, which is freehand painting.

I am informed that children commencing school at the age of five years invariably overtake those commencing earlier, and that there is no advantage whatever from an educational point of view in children attending school at an earlier age. There is, however, a very great disadvantage from a public health point of view, as I have shown, and I would refuse to receive children under the age of five unless the conditions were considerably improved. The school hours are too long, and one obvious reform is to materially shorten them and to lengthen the play intervals. Every Infants' department should, in my opinion, be supplied with hot and cold water, and any children coming to school unwashed should have the operation performed for them, and thus have the elements of personal cleanliness instilled into them at the earliest possible age. The rooms for their accommodation should be the brightest and airiest possible, with a good large room attached for play in wet weather. In summer, instruction might wholly be given in the open air, and would consist of learning to read and write only, with a good deal of systematized play.

To my mind the low physical condition of the children in a great many cases accounts in no slight measure for the spread of infectious disease among the infants in schools. It has often struck me that much good would result, not only in reducing the number of infectious cases, but also to the general health of the community, if free meals were given to the poorest of the children who are compelled to attend school. The expense incurred would, I am sure, soon be recouped; first, by the lessened hospital accommodation which would be required, secondly, by improved education, and thirdly, by improved physique. Dr. Hueppe, in the Harben Lectures given this year, mentions the three factors on which, in his opinion, depends an attack of the infective fevers, viz., Predisposition, Stimulus, Condition. The condition of individuals must depend to a very large extent on food; every person with an insufficient supply of food must lapse into a low physical state.

I have often discussed the advisability of trying the experiment, with members of my Council and others, during the past twelve months, and it was with great interest I read only the other day that the Education Authority of Leeds have had the matter under their serious consideration. It appears that Dr. Hall, of Leeds, having been struck with the physical degeneration of many of the children attending the Elementary Schools of Leeds, at his own expense has

for some years provided the poorest children of some of the schools with two meals daily. The result of the experiment has been so satisfactory, both from an educational point of view, and also from the marked improvement which has taken place in the health and in the physique of the children, that the Leeds Authority has been urged to continue the experiment on a larger scale. Their decision will be awaited with interest.

To sum up, the only reason urged for children attending Infants' schools, as far as I am able to gather, is this: that the parents get rid of them for five hours per day. The disadvantages and dangers I have enumerated; and if it is so important that children should attend school at such early ages, then I suggest that the minimum age should be fixed at five, and that the reforms I have mentioned should be carried out, and if at the same time free meals could be given to the poorest of the children, the benefits would be doubled.

AN ANTI-ENTERIC DRINKING-WATER CART.—Experiments are being carried out at Bisley with a new water cart. It carries two water tanks, in one of which fifty gallons of water are heated by oil burners. The boiled water is passed into the other tank, where it is cooled. One charge of oil (forty-eight pints) will boil 250 to 300 gallons of water, thus giving 2000 to 2400 soldiers a pint of sterilized drinking water apiece. Water-carts and ambulances may now be drawn right up to the fighting line by means of the "Ivel" motor. The cart has been constructed under the supervision of Lt.-Col. R. W. Ford and Major Palliser whose names it bears.

NUISANCE FROM GARAGES AND MOTOR CARS.—Mr. Wynter Blyth deals in his monthly report for April with the important question of how to deal with the serious complaints of nuisance incidental to the Motor Car industry. There are several garages in the Borough of Marylebone in which cars are stored, charged with petrol, cleaned, repaired, and the engines started to see that each cylinder heats in proper time and that all is in order; during this operation, more especially if the crank chamber is full of oil, or if the engine is dirty, there is considerable smell, and more or less noise. In one case the occupiers of adjoining premises have laid a formal complaint by petition, and there is not the slightest doubt that there is nuisance—nuisance that is inseparable from the industry, and one difficult to deal with without seriously interfering with a growing and important trade.

It is Mr. Blyth's opinion that all garages of the kind should have a special shed or room in which to start the engines; any architect could design by means of double walls a practically noise-proof shed; there would also have to be a flue with good draught carrying the waste gases away to the height of the highest chimneys in the neighbourhood.

This means a considerable expenditure of money; but when a person establishes a new, noisy, and intermittently offensive business in densely populous localities, he must either spend money in minimizing any nuisance incidental to the business, or run the risk of having his business entirely prohibited.

A SCHEME FOR THE MEDICAL EXAMINATION OF SCHOOL CHILDREN.

DR. J. MIDDLETON MARTIN, County Medical Officer of Health for Gloucester, has presented a report to the Education Committee, in which he suggested a scheme for regular medical supervision of children attending elementary schools. The Committee were almost unanimous in adopting Dr. Martin's suggestion, and agreed to try it in the Stroud district. One member thought that the proposed medical inspection should be carried much farther than infectious complaints, and that there ought to be a medical inspection at least once a year of every child in every one of the elementary schools in the county to find out whether or not they were in a normal condition, and fit to receive instruction at all.

Dr. Middleton Martin, after dealing with various local matters, wrote: It is evident that the only method of dealing with infectious conditions in schools is to provide for a medical inspection of all the children. Possibly, at the commencement the work will be heavy, but once a scheme is in full swing, the very fact that the machinery is ready for use will diminish the necessity for active work. There can be but little doubt that by such means, too, the average attendance will be improved; for cases of infectious diseases will be recognized early—one of the most important considerations in controlling its spread—and consequently there will be many fewer cases. Indeed, if efficiently worked, epidemics of such diseases as diphtheria and scarlet fever should be almost unknown. Also, it would make the work of the School Attendance Committee easier, in that they would thus have certain knowledge of those children who are infective.

The simplest and most complete arrangement for such a scheme would be for the medical man nearest each school to be appointed medical officer for the various schools.

At the opening of school each term, the medical officer of each school should attend and superficially examine all the children, and more closely any presenting suspicious appearance, or to whom his attention might be drawn by the teacher. At the same time he might generally inspect the building for the information of the Education Committee. All the children whom he finds suffering from any infectious or contagious condition would be excluded. In general, only one visit to the school each term would be necessary, but in special cases it might be advisable for second or even further visits to be made. The attention of parents of excluded children would be called to the reason for the exclusion, and to the necessity of having the condition treated; such children would not be re-admitted until either: (1) they produce a certificate of freedom from infection signed by their own doctor, or (2) they have been passed by the school medical officer. During term-time any child who is suspected by the teacher to be suffering from any infectious condition should be either sent to the doctor by the teacher, or, if advisable, a note should be sent by the teacher to the medical officer asking him to see the child at its home. Complete records of the results of all examinations, etc., should be kept on suitable forms, copies being sent to the Education Committee by the teachers at stated times; cases of notifiable disease would be notified to the Medical Officer of Health for the district under the Infectious Disease Notification Act by the school medical officer.

Such a scheme would tend to render the work of the school attendance officers more effective, for a medical certificate would be available for every child unfit to attend school on account of conditions of health, either (1) from their own medical attendant, or (2) from the school medical officer. In the case of those children who are excluded from school by the latter owing to some infectious condition of the skin, lice in the head, or general dirty state, graduated pressure should be brought to bear on the parents to have the condition remedied. This pressure might take the form of (1) an informal intimation, followed by (2) a formal notice saying that if proper measures are not used proceedings will be taken against the parents for the non-attendance of their children. Possibly at first such a scheme would be resented by the parents, but as soon as the reasons for the precautions taken were realized it would have the support of the majority.

I have estimated the cost of working such a scheme on the following scale:—

Average Attendance.	No of Schools.	Inspection of School.
Under 50	4	} at 1 guinea..... 16 16 0
50—100.....	12	
200—150.....	11	} at 1½ guineas..... 26 15 6
150—200.....	6	
200—250.....	5	} at 2 guineas 18 18 0
250—300.....	4	
300—350.....	1	} at 2½ guineas..... 5 5 0
350—400.....	1	
		£87 14 6

Subsequent visits to school to examine small groups of children, half a guinea per visit; if more than 10 children examined, one guinea per visit; examination of child at house of medical officer 2s. 6d. per child. A complete examination of all the children in the school once a year only, might be sufficient in most cases, but, if the first examination reveals such a bad state of affairs as was discovered in one school in this district—where it was found necessary to exclude 105 children, or 43 per cent—it would be advisable to have a complete examination each term, for the first year at any rate. Under ordinary circumstances I should not expect that the total cost of such a scheme in the Stroud district would exceed £150 a year.

There are in the county some 400 elementary schools, with an average total attendance of about 40,000. The cost of a scheme for the whole county on the same scale would be about £1,500. The present average attendance is about 87·5 per cent of the children. An increase on this of about 2 per cent would be a gain to the county of £1,600, as a rise of 1 per cent is worth £800 a year to the county.

CONSUMPTION AMONG CORNISH MINERS.

A SECOND report has now been issued by Mr. Martin, H. M. Inspector of Mines for the South-western District, Dr. Haldane, and Mr. Arthur Thomas, on the causes of the excessive mortality among Cornish miners, and the means by which such excessive mortality may be avoided. The inquiry was commenced in October, 1902, and it

was soon discovered that ankylostomiasis was prevalent among the miners in certain districts in Cornwall, and a report was accordingly made to the Secretary of State and published as a Parliamentary paper in December, 1902, in which the prevalence of this disease was stated, and some suggestions were offered as to the preventive measures which could be taken. The second report now published deals with miners' phthisis. In this report tables are given by which the death-rate among rock-drillers and other miners may be compared with that obtaining among populations employed in other industries. These show, that while there has been a very great decrease in the death-rate among coal miners below the age of 50 during the last half-century, the death-rate among Cornish miners has diminished only at ages below twenty-five. Further, the figures indicate that during recent years the total mortality among tin miners between the ages of twenty-five and fifty has very greatly increased. On analysing the various causes of death it appeared that the excessive mortality among the Cornish miners as compared with that among occupied males generally, and particularly among coal and ironstone miners, was entirely due to lung diseases. Apart from the tendency to pulmonary affections, Cornish mining appears to be an exceptionally healthy occupation, and shows a marked improvement during the last fifty years. Until 1892 the excessive mortality from lung diseases only affected miners of over forty years of age. Since that time, however, there has been an enormous increase in this kind of mortality among younger men, especially between the ages of twenty-five and forty-five, with the result that the total death-rate at all ages from twenty-five to fifty-five years is now far greater than at any previous period during the last fifty years. So marked is the excess, that in 1900–1902 the annual mortality among miners and mine-labourers between the ages of thirty-five and forty in Cornwall was 39·5 per 1,000, or more than three times that of all occupied males of the same age. Further analysis showed that the great increase in the death-rate was chiefly due to deaths from lung disease occurring in men working in connection with rock-drills, and a large proportion of these men had apparently contracted the lung disease while working with machine drills in other countries, and especially in the Transvaal. Among these men the mortality was enormous. With regard to elucidating the nature of miner's phthisis, the authors of the report state that they were unable to accomplish much owing to the existing prejudice in Cornwall against *post-mortem* examinations, which rendered it impossible for them to obtain permission for a single autopsy on any of the numerous miners who died during the inquiry. They were further considerably handicapped by the absence of any local hospital in which cases of miner's phthisis could be carefully observed. However, it appears that miner's phthisis is tuberculosis occurring in lungs injured by the inhalation of hard stone-dust, and occurring especially among men engaged in working rock-drills. The essential measure of prophylaxis is therefore to prevent the inspiration of the rock-dust, and a completely effective remedy for this is afforded by a jet or spray of water passing into the holes, only a small jet of water being needed to entirely prevent the issue of dust capable of floating in the air. The air may be readily cleared of dust raised by blasting by means of a spray; and it is suggested for the same purpose that the ore should be damped before it is moved.

REVIEWS.

LEICESTER AND SMALL-POX.

THE Medical Officer of Health for the County Borough of Leicester (Dr. Millard) has published a special report to his Council* on the outbreak of small-pox that occurred there in 1903. It is an elaborate report of 90 pages, wherein the facts of the outbreak are fully stated, accompanied with carefully-prepared and instructive tables, and containing a full and detailed account of the measures adopted with a view to its control.

Dr. Millard's experience at one time as Resident Medical Officer to the City of Birmingham Infectious Hospital, during which that city was the subject of an outbreak of small-pox, gave him opportunities for becoming skilled in the diagnosis and treatment of the disease; but he seems scarcely so well versed in the practical aspects of Vaccination, in which such great advances have been made in recent years, and some of the opinions and conclusions expressed in the report on matters of general policy as regards vaccination, though, as might be expected, they are supported with considerable dialectic skill, are, to say the least, singular and unorthodox.

The report warmly supports Leicester in its notorious hostility to primary vaccination, and claims that it is carrying on "an experiment of considerable scientific value, so far successful beyond all expectation." It vaunts the comparative mildness of the 1892 outbreak, with 347 cases and 21 deaths, and that of 1903, with 394 cases and 21 deaths, followed by its recrudescence or return in 1904 with 200 fresh cases up to May last, as discrediting the prophecies that were made as to its dismal fate if it abandoned infantile vaccination in disobedience to the Vaccination laws.

Intelligent people, including the Leicester Town Councillors, will not fail to find in this report additional proofs that vaccination (even imperfect) greatly mitigates this terrible disease, and that it has assisted in controlling the Leicester outbreak to a greater extent than those Leicester people who have adopted extreme views will care to admit, but the general intelligence of the country will entirely disagree with this report and with Leicester, in its policy of limiting Jenner's great discovery to a mere *ad hoc* employment during the turmoil of an epidemic outbreak. This snap-shot method of vaccination would prove miserably inadequate if relied on for coping with a virulent outbreak, and resembles the policy of awaiting the outbreak of an expected fire, without making an attempt to render the combustible material as far as possible fireproof.

The unusual mildness of type in the disease on this occasion, affords an explanation of the quasi-escape of Leicester up to the present from the dismal fate prognosticated for it.† As Dr. Millard says, "It is, however, important to bear in mind that we have no guarantee that the present favourable type will be maintained."

This fortunate decrease in the virulence of the disease was supplemented at Leicester by extreme vigilance among a responsive population in the employment of all the usual extemporized means for controlling the

* A report on an epidemic of Small-pox at Leicester in 1903, by C. Killick Millard, M.D., D.Sc. Price 2/6. G. PALMER, Albion St., Leicester, 1904.

† The fatality among un-vaccinated cases has formerly ranged from 80 to 50 per cent, but in Leicester in 1893, it was 12·8 per cent, and in 1903, 8 per cent. Yet this light mortality was four times that of persons who had been vaccinated once.

spread of the disease: Early notification, prompt isolation of all recognized cases, vigilant surveillance and urgent voluntary vaccination of contacts, disinfection, and other minor measures, also by 2487 primary and 1456 re-vaccinations by two public vaccinators in 1903.

Dr. Millard speaks unreservedly as to the protective value of recent vaccination. All those persons who had been exposed to the infection were safe, if by a conjunction of fortunate circumstances, including "persuasion exercised to the utmost," they were vaccinated in sufficient time to out-race the incubative stage of the smallpox. Evidently, general vaccination antecedent to or co-temporaneous with the risk of exposure, would have been of equal value—re-vaccination also—and far more practicable. It was the manifest duty of the Medical Officer to urge and encourage these measures to the utmost. Whether he did so or not, he states that no attempt was made by the Sanitary Authority to encourage them; doubtless it was no part of the "Leicester method." Dr. Millard appears to go rather out of his way to discourage and depreciate general vaccination and re-vaccination. Concerning the former he says, "that even performed in the most approved manner it cannot be relied on for more than a limited period," and concerning the latter, that "it is not permanent"; but is there anything in medicine, or surgery, or anything else, that is not limited or is permanent? Only one person among the (imperfectly) vaccinated under sixteen appears to have developed the disease in this outbreak. Experience proves that cal-lymph vaccination, when performed in an approved manner and to an approved extent, confers benefits which continue for life, and, allowing for special idiosyncrasies, if renewed at adolescence, affords complete protection for life. This ideal has been nearly approached in Germany, where the number of deaths from small-pox is a negligible quantity,* and if it were adopted in Leicester, farewell to its "mild" recurrent outbreaks, with their deaths, disfigurements, and cost.

It is a mistake for a responsible public official thus to use a special report to depreciate and cast reproach on the utility of the thorough adoption of up-to-date vaccination to meet this great plague of humanity, and seems rather like playing up to "that prejudice against vaccination in Leicester which prevents people from resorting to it when really needed."

Dr. Millard has also a serious grievance against vaccinated persons whose vaccination is not recent, as being more likely to spread small-pox than those who are unvaccinated. This seeming paradox he explains by saying that among the former, when smallpox occurs, it is so modified as to be sometimes unrecognized or concealed; and as with scarlet fever and diphtheria, mild unrecognized cases are always dangerous sources of infection. Fortunately, in the case of smallpox there is a remedy in re-vaccination. In our own experience much more serious results have followed from unrecognized cases of smallpox in unvaccinated persons. Dr. Millard contemplates that when Leicester becomes an unvaccinated community, the accumulated vaccinated contacts of previous outbreaks will be dangerous sources of infection. Were Dr. Millard an Irishman this "bull" might be excused.

It must not be thought because some of the contentions in this report have been criticized unfavourably, that those parts where the circumstances of the outbreak and the action taken in regard to it are described are not interesting and instructive; if they stood alone, they would probably have served Dr. Millard's purpose equally well.

* *Vide*, Debate in the House of Lords, on the second reading of the Re-vaccination Bill, June 17, 1904.

THE MEDICAL INSPECTION OF SCHOOL CHILDREN: A text-book for Medical Officers of Schools, Medical Officers of Health, School Managers and Teachers. By W. Leslie Mackenzie, M.A., M.D., M.R.C.P.E., D.P.H., F.R.S.E., Medical Inspector of the Local Government Board for Scotland, assisted by Edwin Matthew, M.A., M.B., C.M., M.R.C.P.E., Assistant Physician Leith Hospital, Clinical Tutor Edinburgh Royal Infirmary. Pp. 455 and xviii. Price 10s. 6d. Edinburgh and Glasgow: William Hodge & Co. 1904.

This volume is divided into three parts. In the first, the object, form, and organization of medical inspection are discussed, while the second and third parts deal with the practice of medical inspection and with school anthropometry. The subject matter is therefore of the greatest possible interest to members of Education Committees, and to their medical advisers. Though various recognized authorities are frequently quoted (sometimes perhaps at unnecessary length) the chief value of the work consists in the detailed account given by the author of his experience as one of the experts employed in the examination of school children on behalf of the Royal Commission on Physical Training (Scotland). For the purposes of the Commission, six hundred Edinburgh children were examined by Dr. Mackenzie, and an equal number of Aberdeen children by Prof. Matthew Hay. The methods adopted, the results obtained, and the deductions to be drawn therefrom, are set forth with admirable lucidity, and cannot but be of invaluable service to all those called upon to undertake a similar task. While cordially welcoming the treatise, and fully recognizing its merits, we must confess, however, to a certain amount of disappointment. For we are told in the preface that an attempt had been made "to give form and substance" to the recommendations of the Commission that provision should be made for the regular medical inspection of children in all schools. Now a practical and complete scheme of medical inspection is precisely what most medical officers in this country have hitherto failed to evolve, and it was therefore to the author's administrative proposals in Chapter VI of Part I that we immediately turned. From this little could be gleaned beyond the somewhat cryptic assertion that the public health authorities should be paramount, and that if school and public health authorities are to become identical, all difficulty of organisation disappears." (p. 125). Elsewhere we gather that the author would recommend the general adoption of Schedule A, and that every child should be thoroughly overhauled at least three times during its school life. Now we are not at all sure that this is either necessary or desirable, and it seems certain that the cost of such a scheme would be prohibitive, at any rate until public opinion is better informed than it is at present. Furthermore, Dr. Mackenzie does not tell us how many hours were spent in examining the six hundred children who passed under his hands, but it cannot have been inconsiderable. Indeed, we have calculated that the whole time of a Medical Officer would be required in a town of 100,000 population (with say 16,000 school children) for the sole purpose of making the physical examinations which Dr. Mackenzie appears to consider essential. This, however, is a matter which can hardly be profitably discussed in the space at our disposal, and we can only throw out the suggestion that it is in the examination of cases which teachers have been taught to select that the school doctor is most likely to be profitably employed, though detailed examinations of a certain number of unselected cases would at the same time be necessary in order that reliable local standards might be discovered. Probably, however, all organization must at first be tentative, and we shall look

forward with interest to the experience gained by those who have the courage to adopt Dr. Mackenzie's schedule in its entirety.

ELEMENTS OF WATER BACTERIOLOGY, WITH SPECIAL REFERENCE TO SANITARY WATER ANALYSIS. By Samuel Cate Prescott, Assistant Professor of Industrial Biology, and Charles Edward Amory Winslow, Instructor in Sanitary Bacteriology in the Massachusetts Institute of Technology. Pp. 162. Price 5s. 6d. net. London: Chapman and Hall, 1904.

Messrs. Prescott and Winslow, the authors of this handy little volume, are connected with the Massachusetts Institute of Technology, and have evidently had a good deal of experience in the bacteriological examination of the waters of that state. They acknowledge that the most important researches on the subject have been carried on in this country, but so much valuable work has been done in America by Smith, Sedgwick, Fuller, Whipple, Jordan, and others, that the authors have endeavoured to gather the results of their work together in such form as to give a correct idea of the best American practice. In this they have been quite successful, and a most readable and interesting volume is the result. Chief stress appears to be laid by the authors on the detection of the colon bacillus, and little significance is attached to the presence of the *Bacillus enteritidis sporogenes* of Klein, nor do they regard streptococci as of sufficient importance to warrant any special procedure for their isolation. In the detection of the colon bacillus considerable importance is attached to the results of fermentation tests, lactose and dextrose being decomposed with the evolution of H and CO₂, in the proportion of 2 to 1. They also regard as essential characteristics the coagulation of milk and the formation of indol in peptone solution. The chapter on the significance of *B. coli* in water contains a mass of interesting information, and the conclusions at which the authors have arrived as the result of their studies and observations are that "the number of colon bacilli in water rather than their presence, should be used as a criterion of recent sewage contamination, and that "the detection of *B. coli* in a large proportion of small samples (1 cc. or less) examined, is imperatively required as an indication of recent sewage pollution." Used with discretion, they regard certain "presumptive tests" for the presence of the *B. coli* as being of considerable value, but they urge that when such tests give positive results, further experiments should be conducted to ascertain whether the organism present is the true *B. coli*. They agree with Whipple in adopting provisionally a scheme of interpretation which divides waters into the following groups: safe, reasonably safe, questionable, probably unsafe, and unsafe. This is practically an admission that bacteriologists in America have as great a difficulty in interpreting their results as their confreres on this side of the Atlantic, and it scarcely justifies the concluding part of the following paragraph which ends up their book: "The evidence furnished by inspection and by chemical analysis should be sought for and welcomed whenever it can be obtained, yet we are of the opinion that, on account of their directness, their delicacy, and their certainty, the bacteriological methods should least of all be omitted, and, if necessary, they alone may furnish conclusive testimony as to the safety of a potable water."

The appendix contains formulæ for the preparation of standard media adopted from the report of the American Public Health Association, a very full list of references, and a fairly full index.

LAW REPORTS.

HIGH COURT OF JUSTICE.

KING'S BENCH DIVISION.

February 5th, 1904.

BEFORE LORD ALVERSTONE, L.C.J., WILLS AND KENNEDY, JJ.,

HENNEN v. LONG.

Sale of Food and Drugs Acts—Milk—Warranty—Addition of Preservative.

A warranty from the original vendor affords no defence to a charge for selling milk not of the nature, substance and quality demanded by reason of a deficiency in fat, if the defendant after purchase has added a preservative to the milk inasmuch as Section 25 of the Sale of Food and Drugs Act, 1875, requires that the article shall be sold "in the same state as when purchased."

This was a case stated by the justices of Southampton on the hearing of an information preferred against the respondent by the appellant, an Inspector of Nuisances for the borough and county of Southampton, under Section 6 of the Sale of Food and Drugs Act, 1875, charging the respondent with selling milk deficient in fat to the extent of 5·2 per cent at least below the limit fixed by the Board of Agriculture. The justices were equally divided in opinion as to whether or not a warranty in this case amounted to a defence under Section 25 of that Act, and in consequence they dismissed the information.

The Analyst's certificate showed that the sample taken was deficient in fat to the extent of at least 3 per cent, and in the opinion of the Analyst it contained added water to the amount of 5·2 per cent at least below the limit fixed by the Board of Agriculture. The certificate also stated that the sample contained "boric acid preparation as a preservative." Notice having been given by the defendant that he relied as a defence on a warranty given by the vendor to him, evidence for the prosecution was called to show that the person who gave the warranty had not at any time added any boric acid preparation to the milk, and the respondent admitted that he had added such a preparation, but said he had done so without previously dissolving the same.

The prosecution contended that the addition of the preservative prevented Section 25 of the Sale of Food and Drugs Act, 1875, applying. That section provides as follows: "If the defendant in any prosecution under this Act prove to the satisfaction of the justices or court that he had purchased the article in question as the same in nature, substance and quality as that demanded of him by the prosecutor, and with a written warranty to that effect, that he had no reason to believe at the time when he sold it that the article was otherwise, and that he sold it in the same state as when he purchased it, he shall be discharged from the prosecution, but shall be liable to pay the costs incurred by the prosecutor unless he shall have given due notice to him that he will rely on the above defence."

Emanuel appeared for the appellant, the respondent not appearing. The court allowed the appeal, holding that the case should be tried on its merits.

LORD ALVERSTONE, L.C.J., said it was possible that Parliament meant that there should not be a discussion as whether what was added effected an adulteration or not. But be that as it may, in this case there was an

attempt to say that the warranty was a defence upon the ground that the defendant had sold the milk in the same state as when he purchased it, because he had only put in boric acid, which had nothing to do with adulteration. Now, it is perfectly plain that there was a case to be investigated here. The analysis shows that there was an excess of water to the extent of 5 per cent, and it seems to me, having regard to the case that was stated, there was certainly a case to be investigated with reference to circumstances under which this water got into the milk. Under those circumstances the warranty alone could not afford a defence, because something had been added, the effect of which can only be determined when all the case has been heard, and it is evident that the real case to be tried is not the case under Section 25, but is the case whether there is any defence under the protective words of Section 6 itself.

WILLS, J.—To my mind Section 25 of the Act of Parliament is perfectly plain, and I cannot help thinking that what the legislature really meant was, we will not have on this defence of warranty any question whether the thing added to the milk or subtracted from the milk has done harm or not; if you rely on the warranty, you must show that it was exactly what you purchased.

KENNEDY, J., concurred.

KING'S BENCH DIVISION.

March 29th, 1904.

BEFORE LORD ALVERSTONE, L.C.J., DARLING AND CHANNELL, JJ.

THOMPSON v. ECCLES CORPORATION.

Public Health Acts—Drain or Sewer—Single Private Drain—Section 19 of Public Health Acts Amendment Act, 1890.

A pipe made on private land and draining two or more houses belonging to different owners into a public sewer, is a sewer and not a drain, and a local authority in the event of such a pipe becoming a nuisance cannot require the owner to amend it under Section 19 of the Public Health Acts Amendment Act, 1890. Hill v. Hair (1895) 1 Q.B. 906 followed. Bradford v. Eastbourne Corporation (1896) 2 Q.B. 205 not followed.

This was a case stated by justices for the Borough of Eccles, on a complaint by the respondents, the Sanitary Authority, against the appellant under Section 41 of the Public Health Act, 1875 and Section 19 of the Public Health Acts Amendment Act, 1890, for failing to comply with the requisitions of a nuisance notice as to a drain connected with certain premises belonging to him. The alleged drain complained of was part of a nine-inch pipe running through or under the cellars of several houses of the appellant, and receiving the drainage of each. Before it reached the place in question it also received the drainage of several houses belonging to another owner, all of which it conveyed to the public sewer in the adjacent street. It was contended before the justices that the pipe was a sewer and not a drain, and that it was the duty of the local authority to keep it so as not to be a nuisance. It was also contended that the respondents could not order structural alterations under Section 41 of the Public Health Act, 1875.

The justices found that the pipe in question was used by two or more houses belonging to different owners, and was a single private drain within the meaning of Section 19 of the Act of 1890, and made an order upon the appellant to abate the nuisance and to do any works necessary for that purpose.

G. Rhodes appeared for the appellant, and *Fleetwood Pritchards* for the respondents. The Court allowed the appeal.

LORD ALVERSTONE, L.C.J., in giving judgment, said he hoped the Court of Appeal or the House of Lords might be able by sweeping away some of the conflicting decisions to reduce the law to a logical system, or that the Act of 1890 might be amended by the insertion of a definition of the expression "single private drain."

The cases of *BRADFORD v. EASTBOURNE CORPORATION* (1896) 2 Q.B. 205, and *SELF v. HOVE COMMISSIONERS* (1895) 1 Q.B. 685, had decided that when a pipe running through private land receives the drainage of several houses, the effect of Section 19 of the Act of 1890 is to convert the pipe into a private drain if the houses belong to different owners, and to leave it a sewer if the houses all belonged to one owner. This conclusion seemed absurd and ridiculous and to be avoided. This case was practically the same as the *EASTBOURNE CASE*, but as there were conflicting decisions, a choice might be made. He was of opinion that the pipe in question was a sewer. As to the other ground of appeal, he was of opinion that structural alterations might be required under Section 41 of the Act of 1875.

DARLING J., concurred.

CHANNELL, J., said he thought it was impossible to reconcile the provisions of Section 19 of the Act of 1890 with the general definition clause in the Act of 1875. The most probable explanation was that the person who framed the section was under the impression that a drain pipe which drained a number of different houses belonging to the same owner was a single private drain, which was not the law. That was a solution, however, that the Court could not adopt. There might be cases of a single private drain draining more than one house, within the meaning of the Act of 1875, and if so, then he thought the only intelligible meaning of Section 19 was to confine it to such cases.

NORTH LONDON POLICE COURT.

May 30th, 1904.

BEFORE MR. FORDHAM,

ISLINGTON BOROUGH COUNCIL v. HILLYER.

Sale of Food and Drugs Act—Brandy.

In this case a summons had been taken out by the Islington Borough Council against the defendant, a wine and spirit dealer, for selling as brandy an article said to contain 60 per cent of spirit derived from a source other than the grape.

A. M. Bramall, solicitor, appeared for the prosecution, *Horace Ivory, K.C.* and *Bonsey* for the defendant.

Mr. FORDHAM in his judgment said: This is a summons under Section 6 of the Food and Drugs Act, 1875. The offence alleged against the defendant is that he sold to the prejudice of the purchaser as brandy, that which was not of the nature, substance, and quality of brandy. The bottle which was sold was labelled "Fine old pale brandy." The inspector submitted a third part to Dr. Teed for analysis, who, on the assumption that brandy is an article the spirit of which is exclusively derived from the grape, gave a certificate that the sample submitted to him contained 60 per cent of spirit not derived from the grape. The question was whether the bottle did contain what was asked for by the agent, and what it was represented by the defendant to contain. There was no standard for

brandy, and the decision would depend on what the ordinary purchaser understands brandy to be. The word is derived apparently from the term *brant wein* or *brand wein*, meaning burnt wine. The British Pharmacopoeia described brandy as a "spirit derived from the grape." Other definitions, as given by witnesses, were: "A spirit distilled from the grape or from wine," "spirit from the grape," "spirit distilled from wine," "the distilled fermented juice of the grape," "the produce of grape wine distilled," "grape spirit." The only witnesses in the case who did not generally agree with the definition of brandy as found in the books were Mr. Pank, of the firm of Brown and Pank, wine and spirit merchants, of Mark lane, and Mr. McKechnie, of the firm of Bowen and McKechnie, wine and spirit merchants in Cross street, Finsbury. Mr. Pank said, "Brandy has never been exclusively a spirit derived from the grape." Mr. McKechnie said that a mixture of cognac (brandy distilled in a pot-still from wine) with spirit derived from anything, was brandy. The ordinary purchaser (apart from the trade) understood by the word "brandy" an alcoholic liquid the spirit of which was obtained by the distillation of wine from the grape. Evidence had been given that brandy produced by the distillation of wine was a spirit, the alcohol of which contains particular so-called "impurities" in more or less certain proportions, a large proportion of ethers to a small proportion of the higher alcohols, and that this characteristic made brandy so produced a more desirable stimulant for use as medicine than any spirit produced by any process from any other material. Dr. McNaughton-Jones, a medical practitioner of great experience, attributed the great value of brandy in medical practice to the ethers it contains. If he were right in this, it would seem desirable for the Legislature to fix a standard for brandy, defining what brandy is, and the proportion of ethers it must contain—perhaps 80 parts in 100,000 of alcohol. No doubt that much which was sold as brandy was a liquid, the spirit of which was a mixture of the result of the distillation of wine and the result of the distillation of grain or other material. Some was spirit derived from grain, flavoured with a small proportion of spirit derived from wine. Some brandy was made largely of spirit obtained from bad wine, so highly rectified to take its bad flavours from it, that it has become a silent spirit with none of the so-called "impurities" which are among the most valuable properties of spirit distilled from wine. This silent spirit having its origin in the grape, had no more of the qualities of brandy than has spirit distilled from grain and rectified until it has become silent; yet it had been urged in this case that such silent spirit when flavoured with spirit distilled from wine was properly brandy, because it had its origin in the grape. He should not accept that view. However, it was enough for the purposes of the case to hold that brandy was an alcoholic liquid, the spirit of which is obtained by the distillation of wine from the grape. Now, having determined the standard, he had to find whether this bottle of liquid sold by the defendant was a bottle of brandy. According to Dr. Teed's analysis, the sample contained 60 per cent of spirit not derived from the grape. He came to this conclusion mainly because he found that the spirit contained a small proportion of ethers—40·9 in 100,000 parts of alcohol. He had not taken out the proportion of higher alcohols. To Dr. Teed the liquid was silent spirit mixed with a small proportion, probably one-third, of spirit distilled from the grape, and he formed the opinion that the greater part of the spirit in the sample was derived from grain, because the secondary or by-products of his analysis were in much the same proportions as those given by the analysis of whisky, a grain spirit. Mr. Saloman, Mr. Hehner, Mr. Chapman, and

Mr. Bevan were the analysts called for the defence, and their evidence came to this: That if rectified grape spirit were mixed with a proportion of grape spirit, the whole was brandy, and no one could tell whether rectified spirit so used ever had its origin in the grape or not; it might be rectified spirit from almost any material, because all highly rectified spirit (silent spirit) was analytically the same. That being so, Dr. Teed could not say that the sample he analysed contained grain spirit, or, in fact, that it contained any spirit that had not its origin in the grape. Assuming the sample to contain silent spirit, they would not say that it did not contain spirit derived from grain. Mr. Hehner's evidence was specially material, because he had analysed the third part of the bottle purchased, and he admitted that the result of his analysis was as compatible with the spirit in the sample being a grain spirit as with its being a wine spirit. The evidence of the analysts amounted to this: those called by the prosecution said that this sample contains a proportion of spirit not derived from the grape; those called by the defence said that no one could say whether that was so or not; so they could not say that the sample did not contain such spirit. After dealing with the evidence of the tasters, he said that he came to the conclusion that Dr. Teed was correct in his analysis, and in the opinion he formed upon it; and he found that the bottle of liquid labelled "fine old pale brandy" sold by the defendant as brandy, was not brandy, and that the purchaser was prejudiced and did not get the article of the nature, substance, and quality demanded. He, therefore, convicted the defendant. In fixing the penalty, he considered the defendant really had no intention to cheat the purchaser or the public by selling the mixture as brandy. He ordered the defendant to pay a fine of £5 and £50 costs, and in default of distress he directed him to be imprisoned for one month as a second-class misdemeanant.

FORMALIN AND SKIN DISEASE.—Dr. Monckton Copeman's Report to the Local Government Board on an Outbreak of Epidemic Skin Disease at the Central London Sick Asylum, Hendon, which has recently been issued, points to a danger from the employment of certain preservatives in milk, and possibly in other articles of food. In September last an outbreak of dermatitis occurred in the Hendon Hospital of the Central London Sick Asylum District, which Dr. Copeman was instructed by the Local Government Board to investigate. The malady appeared to be the same as has been noted in various metropolitan infirmaries, and which was described in 1895 and 1896 as "epidemic skin disease." In the Hendon epidemic the type of the disease was less severe than in previous outbreaks, and though 68 persons were attacked there were only two deaths. In previous outbreaks there had been reason for suspecting that the milk supply had played some part in the causation of the disease. In this instance also inquiry pointed to the milk as a probable cause, and on those suffering from the malady being put on Swiss milk they all began to improve. Samples of the milk remained good for so long (three or four days), in spite of unfavourable weather, that there was consequently strong presumption that some preservative had been added, though this was denied by the contractor. A subsequent analysis of some of the milk showed the presence of formalin. The presence of formalin in milk is undesirable, for reasons apart from its possible connection with epidemic skin disease. If, as is stated, 15,000 gallons of formalin (40 per cent solution of formic aldehyde) have been sold to milk vendors in one year, some check must be put on the use of this preservative in milk.—B.M.J.

CORRESPONDENCE.

FLEAS IN RELATION TO PLAGUE.

To the Editor of "Public Health."

SIR,

In the course of a review of the report of Dr. Ashburton Thompson upon the second outbreak of plague in Sydney (1902), in the March issue of *Public Health*, certain points are noted in connection with the convection of plague to man by means of fleas. Your reviewer remarks amongst other matters dealt with in his able criticism, that "the weakest link in the chain is in reality the absence of any proof that the rat-flea is under any circumstances so commonly parasitic to human beings as to become an ætiological factor of any epidemiological significance whatever" (page 365, Vol. xvi.). In consequence of certain work performed in this direction by myself and others, I am desirous of pointing out that the very marked differences in structure and habits exhibited by different species and genera of fleas found in association with rats, are so evident as to render it almost as loose from the aspect of scientific nomenclature to speak unqualifiedly of "the rat flea" in relation to plague, as to brand "the mosquito" in bulk as the conveyer of human malaria. Vague statements as to the structure and habits of "rat fleas" in various parts of the world cannot be taken as scientific evidence, since the flea most commonly found on rats, in Bombay and in certain parts of Australia at least, is a *Pulex* closely resembling the human *pulex irritans* in structure, while that which appears to play a like part in the parasitology of English rats is a *Ceratophyllus*, differing widely from either of the pulices mentioned. Whether the Indian and Australian species are identical or not, I must leave to those who make the Siphonaptera a special study, but I can testify from personal observation that while the rat *pulex* of New South Wales, Victoria, and Western Australia, at any rate, closely resembles the *pulex pallidus* of Bombay, the common rat-fleas of Tasmania and New Zealand are widely different from either, as is the common rat-flea of England. The occurrence of rat plague in the States first named and in Bombay, and its absence or great infrequency in the latter ones and in England, is to my mind a significant factor in the epidemiology of plague. That the rat-*pulex* of Bombay and Victoria will under certain circumstances feed vigorously upon human beings, I know from direct observation, and I am also convinced that the *Ceratophyllus* and *Typhlopsilla* genera can only be induced to do so with great difficulty, if at all. The latter fact possibly explains the negative result obtained by Professor Galliard, since he probably employed the European *Ceratophyllus*. The human flea (*pulex irritans*) will also feed on rats experimentally, if starved for a time.

The experiment of Signor Guiseppe Xirolia is of interest in that he notes the multiplication of the bacilli in the body of the flea, and their viability therein for several days at least. The feasibility of the washing out of the proboscideal duct by a stream of blood injected into the subject before feeding is, however, somewhat unlikely, since the blood is rapidly broken up in the gizzard-like proventriculus, and passes into the stomach through a valvular structure somewhat resembling the ileo-cæcal valve, which would prevent regurgitation. The bacilli apparently remain almost wholly in the proventriculus, which possesses a lining of fine comb-like processes projecting into its lumen.

The question of the relative frequency of the *pulex* species of rat-flea as habitual parasites of man requires further investigation, but there is no doubt that it does on occasion frequent and feed upon a human host. The migratory habits of these insects, living as they do in the bedding, clothing, etc., of the host, and only visiting him for feeding purposes, render their discovery at any given time more or less accidental. Given, however, the following facts, it will be admitted that the flea cannot be dismissed offhand as an innocent agent in connection with plague, the report of the Indian Plague Commission notwithstanding:—

1. Fleas of certain species will carry virulent plague bacilli for at any rate several days, and these bacilli are apparently capable of multiplying in the body of the insect without doing it any apparent harm.

2. The common rat-flea of certain localities wherein rat-plague is habitually associated with human plague, is a *pulex* closely resembling the *pulex irritans* of man, whilst that of certain other localities wherein rat-plague is not so associated, belongs to another genus or other genera, differing widely in structure and apparently also in habits.

3. The inoculation of blood containing plague bacilli or of the bacilli separated from the blood of either rat or man, will produce plague in man.

4. The rat-pulices of Bombay and of certain parts of Australia at least, will feed on man when hungry, and the *pulex irritans* will similarly feed on rats.

5. The plague bacillus probably exists in the blood of every fatal human case at some time, and certainly does so in great numbers in the "septicæmic" form of the disease. It also exists in great numbers as a rule in the blood of plague-stricken rats.

It does not therefore require an excessive stretch of the imagination to accept the hypothesis that plague in its so-called bubonic and septicæmic forms may be and habitually is spread through the agency of a particular genus of flea, including not only those pulices which are found to act as rat-parasites, but also the *pulex irritans* of man (which is stated to be constant the world over) and possibly others, generically differing from the Ceratophylli and allied groups as widely as do the Anophelina from the Culex genus amongst mosquitoes. I submit this hypothesis as perhaps affording the most reasonable explanation of the wide variations which are to be noted in the incidence of this fell disease upon mankind and the lower animals, from ancient times to the present day, and as tending to elucidate the otherwise apparently inexplicable vagaries of its spread in infected localities. The bearing upon plague operations if this hypothesis be accepted, is obvious.

I remain, Sir,

Obediently yours,

J. S. C. ELKINGTON, M.D., D.P.H.

Chief Health Officer for Tasmania.

HOBART, TASMANIA,
April 24, 1904.

CYLLIN AND B. PESTIS.

To the Editor of Public Health.

DEAR SIR,

The results reported in your June issue of some tests of Cyllin with *B. pestis* are so different from those recently obtained by me in a series of tests with *B. typhosus*, that there seems some danger in accepting them, lest too great trust be placed in the virtues of that disinfectant.

My experiments were made with Cyllin (Medical) purchased in an unopened bottle from a local druggist, and gave uniformly the same result, viz., that Cyllin 1-2000 and 1-1000 failed to prevent growth of a twenty-four hours' broth culture of *B. typhosus* after twenty minutes exposure, while Cyllin 1-500 gave results equal to Carbolic Acid 1-100.

The natural conclusion seems to be either that Cyllin has a special effect on *B. pestis*, or that the drug used by me was weaker than that tested by Dr. Klein.

It would be interesting to know what results others have obtained.

I am, Yours faithfully,

A. GRIFFITH,
M.O.H., Hove.

June 13th, 1904.

INTERNATIONAL CONGRESS ON HOUSE SANITATION.—An International Congress on the sanitary improvement and salubrity of dwellings will be held in Paris, from the 15th to the 20th of October, in connection with the *Exposition Internationale*. The work of the Congress is to be divided among six sections, dealing respectively with town dwellings, rural dwellings, workmen's dwellings, hotels and furnished apartments, schools and floating habitations. Communications and applications for membership should be addressed to the Secretary-General of the Congress, M. F. Marié-Davy, 7 rue Brézin, Paris (14e Arrondt).

DEATHS AMONG ILLEGITIMATE CHILDREN.—The high death-rate amongst these illegitimate children is to a considerable extent due to the fact that in many cases the burden of expense incidental to the birth of the child and to its subsequent maintenance is borne principally by the mother, with the result that the child is put out to nurse, and is thus deprived of maternal care. Our legislature would do well to follow the example of New South Wales, where a law is enacted which provides that a mother may take legal action against the father of her prospective child before its birth, and also makes it possible for the Court to compel the payments of the expenses, incidental to the child's birth, and for the maintenance of the mother for one month before confinement and for six months after, and also for the maintenance of the child.—(J. Hedley Marsh, *Annual Report*, Macclesfield).

MUNICIPAL MILK DEPOTS IN LONDON.—The Council, after careful consideration, decided in favour of the establishment for Lambeth Borough of a Municipal Milk Depot, from which could be obtained by the poorer classes, at a nominal cost, a supply of sterilized (humanized) milk, the use of which, it was felt, would help to materially lessen the large infantile death-rate that is noticeable chiefly in the Inner Wards of the Borough. The L.G.B. has officially decided, however, that, in London, money for such a purpose cannot legally, in the present state of the law, be taken from the rates—a most unfortunate decision as far as London is concerned, and an unjust one if provincial towns (such as Liverpool, St. Helen's, Glasgow, etc.) are to be allowed to spend their rates for such a purpose without let or hindrance. The Lambeth Council will have to attack the subject of excessive infantile mortality in other ways.—(J. Priestley, *Annual Report*, Lambeth).

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED, 1888. INCORPORATED, 1891.

Metropolitan Branch.—An Ordinary Meeting of the Branch was held at the Offices of the Society, No. 9, Adelphi Terrace, on May 31st, 1904. Present: Dr. Dudfield (President), S. F. Murphy, Bryett, Caldwell, Smith, McCleary, Sidney Davies, Newman, Allan, Annis, and Priestley (Hon. Sec.).

Provision of Sanatoria for Consumptives.—It was resolved to write to the Local Government Board, and ask what action (if any) the Board had taken, or were proposing to take, in connection with the Branch's suggestion (contained in their letter of February 8th, 1904) re an enquiry into the subject of Provision of Sanatoria for Consumptives by the Metropolitan Asylums Board, or otherwise.

Draft Bye-laws re Houses let in Lodgings.—The Draft Bye-laws prepared by the Local Government Board were referred to the Council of the Branch for consideration and report.

References from the Society.—The six resolutions (passed by the Society on January 8th, 1904, and referred to the Branches for consideration) re Food Adulteration, were discussed, and resolutions 1, 2, 4, 5 and 6 were agreed to *nem. con.*, but in the place of resolution 3 (dealing with warranty), the following resolution of the Branch, which was passed on March 24th, 1904, was substituted:—

"That it is advisable that the Warranty sections of the Food and Drugs Acts, 1875 and 1899, should be amended so as to prevent any defence of Warranty being allowed under such Acts in regard to Milk."

Vote of Thanks to Mr. Kent.—A unanimous vote of thanks was given to Mr. Kent (on his retiring from the service of the Society) for his work as Clerk to the Metropolitan Branch.

Tuberculosis (Animals) Compensation Bill, 1904.—It was resolved to take no further action in this matter as a Branch, on account of the Incorporated Society having already disapproved *in toto* of the principle of the Bill.

West of England and South Wales Branch.—A meeting was held on May 19th at Winsley Sanatorium, near Limpley Stoke. Present: Dr. Tubb Thomas (President), Drs. Symons (Bath), J. Pearce (Trowbridge), Keir (Melksham), W. J. A. Adye (Bradford-on-Avon), T. E. Streeten (Swindon), C. W. Vickers (Paignton), W. Williams (Glamorgan C.C.), E. Walford (Cardiff), Herbert Jones (Hereford), Howard Jones (Hon. Sec.), Messrs. J. Hancocke Wathen, and C. J. Waterfall (Associates), and the following visitors. Messrs. H. C. Taylor (Trowbridge), W. G. Evans (Beckington), D. Campbell (M.O.H. Calne), Herbert W. Matthews (Bath), P. Watson Williams (Clifton), L. B. Weatherley (Chairman Winsley Sanatorium), S. S. Reay (Architect), and R. Isgar.

After a general tour of the buildings by the members and visitors on their arrival, the formal business meeting was held in the Sanatorium.

Dr. HERBERT JONES stated that a deputation from the Society had joined a deputation to the Local Government Board in favour of a

Quinquennial Census being inaugurated by the Government, and that the deputation was met very sympathetically by Mr. Long, who said it was altogether a matter of money. The Society was very hopeful that they might be able to get it established.

Dr. Herbert Jones also gave notice of motion that a sum of money be contributed from the funds of the Branch toward the establishment of a Lending Library open to all members. This was seconded by the Chairman.

Dr. WALFORD followed with "Notes on the Influence of Hospital Isolation upon Scarlet Fever at Cardiff."

After discussion, it was proposed by Dr. Herbert Jones, seconded by Dr. Streeten, and carried, "That in the opinion of this Branch the isolation of Scarlet Fever patients in properly administered Hospitals is desirable."

The meeting then adjourned to a delightful woodland retreat in the grounds, where they were entertained to tea by the President.

The PRESIDENT called upon Dr. Weatherley, the Chairman of the Hospital Committee, for a description of the Hospital, etc., which he gave.

A vote of thanks to the Hospital Committee and to the President for his hospitality, concluded the proceedings. Before their departure members made a detailed tour of the buildings, which were highly approved of, with the exception of the lack of cross ventilation of the lavatories etc. in the patients' departments.

North-Western Branch.—A meeting of the Branch was held, by the courtesy of Professor Delépine, in the Pathological Laboratory of the Owens College Medical School, on Friday, May 20th. Present: Dr. W. Berry, J.P. (President), Drs. Greenwood, J. A. Harris, Fraser, Graham, Wells, Coutts, Sergeant, Laird, Wayward, Wilkinson, Edlin, Vacher, Stephenson, Meredith Young, and Professor Delépine.

Dr. H. E. Edlin, M.O.H., Levenshulme, read a paper on an outbreak of anthrax.

Professor Delépine then gave a naked eye and microscopical demonstration of the subject, specimens being shown from the case referred to by Dr. Edlin in his paper.

THE RE-VACCINATION BILL.—During the debate on the second reading of this Bill, Lord Lansdowne, speaking on behalf of the Government, said that they were not hostile to the principle of the Bill. In Germany, where re-vaccination was compulsory, there were only 607 deaths from small-pox in a population of 56,000,000 during twelve years, whereas in this country, with a population of 32,000,000, the deaths from small-pox in the same period numbered 6,700. The Government were therefore convinced of the value of re-vaccination, and the operation was now performed free of cost; and in this way the Local Government Board had attempted to lead rather than drive the people. Lord Lansdowne, however, plainly stated that the Government was not to be understood as being committed to the details of the Bill, and it would be impossible to contemplate the passing of the Bill during this session.

CURRENT PUBLIC HEALTH LITERATURE.

Analyst, May, 1904.

- Original Communications.*—On Analysis of Jams. Raymond Ross.
On the Estimation of Morphine in Opium. Philip Schidrowitz.
On the Analysis of Potable Spirits used by the native population in India, H. H. Mann.
Abstracts.—Determination of Dirt in Milk. M. Ballo. (*Oesterreich. Chem. Zeit.*, 1904.)
Composition of Goats' Milk. Buttenberg and Tetzner. (*Z. f. Untersuch. der Nahr. u. Genuss.*, 1904, 270-272).
An Organic Phosphorus Compound in Natural Wine and Grape Stones. (Weirich & Ortlieb, *Chem. Zeit.*, 1904, 153-154).
The Detection of Citric Acid in Wine. (A. Devarda, *Zeit. landw. Versuch. in Oesterreich.*, 1904, 1.)
Breakfast Foods. (*Iowa State Coll. Agric. Bulletin*, 74, 101-114.)
The Determination of Xanthin Bases in Yeast Extracts. (K. Micko, *Zeit. f. Untersuch. Nahr. u. Genuss.*, 1904, 257-269.)
Sand in Cayenne Pepper. (R. Windisch, *Z. landw. Versuch. in Oesterreich*, 1904, 19.)
Detection of Turmeric in Powdered Rhubarb. (J. Anselmier, *Schweiz. Wochens. Chem. Pharm.*, 1904, 119.)
Determination of Formaldehyde.
Contributions to the Study of Cigarette and Pipe Smoke. (J. Habermann, *Zeit. Physiol. Chem.*, 1903, 148.)
Apparatus for taking Sample of Water some depth below the surface. (A. Bugard, *Zeit. f. Untersuch. Nahr. u. Genuss.*, 1904, 221-222.)

Zeitschrift für Hygiene und Infektionskrankheiten.
(Edited by Profs. Koch and Flügge.)

Vol. 46, Part III.

- 1.—Ueber die Agglutination verschiedener Typhusstämmen. (On the agglutination of different typhoid strains.) By Dr. Rufus Cole (Berlin and Baltimore.)
In these experiments the importance of knowing the agglutinating power of the strain of typhoid bacilli used for the Widal reaction is emphasized.
- 2.—Experimenteller Beitrag für Typhusimmunität. (By same author.)
Experimental contribution on typhoid immunity.
The experiments here described were carried out with a view to explaining the fact that immunity against typhoid remains for a long time after the specific anti-bodies have disappeared from the blood serum. Behring explained this by adopting a histogenic and a hæmatogenic immunity, viz., that after the serum had ceased to be immune the cellular-tissues retained this property. Author suggests another explanation, viz., that according to the side chain theory, cells which have once produced receptors which bound the haptophoric group of the infectious material, react much more quickly to a renewed invasion than normal ones. In

- experimental support of this theory he shows that rabbits which have been rendered immune against typhoid, and kept till the anti-bodies have disappeared from the serum, produce them again much more quickly and after a much smaller dose than rabbits not previously immunized.
- 3.—Trypanosoma Heileri? in Deutsch-Ostafrika. By Dr. Otto Panse.
This is a short description of a trypanosome found in the island of Mafia, which resembles the T. Heileri.
 - 4.—Ueber Versuche mit Formaldehydwasserdampf nach dem Verforen v. Esmarch's. (Experiments with formaldehyde steam after Esmarch's method.) By Drs. Kiste and Trautmann, Hamburg.
This is an account of experiments instituted for the purpose of finding out some method of disinfection suitable for leather, furs, and similar perishable objects. In some previous laboratory experiments by Esmarch, it was found that steam, heated to 103-104°C., impregnated with formalin, was more effectual than steam or formalin alone. The steam gives the penetrating power which formalin alone lacks. Arguing from this it was thought that steam, produced at a lower pressure than the atmosphere, and at about 80°C. or less, impregnated with formalin, would be useful for disinfecting the objects mentioned above. A special apparatus was constructed for the purpose, but the results proved unsatisfactory. Further experiments with a differently constructed apparatus are to be carried on.
 - 5.—Die Vorgänge bei der Zersetzung und Gerinnung der Milch. (The processes in the decomposition and coagulation of milk.) By Dr. R. Thiele (Halle).
 - 6.—Untersuchungen über die Geflügeldiphtherie. (Enquiries into diphtheria in birds.) By Dr. med. vet. Hans Streit (Ontario).
This is an exhaustive enquiry into the so-called fowl diphtheria, or roup, as it occurs in Canada. He confirms previous enquirers, viz., Prof. F. C. Harrison, and Dr. Stevenson, London (Ont.), that this disease has no connection with human diphtheria. It presents analogies in its pathological and clinical aspects with the latter disease, but is caused mainly by a bacillus which author has named the roup bacillus. Similar symptoms can be caused by other micro-organisms such as the *B. pyocyaneus*, the *B. diphtheriæ columbarum* (Loeffler), *B. dip. gallinarum* (Soir and Ducloux). There are several photo plates, representing the disease in its clinical, pathological, and bacteriological aspects.
 - 7.—Ueber die Meningitis cerebro-spinalis epidemica und ihren spezifischen Erreger. (On Meningitis cerebro-spinalis epidemica and its specific cause.) By Drs. A. Bettencourt and Carlos Franca (Lisbon).
This is an account of an epidemic of cerebro-spinal meningitis which started in Portugal in December, 1900, and up to June, 1903, amounted in all to nearly 8,000 cases. The authors enter very fully into the clinical and bacteriological aspects, and confirm previous investigators as to the *B. intracellularis meningitidis* (Weichselbaum) being the immediate cause, although they failed to infect the lower animal with it. They do not enter into the preventive aspect of the disease.
 - 8.—Die Verbreitung der Tuberculose in der europäischen Staaten. (The dissemination of tuberculosis in the European countries.) By Dr. Fr. Prinzing, (Ulm).

This is a very interesting paper from an epidemiological point of view, since the author endeavours to reduce the statistics of the various nationalities to a common basis for the purpose of comparison. The difficulties which he endeavours to deal with are those brought about by the varying percentages of death certified by medical men in different countries, the difficulties of accurate diagnosis in certain cases, such as *tuberculosis mesenterica* in England, and the different age periods and methods of classification of the parts of the body affected, adopted.

**Deutsche Vierteljahrsschrift fuer oeffentliche Gesundheitspflege.
36ter 2tes Heft. Braunschweig. 1904.**

- S.287.—Gesundheit und weittraumige Stadtbebauung. (Health and the Building of Towns with abundant Air Spaces.) Th. Oemcke, Gross-Lichterfelde, near Berlin. (Councillor for Buildings.)
S.306.—Schwefelwasserstoff, Seine Gefahr für Sielarbeiter. (Hydrogen sulphide, its danger for workers in sewers. Dr. E. Pfeiffer, (Hamburg).
S.311.—Hygiene und volkswirtschaftliche Bedeutung des Fleisches. (The hygiene and politico-economic importance of meat). Dr. S. Oberndorfer, (Assistant at the Royal Pathological Institute of the University of Munich.
S.362.—Das staatliche Aufsichtsrecht bei zentralen Wasserversorgungsanlagen. (The governmental powers of supervising central water supplies.) Regierungsrath Krenzlin, (Arnsberg).

New Publications Received.

- The Examination of Waters and Water Supplies. By J. C. Thresh, D.Sc., M.D., &c. Price 14/- net. J. & A. Churchill.
Model Answers to Questions set by the Sanitary Institute. Price 2/6 net. The Sanitary Publishing Co., Ltd.
Livingstone College Year Book, 1904. Price 6d. Livingstone College, Leyton.
Nomenclature des Maladies, par le Dr. Jacques Bertillon. Montévrain, Imprimerie Typographique de l'Ecole d'Alembert.
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OBSERVATIONS ON THE INCIDENCE OF SCARLET FEVER IN DIFFERENT DISTRICTS OF THE SAME TOWN.*

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HAVING been invited by the Secretary of the North of England Branch of this Society to read a paper on the occasion of the Annual Provincial Meeting this year, I have chosen the subject of Scarlet Fever for several reasons, viz.: (1) On account of the special interest in the subject evoked by recent papers and discussions dealing particularly with the effect of hospital isolation on the prevalence and spread of the disease; and (2) On account of the prominent position which this disease has occupied in South Shields from the earliest times of which we have record.

Out of a great many points of interest which one comes across in the study of this disease from a preventive medicine standpoint, I have selected one as the subject of my paper, viz., the differences which the various districts of one town exhibit in respect to the prevalence of the disease. The town on which my observations have been made is South Shields, but I think it is probable that similar differences are evident between the several districts of other towns, and hence I have preferred to use the term "the same town," and not "South Shields."

At the time of my appointment to South Shields, some three years ago, and for the next six months, scarlet fever was epidemic in the town, and it was in reporting on this epidemic at the end of the year

* Read at the Provincial Meeting of the Society of Medical Officers of Health at Newcastle-on-Tyne, July 2, 1904.

1901, that I was first struck with the marked differences in the prevalence of the disease shown by the various districts of the town. I have since then had two further years' experience of the course of the disease, during which the epidemic wave has entirely subsided and been followed by a year in which the number of cases of scarlet fever reached an unprecedentedly low figure; and I have also made investigations into the distribution of the disease during the period 1892 to 1900, as well as during the years 1901 to 1903, the total period considered being one of twelve years.

At last census the town was divided into eighty enumeration districts, and I obtained for each of these full details of population, with the numbers living at different ages, and regarding the number and size of houses therein. From these figures the population for the preceding and following years has been calculated by means of the record of houses built in each district in each of the years in question, the number of new houses being multiplied by the average number of persons per house found to exist in the district at the census.

I would in the first place put before you the figures for the years 1901-1903, as these are evidently the most accurate, and as this is the period during which, I have been personally in charge. I may point out that the distribution of the disease during this comparatively limited period gives fairly reliable data for instituting a comparison between different districts, for the following reasons: (1) The large number of cases occurring during the period, viz., 2,475; (2) The fact that, with one exception, every enumeration district in the town has been invaded; (3) The manner in which the epidemic wave swept through the town, passing from two small areas, first westward and southward to the borough boundary, and then north and east to the sea, thus passing over the whole borough. The town is divided into ten wards, and the following table shows the extent to which scarlet fever prevailed in each of these during 1901 to 1903 (Table I).

In this table the attack rates are given for each of the three years, as well as the average rates. The average rates are those to which the chief importance must be attached, and it is seen that they vary very considerably, viz., from 5.2 per 1,000 to 11.8, the one rate being more than double the other. Why should there be this great difference? It is somewhat difficult to answer this question. Each of these wards differs from the others in various respects, *e.g.*, age-constitution, social condition, physical features such as elevation, exposure, and subsoil. They also differ with respect to the proportion of cases which have been removed to hospital.

TABLE I.
INCIDENCE OF SCARLET FEVER ON DIFFERENT WARDS OF SOUTH
SHIELDS, 1901-1903.

Wards	Shields.	St. Hilda.	Holborn.	Beacon.	Lents.	Westoe.	Laygate.	Rekendyke.	Deans.	Tyne Dock.	Whole Borough.
Attack-rate, 1901	9.8	8.9	8.4	15.8	9.8	19.0	13.8	16.9	13.1	9.0	12.5
Ditto 1902	4.2	4.8	4.8	6.8	10.6	10.8	6.8	9.0	11.5	6.8	8.0
Ditto 1903	2.2	8.5	2.5	4.8	8.6	5.5	2.6	2.8	3.4	8.4	8.6
Average attack-rates, 1901-1903	5.8	5.8	5.2	9.0	7.9	11.8	7.7	9.0	9.8	6.1	8.0
Corrected average attack-rates ...	5.17	5.75	5.28	9.0	8.65	11.09	6.92	8.32	8.86	6.51	—
1901 % of cases removed to hospital ...	50	42	56	41	84	80	84	85	87	85	89
1902 ditto	72	92	66	42	44	44	58	48	41	58	48.9
1903 ditto	90	95	95	47	53	60	88	93	68	89	71
Average ditto	70	76	72	48	48	44	60	57	47	59	52.9
% of population under 15 ...	37	36	36	35	32	37	40	38	39	38	34
Average scarlet fever death rates, 1901-1903	.29	.126	.146	.16	.33	.736	.67	.378	.366	.198	.36
Average general death rates, 1902-1903 ...	22.2	23.7	24.1	15.4	15.5	14.4	22.7	17.0	16.3	17.6	18.2

In respect to one of the above-mentioned characteristics, viz., age-constitution, we have definite information to guide us as to the part such differences play in increasing or lowering the attack rate in any district. It is well known that it is in the early years of life that the great majority of attacks of scarlet fever occur, and that consequently a higher attack rate is to be expected in a district having a large proportion of children in its population, than in one where the proportion of children is low.

In the year 1901, during which 1,263 cases of scarlet fever were notified in South Shields, the attack rates on the numbers living at various ages were as follows:—

0—5,	33 per 1,000	} 38.7 per 1,000
5—10,	45 „ „	
10—15,	18 „ „	
15—20,	4.8 „ „	} 11.6 „ „
20—25,	1.2 „ „	
25—30,	1.6 „ „	} .9 „ „
30—35,	1.9 „ „	
Over 35,	0.26 „ „	

From these figures one can calculate for each ward or district a "standard" attack rate, by finding the number of cases which would

occur therein if the population living at each different age suffered in the same degree as in the town generally. If, then, the attack rate for the whole town be divided by the standard rate for any district, we obtain a factor by which, if the actual attack rate of any district be multiplied, we get the "corrected attack rate." I have carried out a process of this kind, dividing the population for the purpose into three age-periods—those under ten years, those between ten and twenty, and those over twenty years. To make a separate calculation for each quinquennial age-period was, I considered, unnecessary. These three periods appeared to me to be the best to select; the cases occurring in persons over twenty years of age are so rare that varying proportions in a district of persons between twenty and forty on the one hand, or over forty on the other, would not appreciably affect the attack rate; the attack rates for the first two quinquennia are not very dissimilar, and, moreover, the proportion between these two age groups remains very much the same in the various districts; the proportion between the numbers living in the 10-15 and 15-20 groups respectively, also remains much the same in the various districts.

After the attack rates for the wards have been corrected in this manner, we find that the rates vary just as much as before, viz., from 5.17 per 1,000 in Shields ward to 11.09 in Westoe ward. On the other hand, the arrangement of the wards in the order of their attack rates is considerably altered by the correction for age. The following facts are shown by the foregoing table, viz. :—

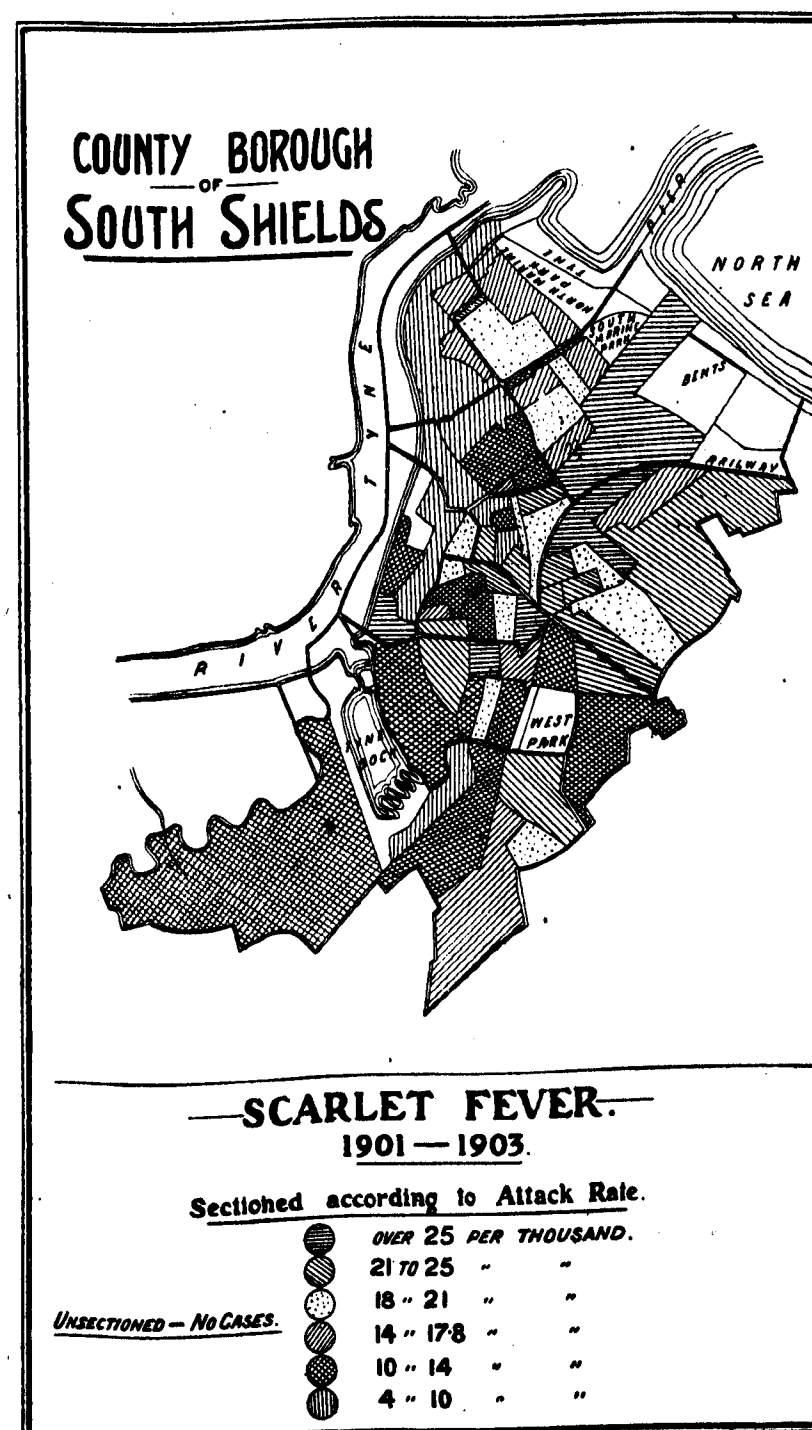
(1). That the three wards, Shields, St. Hilda, and Holborn, which have the lowest average attack rates, all between 5 and 6 per 1,000, are the wards from which the highest proportion of cases was removed to hospital. The annual average proportions of cases removed were 70, 76, and 72 per cent respectively.

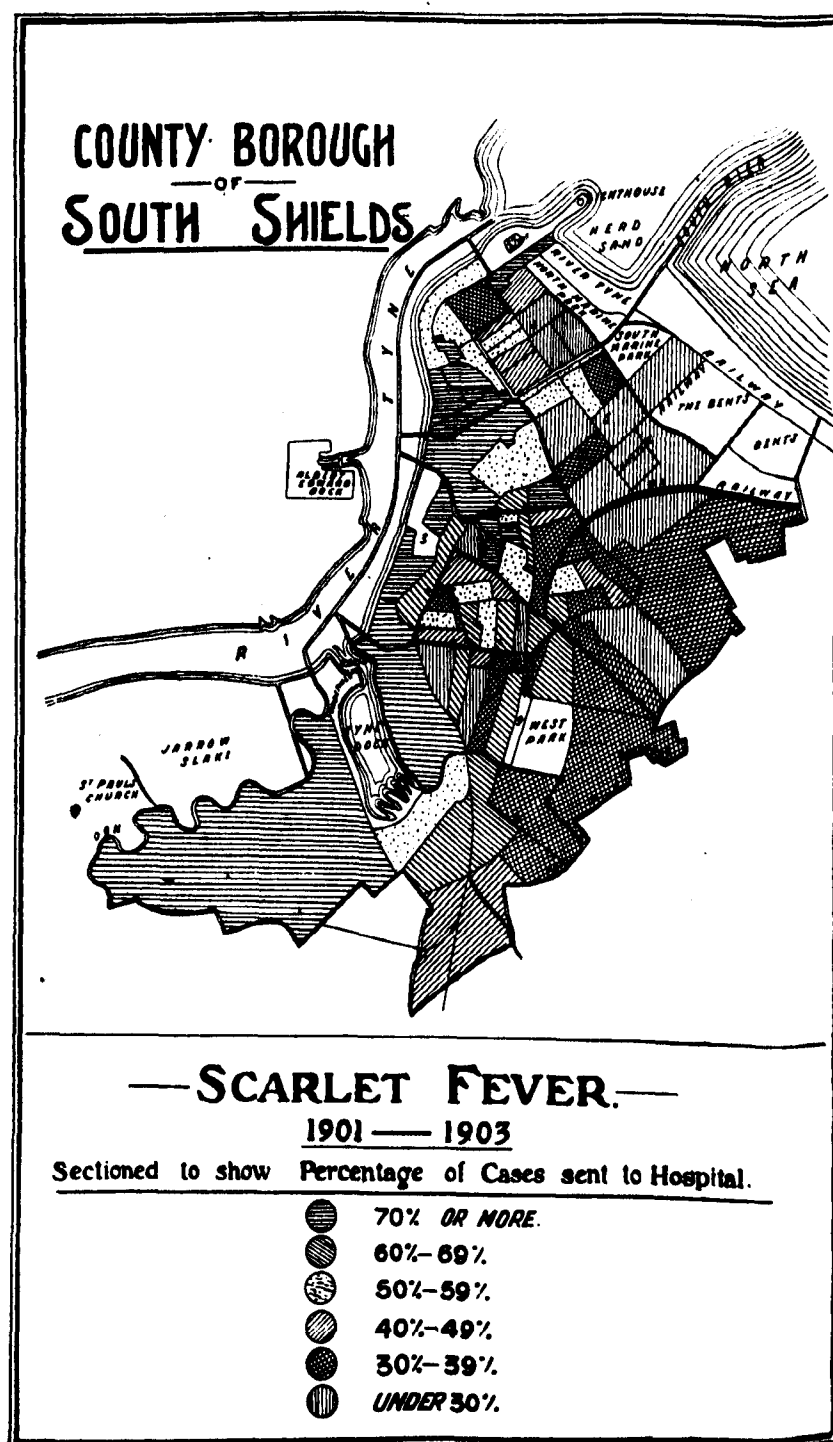
(2). That the three wards, Tyne Dock, Laygate, and Rekendyke, having between 50 and 60 per cent of their cases isolated in hospital, occupy the next three most favourable positions as regards average attack rates.

(3). That the four wards having less than 50 per cent of their cases isolated, showed the highest corrected attack rates.

The table also shows that in each ward a larger proportion of cases was isolated in hospital in each succeeding year, and that in each ward, with one exception, the attack rate fell in each succeeding year.

Apart from age-constitution and the extent of hospital isolation, the wards differ, as I have stated above, in many respects, and in most of them one finds that different parts of the ward also vary widely from each other. There are certain other points, however, in which they may be more or less accurately compared.





In the table is shown for each ward the general death-rate, the average for 1902-1903 being given, and a very striking fact is that the three wards with the lowest scarlet fever attack rates, have general death-rates very much in excess of six of the remaining seven. The other ward with a high general death-rate is Laygate, which occupies the fifth most favourable place as regards scarlet fever attack rate. The high general death-rates in these four wards, Shields, St. Hilda, Holborn, and Laygate, are, as may be guessed, an indication of the poverty of the inhabitants and the general insanitary conditions of existence which prevail in them. These wards, in fact, contain almost all the slums of the town, and are very largely composed of property of this nature. The only other line of interest in the table is that which gives the scarlet fever death-rates. When arranged in order of these rates, the wards occupy somewhat similar positions to those shown by the attack rates: St. Hilda and Holborn occupy the most favourable positions, and Westoe is still the worst. On the other hand, the Beacon ward occupies an exceptionally favourable position (third), and Laygate ward comes very low in the list, indicating a high case mortality in the latter. So far, then, as it is possible to compare areas differing from each other in so many respects as do these ten wards, I find that low attack rates coincide with a high degree of poverty and the removal of a large proportion of cases to hospital, and that high attack rates are found in the better-class wards (consisting chiefly, I may say, of respectable artisan population with a comparatively small admixture of middle-class population) and where the proportion of cases removed to hospital was smaller.

I pass now to a comparison of the enumeration districts as regards attack rate. There are altogether eighty of these, and most of them are entirely contained in one or other of the wards; there are, however, certain exceptions where an enumeration district lies partly in one ward and partly in another. In these cases the portion of the district in one ward may be, and often is, of quite a different character from the portion in the other. I have therefore considered it best to adhere to the ward boundary, rather than the district boundary in these cases, for the purpose of this comparison. The population of each enumeration district varies from 800 to 1,500, but in the case of these divided districts the population of the parts is sometimes much smaller, and in order to avoid the fallacy arising from this circumstance, in considering the attack rates for short periods it has appeared best to consider them along with the adjoining enumeration district in the ward to which they belong, if, as is usually the case, such adjoining districts is of similar character. The districts so arranged number altogether eighty-six.

ENUMERATION DISTRICTS IN ORDER OF CORRECTED ATTACK-RATE FOR TRIENNium, 1901-1903.

District.	Corrected Attack-rate, 1901-1903 per 1000.	Per cent Cases to Hospital.	Proportion of tenements of less than five rooms.	Persons per room in these.	Social Condition.	Physical Features	1892-1900. Average Triennial Attack-rate
1 Holborn 54	—	—	86	2.22	Poorest Class: sparsely popu- lated	Variable elevation: on clay and ash	5.8
2 Shields 20, 24	4.4	80	83	1.70	Poorest Class: densely popu- lated	Low-lying: on clay	8.8
3 " 15	5.9	75	98	2.15	Ditto	Stands high: on ballast	1.98
4 Tyne Dock 74	6.0	62	90	1.86	Ditto	Ditto: on clay	8.6
5 Holborn 56, 57	6.8	50	96	2.06	Ditto	Low-lying: clay	8.5
6 Laygate 48	7.0	66	93	1.87	Poor Class and Poorest: dense- ly populated	? Low-lying: clay	13.9
7 " 52	7.5	66	95	2.29	Poor Class: densely populated	Low-lying: clay	6.8
8 Hilda 24	7.7	71	86	1.95	Poorest Class: population crowded, but with open spaces	Low-lying: clay and gravel	11.7
9 Laygate 50	7.9	71	96	1.99	Poorest Class: densely popu- lated	Ditto	14.5
10 Shields 18	8.2	71	89	2.05	Poorest Class: sparsely popu- lated	Varying high: on ballast	8.2
11 Holborn 53	8.6	90	93	2.43	Ditto	Stands high: on ash hills	10.0
12 Shields 19	9.1	77	99	2.4	Poorest Class: population crowded, but with open spaces	Stands high: on ballast	5.7
13 Hilda 20, 21	9.2	83	90	1.81	Poor and Poorest Class: dense- ly populated	Low-lying: on clay	7.0
14 Shields 17	9.4	57	92	2.08	Poorest Class: sparsely popu- lated	Ditto	7.2
15 Beacon 8	9.8	71	91	0.59	Poor Class: sparsely populated	Stands high: on sand	8.2
16 Shields 16	9.9	54	95	1.95	Poorest Class: dense, with open spaces	High: sand and gravel	6.3
17 Deans 35	10.1	54	89	1.73	Respectable Artisan: densely populated	Stands high: on sand and sandstone	13.6
18 Rekendyke 68	10.6	64	93	1.83	General Labourer Class: dense- ly populated	Lies low: made	13.7
19 Rekendyke 68	10.6	64	93	1.83	General Labourer Class: dense- ly populated	Lies low: made	13.7
20 " 64	10.6	64	93	1.83	General Labourer Class: dense- ly populated	Lies low: made	13.7
21 Tyne Dock 75	10.9	50	80	1.52	Working Class: densely popu- lated	Lies low: gravel	12.5
22 Holborn 55	11.2	100	90	2.14	Ditto	Stands high: on clay	19.8
23 Tyne Dock 80	11.2	81	88	1.85	Poorest Class: sparsely popu- lated	Variable elevation: clay and ash	9.7
24 Deans 76	11.3	33	88	0.97	Semi-rural: widely separated from town, Poor Class chiefly	Lies Low	10.4
25 " 69	11.4	76	84	2.13	Middle Class: sparsely popu- lated	Stands high: on sandstone	4.7
26 Bents 4, 5, 22	11.6	66	85	1.69	Very Poor and Ordinary Arti- san: sparsely populated	Lies low: on clay	8.9
27 Hilda 25	12.4	66	61	1.68	Working Class: densely popu- lated	Low-lying: on clay	7.5
28 Deans 68	12.4	53	83	1.83	Poor Class to very: dense, with spaces	Moderate elevation: sand, gravel, made	13.4
29 Rekendyke 62	12.6	57	92	1.82	Poor Class: densely populated	Stands high: on sandstone	17.8
30 Hilda 44	13.5	70	96	2.18	Working Class: dense	Lies low: on gravel	13.8
31 Deans 70	13.9	25	96	1.46	Poor Class: densely populated	Moderate elevation: made ground	9.8
32 Laygate 51	13.9	73	100	2.44	Respectable Artisan	Moderate elevation: sandstone and clay	10.2
33 Deans 67	14.5	32	96	1.58	Very Poor; densely populated	Low-lying: clay and made	12.6
34 Hilda 45	14.6	55	98	2.19	Superior Artisan	Stands high: sandstone	12.5
35 Tyne Dock 79	14.8	46	74	1.4	Poor Class: densely populated	Lies low: clay	4.3
36 Shields 14	14.9	56	95	1.72	Respectable Artisan: sparsely populated	Stands high: clay	18.4
37 Bents 3	15.0	38	66	1.42	Middle and Superior Working: dense	Moderate elevation: on clay	10.7
38 " 27	15.5	38	66	1.06	Ditto	Stands high: on clay	11.4
39 Laygate 49	15.5	66	86	1.78	Poor Class: densely populated	Moderate elevation: on clay	30.7
40 Beacon 7	15.6	46	89	1.55	Working Class: sparsely popu- lated	Ditto	16.0
41 Westoe 80	16.2	16	60	1.25	Middle and Superior Artisan: sparse	Stands high: on sand	12.6
42 Bents 23	16.7	63	80	1.47	Poor Class: dense population	High: on clay	7.3
						Lies low: on clay	14.4

ENUMERATION DISTRICTS IN ORDER OF CORRECTED ATTACK-RATE FOR TRIENNium, 1901-1903.

District.	Corrected Attack rate, 1901-1903, per 1000.	Per cent Cases to Hospital.	Proportion of tenements of less than five rooms.	Persons per room in these.	Social Condition.	Physical Features	1892-1900. Average Triennial Attack rate
1 Holborn 54	—	—	86	2.22	Poorest Class: sparsely popu- lated	Variable elevation: on clay and ash	5.8
2 Shields 20, 24	4.4	80	83	1.70	Poorest Class: densely popu- lated	Low-lying: on clay	8.8
3 " 15	5.9	75	98	2.15	Ditto	Stands high: on ballast	1.98
4 Tyne Dock 74	6.0	62	90	1.86	Ditto	Ditto: on clay	8.6
5 Holborn 56, 57	6.8	50	96	2.06	Ditto	Low-lying: clay	8.5
6 Laygate 48	7.0	66	93	1.87	Poor Class and Poorest: dense- ly populated	? Low-lying: clay	13.9
7 " 52	7.5	66	95	2.29	Poor Class: densely populated	Low-lying: clay	6.8
8 Hilda 24	7.7	71	86	1.95	Poorest Class: population crowded, but with open spaces	Low-lying: clay and gravel	11.7
9 Laygate 50	7.9	71	98	1.99	Poorest Class: densely popu- lated	Ditto	14.5
10 Shields 18	8.2	71	89	2.05	Poorest Class: sparsely popu- lated	Varying high: on ballast	8.2
11 Holborn 53	8.6	90	93	2.43	Ditto	Stands high: on ash hills	10.0
12 Shields 19	9.1	77	99	2.4	Poorest Class: population crowded, but with open spaces	Stands high: on ballast	5.7
13 Hilda 20, 21	9.2	83	90	1.81	Poor and Poorest Class: dense- ly populated	Low-lying: on clay	7.0
14 Shields 17	9.4	57	92	2.08	Poorest Class: sparsely popu- lated	Ditto	7.2
15 Beacon 8	9.8	71	91	0.59	Poor Class: sparsely populated	Stands high: on sand	8.2
16 Shields 16	9.9	54	95	1.95	Poorest Class: dense, with open spaces	High: sand and gravel	6.3
17 Deans 35	10.1	54	89	1.78	Respectable Artisan: densely populated	Stands high: on sand and sandstone	13.6
18 Rekendyke 63	10.6	64	93	1.88	General Labourer Class: dense- ly populated	Lies low: made	13.7
19 " 61	10.6	66	90	1.71	Mixed Working Class: densely populated	Lies low: made	10.1
20 " 64	10.6	35	96	1.81	Working Class: densely popu- lated	Lies low: gravel	12.5
21 Tyne Dock 75	10.9	50	80	1.52	Ditto	Stands high: on clay	19.8
22 Holborn 55	11.2	100	90	2.14	Poorest Class: sparsely popu- lated	Variable elevation: clay and ash	9.7
23 Tyne Dock 80	11.2	81	88	1.85	Semi-rural: widely separated from town, Poor Class chiefly	Lies Low	10.4
24 Deans 76	11.3	33	38	0.97	Middle Class: sparsely popu- lated	Stands high: on sandstone	4.7
25 " 69	11.4	76	84	2.13	Very Poor and Ordinary Arti- san: sparsely populated	Lies low: on clay	8.9
26 Bents 4, 5, 22	11.6	66	85	1.69	Working Class: densely popu- lated	Low-lying: on clay	7.5
27 Hilda 25	12.4	66	61	1.88	Poor Class to very: dense, with spaces	Moderate elevation: sand, gravel, made	13.4
28 Deans 68	12.4	53	83	1.83	Poor Class: densely populated	Stands high: on sandstone	17.8
29 Rekendyke 62	12.6	57	92	1.82	Working Class: dense	Lies low: on gravel	13.8
30 Hilda 44	13.5	70	96	2.18	Poor Class: densely populated	Moderate elevation: made ground	9.8
31 Deans 70	13.9	25	96	1.46	Respectable Artisan	Moderate elevation: sandstone and clay	10.2
32 Laygate 51	13.9	73	100	2.44	Very Poor; densely populated	Low-lying: clay and made	12.6
33 Deans 67	14.5	32	96	1.58	Superior Artisan	Stands high: sandstone	12.5
34 Hilda 45	14.6	55	98	2.19	Poor Class: densely populated	Lies low: clay	4.3
35 Tyne Dock 79	14.8	46	74	1.4	Respectable Artisan: sparsely populated	Stands high: clay	18.4
36 Shields 14	14.9	56	95	1.72	Working Class: dense	Moderate elevation: on clay	10.7
37 Bents 3	15.0	38	66	1.42	Middle and Superior Working: dense	Stands high: on clay	11.4
38 " 27	15.5	38	66	1.06	Ditto	Moderate elevation: on clay	30.7
39 Laygate 49	15.5	66	86	1.78	Poor Class: densely populated	Ditto	16.0
40 Beacon 7	15.6	46	89	1.55	Working Class: sparsely popu- lated	Stands high: on sand	12.6
41 Westoe 30	16.2	16	60	1.25	Middle and Superior Artisan: sparse	High: on clay	7.3
42 Bents 23	16.7	68	80	1.47	Poor Class: dense population	Lies low: on clay	14.4

ENUMERATION DISTRICTS IN ORDER OF CORRECTED ATTACK-RATE FOR TRIENNium, 1901-1903—Contd.

District.	Corrected Attack-rate, 1901-1903 per 1000.	Per cent Cases to Hospital.	Proportion of tenements of less than five rooms.	Persons per room in these.	Social Condition.	Physical Features.	1892-1900. Average Triennial Attack-rate
43 Beacon 6	16.7	20	23	1.19	Middle Class ...	Stands high: on sand	15.2
44 Shields 7, 8, 9	16.8	37	93	1.88	Working Class: sparse	Stands high: on sand	10.1
45 Rekendyke 58	16.9	40	61	1.59	Working Class: dense	Moderate elevation: clay	14.8
46 Beacon 4	17.2	33	56	1.1	Middle Class and Superior	Ditto: sand and clay	13.4
47 Tyne Dock 77	17.6	52	91	1.33	Artisan: dense	Stands high: clay	10.0
48 Laygate 47	17.8	78	95	1.83	Working Class: densely popu- lated ...	Low: clay	14.0
49 Rekenkyke 65	17.8	66	97	2.02	Ditto ...	Low: gravel	12.1
50 Beacon 10	18.0	50	86	1.94	Ditto ...	Moderate elevation: sand	13.1
51 Laygate 42	18.0	33	98	2.04	Ditto ...	Ditto: made	11.7
52 Westoe 32	18.0	18	67	1.31	Superior Artisan: dense, with open spaces ...	Ditto: limestone	12.2
53 Beacon 11	18.2	56	93	1.89	Working Class: densely popu- lated ...	Ditto: sand	12.6
54 " 12	18.5	43	98	1.43	Ditto ...	Ditto	14.8
55 Rekendyke 57	18.6	41	94	1.72	Ditto ...	Low-lying: clay	11.9
56 Bents 26	18.7	7	25	1.36	Middle Class: sparse	Moderate elevation: made and clay ...	18.4
57 Laygate 45	18.8	56	99	2.03	Poor Class: dense	Low: clay	12.0
58 Tyne Dock 78	18.9	35	82	1.31	Working Class: dense	High: clay	14.8
59 Rekendyke 60	19.0	51	97	1.69	Superior Artisan: dense new	High: sandstone	21.4
60 Bents 2 ...	20.0	62	76	1.39	Middle and Working Class: dense ...	High: clay	9.2
61 Deans 71	20.1	37	93	1.50	Superior Artisan: dense, new	High: sandstone	4.0
62 Beacon 5	20.2	17	54	1.15	Middle Class: dense ...	Moderate elevation: sand and clay ...	15.9
63 Holborn 46	20.3	27	91	2.05	Working Class: dense	Low: gravel	16.3
64 Beacon 13	20.5	45	63	1.47	Middle and Working Class: dense ...	Low: ash and made	10.9
65 Westoe 38	20.8	45	94	1.61	Working Class: dense	High: limestone	13.6
67 Rekendyke 72, 73	21.9	42	96	1.24	Superior Artisan: sparse	High: clay	14.9
68 Westoe 39	22.4	63	96	1.68	Working Class: dense	Low: made	8.3
69 " 33	22.5	37	59	1.89	Working Class: dense	High: limestone	14.7
70 " 36	23.3	54	57	1.08	Superior Artisan: dense	Ditto	37.3
71 Deans 72	23.4	51	91	1.32	Middle Class and Superior	Stands high: on sandstone	24.0
72 " 73	23.4	25	89	1.41	Working: dense population	Low: made	12.5
73 Westoe 37	23.6	34	73	1.91	Working Class: sparse	Ditto	3.9
74 Laygate 43, 44	23.8	40	92	1.56	Working Class: dense	High: sandstone	17.1
75 Beacon 9	23.8	47	99	1.57	Ditto	Moderate: made	11.5
76 Deans 34	24.2	32	41	1.86	Ditto	High: on sand	16.6
77 Westoe 31	24.8	35	58	1.18	Superior Artisan and Middle Class: sparse	High: on limestone	34.0
78 Westoe 41	25.7	36	70	0.98	Middle Class and Superior Artisan: fairly dense	High: clay	10.4
79 Rekendyke 59	26.0	24	81	1.36	Superior Artisan: dense	High: limestone	10.2
80 Deans 66	26.2	41	80	1.40	Ditto: new ...	High: sandstone	31.2
81 Westoe 40	27.1	38	99	1.69	Working Class: dense	Moderate: sandstone	18.6
82 Bents 1 ...	28.6	17	47	1.83	Ditto	High: limestone	11.2
83 " 28, 29	29.3	20	83	0.98	Middle Class: sparse	High: sand	21.4
84 Westoe 29	29.6	26	46	1.34	Respectable Artisan: dense ...	Ditto	11.0
85 Rekendyke 36	29.7	50	55	1.57	Middle and Working Class: sparse	Moderate: clay	12.8
86 Holborn 69	30.3	92	86	1.19	Superior Artisan: sparse	High: sandstone	9.8
				2.45	Very Poor: dense, with open space ...	Low: clay	4.7

In the comparison of wards the total cases notified have been considered, but in the comparison of enumeration districts I take into consideration only the primary cases, excluding secondary and return cases. In comparing districts of such small size with respect to the endemicity and spread of the disease, I think that it is better to exclude the secondary cases, as their occurrence is almost entirely governed by the number of susceptible persons in an invaded house, and is thus very largely a matter of chance. The figures compared are, then, the primary cases per 1,000 of the population during the triennium 1901-1903, and the table shows the eighty-six districts arranged in order of their corrected attack rates for this period. The districts so arranged fall into six groups: In the first the attack rates are less than 10 per 1,000; in the second, from 10 to 14 per 1,000; in the third, above 14 and under 18 per 1,000; in the fourth, from 18 to 21 per 1,000; in the fifth, from 21 to 25 per 1,000; and in the sixth, from 25 per 1,000 upwards, the highest rate being 30.3 per 1,000, and the lowest 4.4 per 1,000, putting aside the district in which no cases occurred. The sixteen districts with attack rates of less than 10 per 1,000 per triennium belong almost entirely to Shields, St. Hilda, Holborn, and Laygate wards, with only two districts from other wards. If the table be referred to, it will be noticed that all the districts in the first group have one common feature, the poverty of their inhabitants, with all that that implies in the way of bad sanitary conditions. The average proportion of houses of less than five rooms is 92.1 per cent, whilst the average number of occupants per room in these houses is 1.96. The property is old, much of it consisting of good-class houses converted into tenements. In respect of density of population, the districts vary, five of the sixteen being sparsely populated, and several having large open spaces in them, whilst the remainder are examples of the most crowded districts of the town. Nor as regards natural situation do they show any uniformity; seven stand high, and eight are low-lying, one being of medium elevation. The subsoils also vary, clay, ballast, ash, and sand being all represented.

With respect to the proportion of cases sent to hospital, in none was the percentage less than 50, whilst the average number removed was 69.6 per cent.

The sixteen districts with attack rates between 10 and 14 per triennium largely belong to Deans and Rekendyke wards. Socially the members of this group show great diversity, varying from purely middle-class districts to very poor districts resembling those of the first group. Averages are therefore not very illuminating; but it may be stated that the average proportion of houses of less than five rooms is 85 per cent, with an average room-population of 1.8

persons, indicating considerably less poverty than existed in the first group. As in the first group, the greatest diversity exists as regards elevation and subsoil. The average percentage of cases sent to hospital was 54.3.

The seventeen districts with attack rates above 14 and under 18 per 1,000 per triennium, contained on the average 78 per cent of houses of less than five rooms, these houses having an average room-population of 1.43 persons. The social class is distinctly better than that of the second group, and entirely other than that of the first group. The cases removed to hospital averaged 46 per cent.

In the fourth group, with rates ranging from 18 to 21 per 1,000, there are sixteen districts; the average proportion of small houses is 82 per cent, having a room-population of 1.61 persons; and the average proportion of cases removed to hospital is 39 per cent. This group is, on the whole, on a somewhat lower social level than the third, but with a lower average of cases removed to hospital it shows a higher average attack rate.

The fifth group comprises twelve districts, with rates varying between 21 and 25 per 1,000. The average proportion of small houses is 79 per cent, with an average room-population of 1.47 persons. Socially this group is composed almost purely of respectable working-class districts with one or two terraces of middle-class property. The average proportion of cases sent to hospital from this group was 41 per cent, being slightly greater than the average of the immediately preceding group.

The last group comprises nine districts, in which the attack rates were above 25 per 1,000 per triennium, the lowest rate in this group being more than two-and-a-half times as great as the highest rate in the first group. In this last group the average proportion of small houses is 72 per cent, with an average room-population therein of 1.64 persons. There is thus evidently an exceptionally large number of large houses in the districts of this group; six of the districts, in fact, are inhabited by shopkeepers and the best class of artisan, whilst only one, viz., the last in the list (Holborn, 69), is a slum district. The average proportion of cases sent to hospital from the districts of this group was 38 per cent, or just about half the average sent from the districts of the first group. If the natural features of the districts in the last group be considered, it is found that they all stand high, or moderately high, with the exception of the last on the list. Five of the nine have a subsoil of sandstone or limestone, and two others have sand subsoils, only two having clay. Comparing this group of districts with the first group in respect of natural features, it may be repeated that half of the first group stand high, so that elevation

is evidently not a determining factor. The differences of subsoil in the two groups can hardly be supposed to affect the prevalence of the disease. We are therefore left with the other two points of distinction, to wit, social condition and extent of hospital isolation. In the group with low attack rates we find poverty and a high degree of hospital isolation; and in the group with high attack rates the social conditions are comparatively good, the class being chiefly the best paid and most intelligent of the working-class of the town, together with a low degree of hospital isolation. The intermediate groups show generally the same coincident characteristics in a less marked degree, although there are many individual exceptions.

On the whole, therefore, the examination of the attack rates in the enumeration districts during the triennium 1901-1903 confirms the conclusions arrived at by consideration of the attack rates in the wards. The exceptional instances where poor social conditions and a high proportion of cases isolated, coincide with a high attack rate, do not, in my opinion, invalidate this conclusion.

We may consider now the incidence of the disease on the several districts during the period 1892-1900. During this period hospital isolation was carried out to a considerably smaller extent than during the triennium 1901-1903, and the area to which it was specially applied was somewhat different. It is therefore useful to keep the figures for the two periods separate. During the nine years 1892-1900 the population of the town increased by about 16,000, and in some of the districts the whole of the houses were built during this period. I have calculated for each district the average attack rate per triennium. The rates are given in the table of enumeration districts, and vary from 1.98 per 1,000 to 37.3 per 1,000.

To what extent do the variations in prevalence during this earlier and longer period support the conclusions arrived at from consideration of the figures for 1901-1903, and do they indicate any other social or physical features in a district as factors in producing the results? As regards natural features, as before, no relation whatever is traceable between subsoil and attack rate; in respect to elevation of site, the position is similar to that shown by the 1901-1903 figures, viz., that low attack rates are found both in low-lying and in elevated districts, and, contrary to what might be expected, it does not appear that elevation of site has any tendency to lessen the prevalence of this disease, as the twelve districts with the highest average triennial attack rates, varying from 17 to 30 per 1,000, all stand particularly high. As previously remarked, I do not consider that elevation of site actually favours the spread of the disease; but that these elevated sites are taken up chiefly by better-class property, occupied by a class

who are for other reasons specially exposed to the ravages of this disease. When localities of similar social status are compared, I do not find that the elevation of the site affects the prevalence. As regards the prevalence of the disease in districts of varying social status, the figures for 1892-1900 again show on the whole a marked coincidence between low attack rates, and poverty and insanitary conditions. Of the eighty-six districts in the town, fifteen are described as of the poorest class, and eleven of these have attack rates of less than 10 per 1,000 per triennium during this period, although the total number of districts with attack rates below this figure is only twenty-seven. At the other end of the scale we find that the four districts with attack rates of over 30 per 1,000 per triennium, are all of a superior class socially, one being occupied by middle-class and the others by superior artisan class. The intermediate groups show in a less degree the same thing, a tendency to high attack rates in superior working-class districts, and to lower rates where greater poverty prevails.

There appears, then, to be no doubt that scarlet fever in South Shields is much more prevalent in the better-class districts than in the poorer, and that this has been so for the last twelve years at least. Before 1892 I have no figures to show the distribution of the disease, as it was not till then that the Notification Act was adopted. We are now faced with the question to what extent the favourable position of the poor-class districts depends on the greater use of hospital isolation, and whether apart from such isolation they are less liable to the ravages of this disease. To answer this question, except in a very tentative fashion, is difficult. Ever since the introduction of hospital isolation, there has naturally been a tendency to apply it particularly to the poorest localities; there was found the greatest difficulty in securing any form of home isolation, and the greatest need for hospital treatment for the sake of the patient. It is not, therefore, easy to find very poor localities in which the proportion of cases sent to hospital has been low. If figures were available which showed the distribution of the disease in the borough before the adoption of hospital isolation, we would have the necessary data for answering the question, but in South Shields hospital isolation was carried out to a considerable extent for ten years before the adoption of notification. The information, however, that is available regarding the distribution of the disease in the seventies and eighties, points to a distribution of the disease almost the reverse of the present. Whenever, in the Annual Reports from 1875 to 1885, reference is made to the distribution of this disease, it is pointed out that it chiefly affects the poorest and most insanitary quarters, and those

with the largest general death-rates. In 1873 a Local Government Board Inspector attributed its prevalence to "the filthy condition of the back streets." Dr. Spear, in his report for 1875, says that "such conditions (viz., those cited by the Inspector) greatly favour the spread of the disease"; in 1877 the same authority remarks: "The disease is specially prevalent in insanitary areas, particularly new, jerry-built parts." The same remark is made in the 1878 report. In 1885 Dr. Campbell Munro remarks that "the disease was very prevalent and fatal in the most insanitary areas, and those having the highest general death-rates." The streets mentioned as having suffered severely are, in some of the localities, least subject to the disease during the past decade.

If such a marked alteration in the distribution of the disease has taken place, it appears to me that the specially vigorous application of hospital isolation to these poor-class localities is probably a factor in producing the result. With the purpose of showing to what extent, if any, social and sanitary conditions apart from hospital isolation influence the prevalence of the disease, we may compare the attack rates in districts isolating similar proportions of their cases in hospital. During the nine years 1892-1900 there were twenty-nine districts in which less than 30 per cent of the cases were sent to hospital. The average attack rate for these districts per triennium was 15.8 per 1,000; in nine of these districts, inhabited by the general labourer class, it was 13.1 per 1,000; in seven, inhabited by the superior artisan class, it was 24.3 per 1,000; and in nine middle-class districts it was 14.3 per 1,000. There were only three "poor" and one "very poor" district in which such a small proportion of cases were isolated, and their average rate was 8.4 per 1,000.

Again, there were forty-two districts in which from 31 to 49 per cent of the cases were sent to hospital during 1892-1900; the average attack rate for these districts was 12.15 per 1,000 per triennium; in thirteen of these districts, described as of the "poorest" or "poor" class, the rate was 11 per 1,000; in twenty-one districts inhabited by the general labourer class, it was 12.6 per 1,000; and in eight inhabited by the superior artisan class it was 12.75 per 1,000.

Again, there were ten districts in which 50 per cent to 59 per cent of the cases were isolated in hospital; the average attack rate for these districts was 10.3 per 1,000; in five of them belonging to the "very poor" class it was 7.8 per 1,000; and in the other five respectable working-class districts the average rate was 12.9 per 1,000.

In the remaining five districts, isolating over 60 per cent of their cases in hospital, the average attack rate was 6.47 per 1,000; they all belonged to the "very poor class." It will be noted that in the great

majority of the districts the proportion of cases sent to hospital was very low, only fifteen reaching 50 per cent. The figures clearly show that with practically similar degrees of hospital isolation, the "poor" and "very poor" districts suffered distinctly less than the more respectable neighbourhoods, and that the districts inhabited by the general labourer class suffered less than those occupied by the superior artisan and middle class.

As the figures cover a period of nine years, during which scarlet fever was always fairly prevalent in the town, and as hospital isolation was not carried out to such a degree as, in my opinion, to have much effect on the course of the disease, one seems compelled to admit that scarlet fever is naturally less prevalent in these insanitary districts at the present time, whatever it may have been in the past. I do not propose to take up time by discussing the reason of this circumstance, but I shall pass on to the consideration of the effect of hospital isolation in diminishing or otherwise the prevalence of the disease in districts of similar social features. The figures for 1892-1900 show only slight reduction of the average rate for any particular class with the increase in the amount of hospital isolation; but as only five districts isolated 60 per cent of their cases, the effect of hospital isolation cannot be elucidated from these figures.

I now return, therefore, to the figures for the triennium 1901-1903. During that period, I find that there were twelve districts in which less than 30 per cent of the cases were sent to hospital, and that these districts have an average attack rate of 21.7 per 1,000; in seventeen districts from 30 to 39 per cent were sent to hospital, and here the average attack rate was 19.2 per 1,000; in eleven districts from 40 to 49 per cent were sent to hospital, and here the average attack rate was 20.1 per 1,000; in seventeen from 50 to 60 per cent were sent to hospital, and here the average attack rate was 15.8 per 1,000; in twelve from 60 to 70 per cent went to hospital, and the average attack rate was 13.1; in sixteen over 70 per cent went to hospital, and the average attack rate was 11.2 per 1,000.

These figures show a progressive lowering of the attack rate with the increase in the proportion of cases sent to hospital, when this rate is 50 per cent or more. Of fourteen "very poor" districts, in eleven more than 60 per cent of the cases were isolated, and the average attack rate was 9.8 per 1,000; and in three between 50 and 60 per cent were isolated, and the average attack rate was 8.7 per 1,000. Of twelve "poor" districts, four isolating over 70 per cent had an average attack rate of 10.9 per 1,000; five isolating between 60 and 70 per cent had an average attack rate of 11.8 per 1,000; and three isolating between 50 and 60 per cent had an average attack rate of

15.2 per 1,000. Of thirty-three ordinary working-class districts, eight isolating over 60 per cent had an average attack rate of 15.2 per 1,000; eight isolating between 50 and 60 per cent had an average attack rate of 15.7 per 1,000; nine isolating between 40 and 50 per cent had an average attack rate of 20.6 per 1,000; and eight isolating less than 40 per cent had an average attack rate of 19.8 per 1,000. Out of sixteen superior artisan districts, five isolating from 40 to 54 per cent of cases had an average attack rate of 21.4 per 1,000; eight isolating from 30 to 39 per cent had an average attack rate of 19.8 per 1,000; and four isolating less than 30 per cent of their cases had an average attack rate of 21.8 per 1,000. Out of nine middle-class districts, three isolating from 30 to 39 per cent of their cases had an average attack rate of 17.7 per 1,000; and six isolating less than 30 per cent had an average attack rate of 21.6 per 1,000.

- The comparison, then, of groups of districts belonging to a similar social class gives similar results. The "very poor" districts isolating less than 60 per cent do, indeed, show a slightly lower attack rate than those isolating more than 60 per cent, but in the two groups where there are the best data for the comparison, viz., "poor" districts and ordinary working-class districts, we see the fall in the attack rate coinciding with the rise in the proportion of cases sent to hospital, *when such proportion reaches 50 per cent*. No inference can be drawn from a comparison of the middle-class and superior artisan groups, as the proportion of cases sent to hospital is so small.

To still further verify these results I have taken six groups of districts having various percentages of their cases isolated in hospital, and totalled up for each group the populations, cases, and removals to hospital, and from these figures I have estimated the attack rate per 1,000 of the population and the percentage of cases removed. The twelve districts from which less than 30 per cent of the cases went to hospital have a total population of 14,496; 21 per cent of the cases went to hospital, and the attack rate was 20.7 per 1,000. The seventeen districts from which between 30 and 39 per cent of cases went to hospital have a total population of 21,389; 35 per cent of the cases went to hospital, and the attack rate was 19.4 per 1,000. The eleven districts from which 40 to 49 per cent of the cases went to hospital have a total population of 11,820; 42 per cent of the cases went to hospital, and the attack rate was 20.5 per 1,000. The seventeen districts from which 50 to 60 per cent of cases went to hospital have a total population of 17,703; 52 per cent of the cases went to hospital, and the attack rate was 15.4 per 1,000. The twelve districts from which 60 to 69 per cent of the cases went to hospital have a total population of 15,293; 65 per cent of the cases went to

hospital, and the attack rate was 13.2 per 1,000. The sixteen districts from which 70 per cent or more of the cases went to hospital have a total population of 15,610; 79 per cent of the cases went to hospital, and the attack rate was 10.6 per 1,000. These figures are nearly identical with those arrived at before, but rather stronger evidence of the favourable position occupied by districts isolating a large proportion of cases in hospital.

From the facts and figures which I have put before you I consider that certain general conclusions may be formed regarding some of the factors which favour the prevalence of scarlet fever in a district, and those which tend to limit and reduce its prevalence.

Comparison of districts of the same town is in some respects more reliable than comparison of different towns; in dealing with one town we have similar meteorological conditions, and an equal efficiency or inefficiency with respect to methods of disinfection and isolation, in all of which respects different towns may vary widely, causing their comparison in regard to one point, such as proportion of cases isolated in hospital, to be misleading. No doubt, on the other hand, the absence or the weakness of the barriers between one district and another of the same town considerably reduces the value of comparison of adjoining districts, particularly when of small size; a district is not only affected by the policy of hospital isolation, say, adopted in itself, but also by that adopted in its neighbours. In the epidemic diseases of children, however, I think it is very often seen that the disease is not generally diffused through the town at the same time, but that it may for a considerable period, weeks or months, be confined to a certain district, and my own observations incline me to believe that scarlet fever spreads very largely from one house to others in the near neighbourhood. By the agency of a school a fresh district is invaded, and the process is repeated there.

In the first place, I have shown that the physical features of a district do not apparently appreciably influence either the extent of the endemicity of the disease, or its spread in epidemic times. The fact that the districts most markedly affected all stand high, I have explained as due to the preference for such districts naturally exhibited by the superior artisan population, who are of all classes of the community most subject to the ravages of the disease.

In the second place, I have shown that, apart from the extent to which hospital isolation is adopted, very poor-class districts, including all to which the term "slum" is applicable, are apparently less subject to the disease than more respectable neighbourhoods. Whether this is due to a special insusceptibility to the germ of the disease shown by a population strengthened by the comparatively

free operation of the law of the survival of the fittest, or whether it is due to an antagonism between filth and the scarlet fever germ. I cannot say.

In the third place, I have attempted to estimate the results attained in different districts by varying degrees of hospital isolation, and, so far as they go, my figures tend to show that such isolation, if carried out to a high degree (the isolation of 50 per cent or more of the total cases), lessens the prevalence and spread of the disease. When social differences are ignored and the total districts are compared, I have shown that districts isolating the largest proportion of cases suffer far less than the others; and even when the comparison is limited to districts of the same social class, my figures show a well-marked advantage in districts where the proportion of cases isolated is high. Circumstances have so far prevented the adoption of a vigorous policy of hospital isolation in the superior artisan and middle-class districts.

In conclusion, I should like to call attention to the fact, as shown by the figures both for 1892-1900 and for 1901-1903, that it is most amply proved that, in South Shields at least, the isolation of cases of scarlet fever in hospital does not result in an increased prevalence of the disease and an intensifying of its virulence. If the discharged hospital convalescents were the main instruments in maintaining the presence of the disease in the town in a high degree, surely the districts to which most of these belong would not occupy such a favourable position.

DISCUSSION.

The PRESIDENT (Dr. Groves) in inviting discussion, said that the whole medical profession should be grateful for any facts which militate against or otherwise the question of isolating cases of infectious disease in hospital.

Dr. ARMSTRONG thought every word of the paper was weighty. He considered one last remark Dr. Boyd made summed up the whole position, with regard to faddists, and the difficulty of putting them down. There was one point to which he referred—a difficult point—and he was not going to say a word of opposition to anything Dr. Boyd had said, and that was the question of school attendance. He had always had the impression that schools had a very strong effect upon the spread of scarlet fever. He thought that was the worst element in towns such as his own. As most of the members of this Society were aware, he had always been an advocate in favour of the extension of the hospital system. He believed with Dr. Boyd, that the hospital system was calculated to lessen scarlet fever, and he was glad to say his Sanitary Authority were of the same opinion. They had been carefully considering the question for some time past, and his Council had within the last two or three weeks decided to spend £53,000 on increased hospital accommodation. Some of them were familiar with the hospital at Walker Gate, and they were going to extend this at the cost of the amount named.

That did not look as if the Sanitary Authority of Newcastle were doubtful as to hospital isolation. He wished to thank Dr. Boyd very heartily for his excellent paper. With regard to the closing of schools, they had been experimenting in Newcastle for two years with reference to measles and whooping cough. His Authority during that period had paid £2,000 in notification fees, and except in one little instance very little good was gained. In one school which they closed early, they did apparently put a stop to the disease. The difficulty with educational bodies would be to get the schools closed at an early stage. He indicated in the report he made upon the subject, that if they were inclined to take up notification of these two diseases again, he hoped it would be on the understanding that they began with the early closing of schools, and did not wait until 10 per cent of the children were attacked.

Dr. EUSTACE HILL thought the paper a valuable contribution to a much vexed subject. He said he had the good fortune to be Medical Officer of Health for South Shields for a short period, and he was bound to say as regards the incidence of disease in the poor part of the town, even in the short period he was there, he recognized that infectious diseases were least in places where you would expect them to be higher. It was impossible to say much with regard to scarlet fever there, but there was no doubt that certain mortalities were less in the low part of the town than in the better portion of the population. The question of the survival of the fittest, which Dr. Boyd mentioned, perhaps did deserve some slight consideration, because if they had a juvenile population liable to attack from scarlet fever, decimated from such diseases as infantile diarrhoea, or other diseases resulting from want of food, they got a lesser incidence among other diseases at a later period of life. Then, again, the schools, as Dr. Armstrong mentioned, had a great bearing upon the subject. It was rather difficult to come to a conclusion as to the reliability of figures as to cases of scarlet fever. His own experience in the County of Durham was that the more you isolate patients, the less the prevalence of the disease. He had had considerable opportunity of ascertaining whether this was the case or not, because he had fifty or sixty annual reports of Medical Officers passing through his hands, and it is almost universal, especially in places like Darlington and Chester-le-Street, for them to say year after year that isolation results in a diminished incidence. He thought they could not get over that fact. If he had referred to only one or two points in Dr. Boyd's paper, it was merely to say that he agreed with the conclusions he had arrived at.

Dr. HERBERT JONES said that this was a subject which was exercising the minds of a large number of Medical Officers of Health all over the country. He would like to add his meed of thanks to Dr. Boyd for the great trouble he had taken in connection with the paper, and especially would he like to draw attention to the trouble which he must have been at to give them the table referring to the death-rates at different age periods. It was very difficult indeed to get at the age-incidence in districts, and he considered that Medical Officers of Health ought to have more ready access to the details of the census returns than they now possessed. There was an enormous mass of information at Somerset House, which would be invaluable to them, but they could not get at it. In connection with the discussion with regard to the use or otherwise of isolating cases of scarlet fever, it seemed to him that too much dependence was placed on statistics. They should look at it from the broad common-sense point of view. If the greatest opponent of isolation hospitals had a case of scarlet fever in his own house, he would put the patient into the

top room of the house, or the spare bedroom. The isolation hospital was the spare room of the working man.

Dr. TAYLOR said he agreed entirely with the remarks made by Dr. Boyd. With reference to one remark, namely, the class of property which is chiefly infested by scarlet fever, in his experience in Chester-le-Street district, in which a large number of new houses have been built, they found scarlet fever most prevalent in new houses. Throughout the whole district of Chester-le-Street they had only one class. There were no slums, and no class of really poor people. They were all artisans, of the mining class chiefly, respectable, well-fed, and in some cases well housed. But scarlet fever did not attack out of proportion the houses where the worst areas were. Scarlet fever infested new houses in a greater proportion than it did older houses. In regard to isolation, he thought it useless to compare two towns. He thought it was absolutely useless to compare two parts of the same town. They might have a greater number of persons isolated in one area than another. The comparison ought to be with single units. His experience was that isolation in hospitals certainly reduced the chances of scarlet fever occurring in second or third cases in the same house. But they, as Medical Officers of Health, should endeavour to get their Councils to give every man a chance to protect his own children. They ought to prepare a place in which to house the infected child, so as to permit people to protect their other non-infected children; for they knew that although children escaped with their lives in scarlet fever, they might not escape with their health. He thought far too little had been done with reference to the supervision of schools. Medical Officers of Health had not been able to supervise schools, but it was to be hoped that some system would be adopted by which schools might be put under some system of supervision. He thought this an important point for school authorities to take up. He entirely agreed with Dr. Boyd, and he was very glad that he was not one of those individuals who said "abolish isolation hospitals, and you abolish scarlet fever."

Dr. STAINTHORPE said that with regard to the incidence of scarlet fever in towns, his experience was that where they had a population of people employed in the same work—take the mining districts—there was a greater community of interests, they were in the same social position; with the result that there was an enormous amount of visiting each other's houses. If he went to a house, apparently the neighbours saw him, and rushed in to see why he had been there, and that was a reason why they had an outbreak so quickly spreading in a mining district. Take another district, partly mining and partly agricultural. He did not find anything like the same ready spread of infection in such a district. Splitting up of houses did not lead to the same amount of social intercourse that took place in the mining districts. He was most strongly of opinion that unless County Councils took the action which they had the power to do, they would not progress much in the matter of isolation hospitals. What they wanted was for County Councils to urge upon their Medical Officers or their district Authorities the necessity of having hospitals built for areas which would be suitable. It would be much better for a small urban district to be included in a joint scheme, which would be worked at a much less cost.

Dr. WILSON expressed his approval of the paper.

Dr. HEMBROUGH spoke of the advantages of joint hospitals. He said the feeling in the county was to the effect that people would not go into these hospitals. He hoped in future there would be more hospitals erected. The County Council of Northumberland appeared to be un-

willing to use its powers to the full extent, or anything like their full extent. It was an enormous waste of money for each district to put up a little tin hospital, with which they could not have the amount of efficiency for the money expended, either in nursing or anything else.

Dr. WILLIS added his testimony to what had been already said in appreciation of the paper, and only hoped that many other Medical Officers of Health would follow Dr. Boyd's example, and prepare statistics upon the same lines. There was only one point on which he disagreed with Dr. Boyd, and that was with regard to the prevalence of scarlet fever in higher elevations. His experience was that the attack was much less in higher than in low-lying districts.

Dr. BOYD thanked all who had spoken for their kind remarks. There were only one or two points to which he might reply. Dr. Hill referred to the age constitution. He had dealt with that in the paper, and had taken three groups, and he thought it would come out pretty accurately. Inequalities of age would be allowed for. He thought Dr. Hill's suggestion as to the weakly being killed off by other diseases, might very likely account for a certain amount of immunity from scarlet fever shown by the population of slum districts. As regards Dr. Willis' experience that scarlet fever is less in the high-standing districts, that confirmed his opinion that elevation does not in itself seem to have any effect. Dr. Taylor did not think there was much value in comparing towns, but if they wished to show how it affected the spread in a locality, they must compare towns or parts of a town. He thought statistics were more accurate perhaps than any other form of argument, and had a certain value.

The PRESIDENT said it was impossible to make one rule for all parts of the country. Their experience was that rural districts differed from those in big towns; but their Society, acting for the general good as well as their own individual good, listened to the opinion of all experts, and tried to draw their own deductions. They had continually to watch the education question; they had already urged that the medical officer of a school should be the Medical Officer of Health; he knew the education movement was only at the beginning, and he was afraid that doctors might be considered rather impracticable. At any rate they had not to push them too much. He considered Dr. Boyd's paper a very valuable contribution to the subject they had discussed.

LEAD POISONING AMONG HOUSE PAINTERS.—Count Posadowsky, German Minister of the Interior, has submitted to the Federal Governments a schedule of "Regulations for the prevention of Lead Diseases among house painters, decorators, and varnishers." These regulations are to be binding on all employers in the house-painting and other similar trades, as well as on all industrial establishments where painters and varnishers are employed in connection with other trades and manufactures—for instance, carriage factories, furniture factories, wharves, etc. The regulations do not forbid the use of white lead for social economic reasons. They contain detailed instructions for avoiding the dangers connected with the manipulation of lead colours mixed with oil or varnish, as well as with the process of rubbing or breaking away dry coats of lead colour. Medical supervision and the keeping of a special health book are to be obligatory, and each workman is to receive gratis a leaflet enlightening him on the dangers connected with the trade, and the best methods for escaping them.—*Brit. Med. Jour.*

THE INFLUENCE OF HOSPITAL ISOLATION UPON SCARLET FEVER IN CARDIFF.*

By EDWARD WALFORD, M.D.,
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IN submitting for your consideration the following remarks, I must disclaim any intention of entering into the very interesting but somewhat fruitless controversy with respect to the general effect of isolation upon the prevalence of scarlet fever throughout the country. Statistics have been brought to bear upon this question, but for the present, at any rate, no sufficient or reliable data seem available for the purpose. So long as the opportunities for personal infection continue to increase in large towns, it is hardly to be expected that the removal to hospital of some 50 per cent of the cases of scarlet fever notified will entirely abolish this disease from our midst.

In these large towns we find the density of the population increasing year by year, and particularly in those districts which are already too densely populated. The number of large public elementary schools is on the increase everywhere, causing increased aggregation amongst that part of the population most susceptible to infection. That scarlet fever has diminished to the extent that it has, is, I think, much to the credit of the administrative methods enforced. To what extent hospital isolation has in itself contributed towards this result can hardly be decided, as no satisfactory means are at hand for separating the other powerful factors. That the removal of centres of infection from crowded localities must have a reducing effect upon the incidence of infectious disorders in such localities is, I think, unquestionable, although we may not be able to estimate this effect with mathematical precision. Even in the absence of any clear and definite proof of the benefits of hospital isolation, common sense would seem to suggest this method of dealing with infectious diseases. No one, as far as I know, has ever raised this question in connection with the isolation of small-pox, diphtheria, typhus fever, or enteric fever; but as by far the largest number of patients isolated in hospitals are those suffering from scarlet fever, it is probable that if the necessity for isolating such cases had not arisen, very few isolation hospitals would have been erected.

Although I propose to restrict my observations, as far as possible, to the behaviour of scarlet fever in Cardiff under varying degrees of

hospital isolation, it will be impossible to avoid altogether the general question, as this town has been introduced into the controversy, and in a way which is, I think, open to some objection. The most serious and considerable attack upon this system of isolating scarlet fever patients in hospitals has come from an unexpected quarter, namely, from the ranks of those who as a body have been chiefly instrumental in the erection and establishment of these buildings—Medical Officers of Health. Dr. Killick Millard, the Medical Officer of Health for Leicester, a town which has gained some notoriety for peculiar methods of dealing with infection, has been perhaps the most active and consistent opponent. His opinion is, of course, entitled to every consideration, as that of one having special opportunities of observation. Dr. Millard's observations are interesting, and almost entirely statistical in character. In dealing with the question in its application to the whole kingdom, he has endeavoured to show that certain towns taken by themselves have derived no benefit from hospital isolation, and that when a certain group of towns practising fairly complete isolation is compared with another group in which the isolation is not so complete, the latter group compares favourably with the former group as regards scarlet fever prevalence.

For instance, the experience of nine towns is given for a period of eighteen years, 1882-1899. Three of these towns are placed in one group as good isolators, and six in another group as isolators of a lesser degree. The first group contains three large towns, Huddersfield, Nottingham, and Bradford; the second group, Oldham, Halifax, Derby, Birkenhead, Bolton, and Blackburn. The aggregate population of the two groups is approximately the same, but that is about the extent of their similarity. The individual towns differ amongst themselves in every conceivable way—in density and in social condition of population, in the character of the housing of the poorer classes, in the proportion of young children in the population, and also in the extent in which they have severally practised hospital isolation during the above period. Averages of the scarlet fever death rate, attack rate, case mortality, and proportion of cases isolated in one group, are compared with similar averages in the other group. The result, as might be expected, does not afford any very great satisfaction to the advocates of hospital isolation, neither does it afford a very convincing argument against the system.

It is, I think, obvious that conclusions based upon such incomplete and dissimilar observations are of little value. The period under consideration is too short, and the conditions of the towns differ in so many ways, that the statistics are not strictly comparable. We find that during this period of eighteen years the

* Paper read at the meeting of the West of England and South Wales Branch of the Society of Medical Officers of Health, May 19th, 1904.

average amount of isolation in Group 1 (the good isolators) was 64 per cent of the cases of scarlet fever notified, the attack rate was 3.99 per 1,000 persons living, the case mortality was 6.10 per cent, and the death rate 0.24 per 1,000 persons living. In Group 2 (the bad isolators) the average percentage of isolation was 28, the attack rate 8.94 per 1,000, the case 6.56 mortality per cent, and the death rate 0.25 per 1,000. Arranged in this way there would seem to be a slight advantage to the imperfect isolators, or, at any rate, no advantage to the good isolators. But by a rearrangement of these statistics different results may be obtained. By dividing the eighteen years into two periods of nine years, and comparing the earlier periods, when there was in each group less hospital isolation, with the later period, when there was more isolation, some advantage is shown in Group 2 in the later period, in which the proportion of cases isolated had increased to a greater extent than in Group 1. For instance, in Group 2 the proportion isolated in the nine years 1882-1890 was 16 per cent, and in the nine years 1891-1899, 39 per cent. The attack rate, which was during the first period 4.18, was reduced during the later period to 3.73. In Group 1, in which the proportion of isolation had only increased from 54 per cent to 71 per cent, the attack rate had not been reduced, but the case mortality had been reduced from 8.55 in the earlier period to 4.6 per cent in the later period. I do not think that it can be seriously maintained that these figures, in whichever way the grouping of averages is arranged, have any particular value or bearing upon the question at issue. Taken in one way, they would seem to show no advantage to the towns practising hospital isolation to a large extent; taken in another way, they indicate that an increasing proportion of hospital isolation resulted in some cases in a reduced prevalence of scarlet fever.

Further, Dr. Millard takes three more groups, two comprising nine towns each, and the other having four towns. I am chiefly concerned with the two groups, as the third only contains four towns having no isolation hospitals. The period taken is the ten years 1890-1899. In Group 1 nine towns are placed in which the average proportion of cases of scarlet fever isolated in hospital amounted to 62.8 per cent, as compared with Group 2, in which the percentage isolated was only 28.8. The average attack rate in the former was 4.45 per 1,000, and in the latter 3.89. Cardiff is placed in Group 2, that is, amongst the towns isolating a comparatively small proportion of cases, and having an attack rate lower than that in the group isolating a much larger proportion. We will see presently what justification there is for this arrangement. Group 3, however, is that in which such a high degree of excellence has been reached, as the towns in it have not

isolated scarlet fever in hospital at all. Dr. Millard remarks, "Unfortunately there are only four of them." The mean attack rate in these towns during the ten years 1890-99 was 4.75 per 1,000, and a point is made of the fact that, notwithstanding the absence of hospital isolation, this rate diminished from 6.13 in the five years 1890-1894 to 3.62 in the five years 1895-1899. I will refer to the town which is regarded with peculiar satisfaction as taking the highest place in this group (Swansea). This position is very properly attributed to the excellence of its sanitary administration, in spite of many difficulties; to what extent it is due to the absence of hospital isolation is another matter. In the first place, although it is doubtless correct to state in a general way that Swansea has never isolated scarlet fever in hospital, it is not absolutely correct, for, from a return kindly supplied to me by Dr. E. Davies, the Medical Officer of Health, I find that during the eleven years ending 1903, 229 cases of scarlet fever were isolated in hospital, the percentage of cases removed ranging from 1.5 per cent in 1895 to 12.9 per cent in 1901. In Swansea Dr. Millard says, "The mortality has continued to fall until it may now be said to have almost vanished, and the attack rate is rapidly falling, and the inhabitants are to be congratulated upon the result." All this has happened in spite of the fact that all the cases were treated at home. "The fatality of the disease during the five years 1895-99 was only 2.2 per cent of the cases notified, and in one year, 1896, no less than 549 cases were notified with only 3 deaths." This argument would have had greater force if Swansea's scarlet fever mortality statistics had vanished together with Dr. Millard's statistics in 1899. But such was not the case. Even in the year following 1896 an alteration commenced, for in 1897 there were 100 less cases notified and four times as many deaths, and in 1902 there were 500 cases and 18 deaths, giving a fatality of 3.6 per cent, and this was the only year during the eleven years when no cases were removed to hospital. The attack rate in Swansea is, moreover, by no means remarkably low, ranging during this period from 11.9 per 1,000 in 1893 to 2.8 in 1895 and in 1899. But the attack rate, having reached this low figure in 1899, commenced to rise immediately afterwards to 3.3 in 1900, 5.8 in 1901, 5.2 in 1902, and 4.5 in 1903.

Whilst Dr. Millard was pursuing his investigations in South Wales, it is to be regretted that he did not visit the Rhondda Valley. Here he would have found a town which has really never isolated any cases of scarlet fever in hospital at all. The Rhondda Urban District, with a mean population of 108,874, for the five years 1897-1901 had an attack rate of 8.7 per 1,000, as compared with 3.8, the attack rate in Cardiff for the same period, with fairly complete hospital

isolation. In 1900 and 1901 the attack rate in Rhondda were 16·3 and 12·1 respectively with no hospital isolation, as compared with 2·3 and 8·2 in Cardiff, when 60 per cent of scarlet fever cases were isolated in hospital. These figures do not therefore show much advantage to the towns without hospitals.

SCARLET FEVER IN CARDIFF.

Year.	Population. All Ages.	Cases Notified. All Ages.	Attack Rate. All Ages.	Population. Under 15 Years.	Attack Rate. Under 15 Years.	Percentage Removed to Hospital.
1891	130,283	685	5·25	46,213	13·4	—
1892	132,895	1851	13·17	47,189	32·1	13
1893	136,168	816	6·00	48,185	14·9	22
1894	139,519	577	4·13	49,203	10·8	31
1895	142,958	484	3·38	50,242	8·5	43
1896	146,479	874	5·96	51,303	14·8	48
1897	150,087	758	5·05	52,386	13·1	50
1898	153,783	332	2·15	53,492	5·3	56
1899	157,414	184	1·16	54,621	2·7	66
1900	161,452	383	2·37	55,775	6·1	65
1901	165,308	1362	8·23	56,952	21·4	47
1902	168,909	1433	8·42	58,155	21·7	48
1903	172,598	963	5·57	59,383	14·1	63

FATALITY PER CENT.

Year	All Cases.	Home Cases.	Hospital Cases.	Percentage Removed to Hospital.
1892	4·7	4·8	2·0	13
1893	4·7	5·2	3·8	22
1894	1·3	1·7	0·5	31
1895	1·6	1·7	1·2	43
1896	3·2	0·8	5·2	48
1897	2·2	1·3	2·6	50
1898	2·4	0·0	4·3	56
1899	2·1	0·0	2·5	66
1900	2·8	4·5	2·0	65
1901	2·1	2·2	2·0	47
1902	2·5	3·0	1·9	48
1903	3·3	5·3	2·0	63

I will now attempt to deal with Cardiff, showing the manner in which the decline in the incidence and fatality of scarlet fever has been associated with hospital isolation. If this question of hospital isolation is to be considered from a statistical standpoint, it will, I think, be found safer to rely upon the statistics of one town, comparing the results in that town at different periods according to the amount of hospital isolation, taking each year by itself as a separate event in order to prevent erroneous conclusions from averages which include epidemic and non-epidemic years. It may, perhaps, be especially useful to compare the height of the epidemic wave in years

when there was no hospital isolation, with the height when this form of isolation was freely resorted to. Errors, due to the comparison of towns in which the conditions of social life and population differ, are also avoided in this way. Cardiff, as already mentioned, is placed by Dr. Millard in a group of towns in which the average percentage of the cases isolated in the ten years 1890–1899 was only 28·8 per cent, and in which the attack rate was comparatively low, 3·89 per 1,000. A little consideration will show that there is no justification for placing this town in any such group. Taking this period of ten years, it will be seen that no cases were removed to hospital in 1890 and 1891, and only a very small proportion in 1892 and 1893, and by extending this period still further back, a still smaller proportion of isolation would be obtained, which would entitle us to be placed in the group with Swansea. What are the real facts?

It so happens that in Cardiff two distinct epidemic waves of scarlet fever occurred since the Infectious Disease Notification Act was adopted. In the year 1892 there was an extensive epidemic, in which 87 deaths occurred, and in which 1,851 cases were notified, the largest number on record. The proportion of cases notified, or the attack rate per 1,000 of the population, amounted to 13·17, and the number of cases removed to the hospital was quite insignificant, being no more than 13 per cent of the cases notified. This epidemic may be said to have commenced in 1891, in which the attack rate reached 5·25 per 1,000, and to have extended to 1893, with an attack rate of 6·0 per 1,000. The next epidemic occurred in the year 1902, when the population was of course much larger, and when we should therefore expect to find the actual number of persons attacked larger. In this year (1902) the number of persons admitted to the sanatorium suffering from scarlet fever amounted to 709, as compared with 97 in 1892, and the number of cases notified to 1,433 as compared with 1,851, the number of deaths being 36 as compared with 87 in 1892. The attack rate was therefore 8·4 per 1,000 of the population in 1902, when nearly 50 per cent of the notified cases were removed, as compared with 13·1 per 1,000 in 1892, when only 13 per cent were removed. I have already mentioned that we have no record of the number of cases of scarlet fever occurring in the period antecedent to 1890 (the date of the Notification Act), and consequently statistics bearing on the attack rate in this period are not available; it may, however, be interesting to glance back at the next preceding epidemic to a period remote from hospital isolation in any degree. A severe epidemic of scarlet fever existed in Cardiff in 1884, causing 128 deaths and a death-rate of 1·36 per 1,000. Assuming that the fatality or proportion of deaths to cases notified was the same as in the next

epidemic in 1892, *i.e.*, 4·7 per cent (the highest on record), there would have been 2,723 cases in the town during 1884 amongst a population of 93,468, giving an attack rate of 28 per 1,000, a rate which has never been exceeded. Of course, if the fatality was lower than 4·7 per cent, the number of cases must have been more than 2,723. We have, then, three epidemics, as follows:—

Year.	Proportion Isolated in Hospital.	Attack Rate.	Death Rate.
1884 ...	0·0 per cent	28 per 1,000	1·86 per 1,000
1892 ...	18·0 "	18 "	0·85 "
1902 ...	48·0 "	8 "	0·21 "

Now we will divide Dr. Millard's ten-year period (1890-1899) into two periods of five years each. During the earlier period (1890-1894), out of the total number of cases of scarlet fever notified only 16 per cent were removed to hospital, and the attack rate reached 6·1 and the death rate 0·28 per 1,000 of the population. During the second period (1895-1899) the proportion of cases removed to hospital increased to 50·3 per cent, the attack rate decreased to 3·5, and the death rate to 0·08 per 1,000. It is therefore, I maintain, misleading to place Cardiff in a group of towns showing a low attack rate as the result of a small percentage of hospital cases; the real facts being that the attack rate was high (6·1 per 1,000) when the removals to hospital were comparatively few (16 per cent), and that this rate was considerably reduced, coming down to 3·1 per 1,000, when the proportion of removals increased to 50 per cent.

SCARLET FEVER IN CARDIFF 1890-99.

Period.	Proportion Isolated.	Attack Rate.	Death Rate.
1890-94 ...	16·0 per cent	6·1	0·28
1895-99 ...	50·3 "	3·5	0·08

It will be seen that in Cardiff the attack rate reached its lowest proportions during the years 1898, 1899, and 1900, when the proportion of cases removed to hospital was relatively high.

It may be objected that the attack rate, calculated on the whole population at all ages, does not give an accurate indication of the incidence of scarlet fever. This is so, of course, to some extent; scarlet fever is a disease of childhood, the majority of the cases notified being under fifteen years of age. For instance, in the year 1892 82 per cent of the cases notified were under that age, and in 1902 88 per cent. Consequently any variation in the proportion of persons living under fifteen years of age would probably affect the attack rate,

causing a rise or fall in the rate, as the proportion in the population under that age was greater or less. I have, therefore, estimated the population in Cardiff under fifteen years of age in each year during the period 1891-1903, and have taken the proportion of the cases of scarlet fever notified under that age; the resulting attack rate per 1,000 of such population is given in the table, this rate being 32·1 per 1,000 in 1892 as compared with 21·7 in 1902. It may be mentioned that in 1901 the proportion of persons living under fifteen years of age did not differ much from that in the previous census year (1891), being 34·4 per cent of the whole population in 1901, as compared with 35·4 per cent in 1891. Supposing we consider the three years 1891, 1892, and 1893 as comprising one epidemic period, and 1901, 1902, and 1903 as another such period. And if we compare the average attack rate in each period, calculated on the mean population of the three years, we still have a higher attack rate (8·3) in the earlier period as compared with 7·4 per 1,000 in the later period, although of course the difference is not so marked.

There is then, apparently, so far as Cardiff is concerned at any rate, some statistical evidence in favour of continuing our present methods of dealing with scarlet fever, and amongst these methods I regard hospital isolation as of considerable value. The decline in the mortality from this disease throughout the country and in the large towns which has taken place during the past thirty or forty years shows clearly, however, that there are many other factors besides this form of isolation, contributing to this result. The exact influence of hospitals upon the incidence and fatality of the disease cannot yet, I think, be stated statistically. The solution of the problem would seem to lie outside the region of statistics.

The advantages of this method of dealing with scarlet fever to the community at large and to localities and individuals can be shown, however, in quite other ways. The question is rather, Do the advantages outweigh the alleged disadvantages? Even from a financial point of view it is probable that there is a real gain to those towns isolating cases in hospitals; but putting this aside for accountants and others to decide, let us consider for a moment some of these disadvantages which we must admit and deplore. We hear a good deal about return cases. It is, of course, discouraging to find, after a long residence in a fever hospital, that a patient will return home and communicate the infection to other members of the family. These return cases, as they are called, are certainly not the result of a too early discharge from hospital; on the contrary, they seem to occur usually amongst those patients who have been detained for the longest periods, and, moreover, they are not all due to infection

brought from the hospital. Some persons are so intensely ignorant or careless that they will retain infected things in the house. A fancy toy, such as a doll, or piece of clothing worn by the patient to which it was particularly attached, is retained and brought out again on the return home, with the result that other children are attacked. And, after all, secondary cases occur in houses from which cases are not removed to hospital, and they are of more frequent occurrence than return cases from hospitals; and, if so, the advantage in this respect is with hospital treatment. In Cardiff, during the year 1903, out of 545 cases of scarlet fever treated at home, there occurred 86 secondary cases in the same house as the primary case. The secondary cases occurring in the same house within a week of the return home from hospital of the primary case, amounted to 21 out of a total of 376 cases treated in the hospital, giving 5.7 per cent of secondary cases amongst those treated at home, and 5.5 per cent amongst those removed to hospital. Comparisons of this kind are, however, of little value, unless one knows the number of persons susceptible to infection in each of the infected houses. Whilst admitting the importance of this aspect of the question, several circumstances prevented me from dealing with it: want of time and opportunities in the first place, and in the second place I found that when I first embarked upon the enquiry the information obtained was of such an uncertain and unreliable character, that any tabulation or classification of the results would be quite worthless. I had, therefore, reluctantly to relinquish the attempt.

Secondary septic sore throats and post-scarlatinal diphtheria occurring during convalescence, seem to be complications peculiar to hospitals; against these must be placed complications such as arthritis and nephritis, which are especially apt to occur during the convalescence of those who are treated under unfavourable circumstances in their own homes, or who are not treated or nursed at all, as may be the case amongst the very poor. Such complications may not affect the scarlet fever mortality returns, as they more often lead to permanent ill-health or premature death.

So far as the fatality of scarlet fever is concerned, no marked advantage can be shown in the case of hospital patients as compared with those treated at home, although it is obvious that the medical care and nursing which patients receive in hospitals must be favourable to their ultimate and complete recovery. On looking at the Table it will be seen that in some years the mortality of those treated in the hospital is greater than that of those treated at home, and in some the reverse is the case. On the whole there is not much difference in the mortality. For if we take the ten years 1893-1902, we find

that out of 3,317 cases of scarlet fever treated in the hospital in Cardiff there were 91 deaths, giving a case mortality of 2.7 per cent; and out of 3,918 cases treated at home there were 97 deaths, giving a case mortality of 2.4 per cent. We should, I think, expect to find the mortality higher amongst hospital cases. In many instances admission is sought on account of the severity of the illness, and there is therefore good reason for believing that a larger proportion of severe cases are treated in hospital than at home. Dr. Millard ever states that the fatality of scarlet fever appears to vary directly with the extent to which hospital isolation is practised. In Cardiff, however, the case fatality since 1891 shows the highest fatality with the smallest amount of isolation. Mean fatality: 1891-1893 = 4.8 per cent; 1900-1902 = 2.3 per cent. The disadvantages which have been alluded to are, after all, the result of our imperfect methods of administration, and cannot be justly urged as arguments against the principle of hospital isolation, and, as a matter of fact, they would be more readily removed by an extension of the system than by its abolition. There can be no doubt that it is wrong in practice to permit the promiscuous aggregation of acute and convalescent cases in the same ward, and that complications do sometimes result in consequence. Convalescent wards attached to these hospitals would probably, therefore, be an efficient means of abolishing both return cases and secondary sore throats. The idea of convalescent scarlet fever hospitals is not altogether a visionary one; it has been put into actual practice in Cheshire, in which the Local Government Board has officially sanctioned the inclusion in an isolation hospital scheme (under the Isolation Hospital Act) of an auxiliary or convalescent hospital, to be situated some distance from the infectious hospital proper.

It is hardly necessary to emphasize the advantages of the removal to hospital amongst certain classes of the community. It is possible that such cases may be regarded by some rather in the light of personal convenience, than as being any direct benefit to the public health. At any rate, the removal greatly facilitates the administration of certain Acts of Parliament and Regulations relating to infectious diseases, framed with a view to their prevention. Take the cases of pupils attending school, attacked with scarlet fever, the retention of whom in their homes might result in the absence from school of other members of the family not in themselves ill, causing in epidemic times a large number of absentees from the schools, and a serious interruption in the education of the community. Again, there are certain trades to which special legislation applies, such as milk-sellers, tailors, and trades connected with the manufacture or

sale of wearing apparel, laundries, etc., which might be brought to a complete standstill unless the infection is removed from the premises.

It is probable that there is room for improvement in some of our administrative details, and that better results might be obtained by better methods. Possibly in many places a better selection of cases removed to hospital might be made. The wholesale removal of rich and poor, regardless of their opportunities of home isolation, should be checked. The tendency to make these hospitals a personal convenience, is an abuse rather on the increase, and most difficult to deal with. The provisions of the Infectious Disease Notification Act require strengthening, in the direction of a more prompt notification of cases. With respect to the hospitals themselves, it seems quite likely that we have been detaining cases an unnecessarily long time, and that the removal of convalescents from acute cases should be effected as far as possible. Whatever reasons there may be for an improvement in these and other directions, I see none for advocating the abolition of isolation hospitals, and feel justified in submitting that, so far as Cardiff is concerned, the hospital has been one of the factors, and not the least important, in the reduction of the incidence and fatality of scarlet fever.

DISCUSSION.

The President, Dr. TUBB-THOMAS, thanked Dr. Walford for his able and interesting paper, which came at a very opportune time owing to the conclusions of Dr. Millard, which were based on insufficient information, which if thoroughly examined, would have been proved to have been utterly fallacious. Much harm had been done in the county of Wiltshire by Dr. Millard's paper.

Dr. HOWARD-JONES referred to the scarlet fever statistics for Newport for the years 1891-1901, during the first half of which they had no Isolation Hospital for scarlet fever, whilst during the latter period between 70 and 80 per cent of the cases had been isolated in hospital. During the "isolation" period, the cases had been 50 per cent, and the deaths 60 per cent less than before isolation. All uncomplicated convalescent cases were transferred to a special convalescent block, from which all septic cases were rigorously excluded. No cases were discharged from the acute wards.

Dr. STREETEN (of Swindon) referred to the difficulties he had to contend with at Swindon in reference to hospital isolation, owing to the fact that the accommodation was far too small for the requirements of the town, with the result that the hospital had to deal with a larger number of cases than it was intended for.

Dr. HERBERT JONES referred to the good which had indirectly resulted from Dr. Millard's paper, and that the Local Government Board were to be congratulated for insisting upon permanent buildings for isolation hospitals, which could be thoroughly disinfected. He also referred to scarlet fever statistics at Crewe, and the beneficial effects of hospital isolation there.

Drs. VICKERS, WATHEN, and CAMPBELL also spoke strongly in favour of hospital isolation of scarlet fever.

Dr. WALFORD briefly replied.

SCARLATINA AND MILK SUPPLY. SERIES OF 59 CASES DUE TO INFECTED MILK.

REPORTED BY ARTHUR A. MUSSEN, B.A., M.D., D.P.H.,
Assistant Medical Officer of Health, City of Liverpool.

AN interesting series of scarlatina cases, due to infected milk, occurred in Liverpool in the early part of this year, which appears to be worthy of record.

Between January 30th and February 6th a number (sixteen) of cases of scarlatina were notified in a suburban district which had previously been comparatively free from the disease, and on investigation it was found that the only circumstance which these cases had in common with one another was the milk supply. Enquiries were accordingly made at the suspected dairy, and the following history was obtained:—

About Christmas, 1903, that is, six weeks before the first case of the series was notified, one of the children in the dairyman's family was taken ill, and was seen by a doctor, who diagnosed the illness to be rheumatism. (In the light of subsequent investigations there does not seem to be any reason to doubt the correctness of this view.) About January 16th or 17th another child, a boy, aged nine years, became ill, and, according to the mother, presented similar symptoms to the first patient; but, as they did not call in a doctor, he was kept in bed for a few days, and allowed to come downstairs about a week previous to the notification of the first case. When this child was seen on February 6th there was slight œdema of feet and ankles, and copious desquamation from hands and feet, showing without doubt that he had recently had an attack of scarlatina. No one else in the house appeared to have contracted the disease, nor could any other case of sickness among the workers in the dairy be traced.

The shippon connected with the dairy is of modern construction, and had been kept in a fairly sanitary condition. At the time of the outbreak it contained thirteen milking cows, all of which were carefully examined by the Corporation Veterinary Surgeon, who failed to find anything in their condition to account for the infectivity of the milk. The total number of houses on the dairyman's list of customers was 138.

On February 6th the child was at once removed to hospital, all the milk, cream, etc., in the dairy was destroyed, and the house and clothes were thoroughly disinfected. No milk was allowed to be brought into the dairy, and those persons engaged in milking or dealing

with the milk were instructed to change their clothes, and not enter the house or dairy until the disinfection was completed.

The subsequent progress of the outbreak is shown in the accompanying table, which gives the number of cases notified in each day in houses supplied with milk from the infected dairy, and also the dates of onset of the first cases in each house infected subsequently to the discovery and removal of the source of infection on February 6th.

Date.				Number notified each day in houses supplied with milk from infected Dairy. (Nos. in brackets are cases in houses previously infected.)	Number attacked each day in houses not previously infected, among those cases notified subsequently to dis- covery and removal of source of infection on February 6th.
January	30	...	...	1	16*
February	2	...	...	2	1
"	3	...	...	2	—
"	4	...	...	3	4
"	5	...	...	4	6
"	6 (case removed)	...	...	4	8
"	7 (Sunday)	...	...	—	2
"	8	...	...	7	5
"	9	...	...	7 (2)	4
"	10	...	...	3 (2)	3
"	11	...	...	5 (2)	—
"	12	...	...	2	—
"	13	...	...	— (1)	—
"	14 (Sunday)	...	...	—	1
"	15	...	...	1	—
"	16	...	...	2	—
"	17	...	...	—	—
"	18	...	...	—	3
"	19	...	...	— (1)	—
"	20	...	...	3 (1)	—
"	21 (Sunday)	...	...	—	—
"	22	...	...	— (1)	—
"	23	...	...	— (1)	—
March	1	...	...	1	11
"	8	...	...	1	—
Total Cases				59	59

From this table it would appear that no case was attacked in houses not previously infected after February 10th (the four cases lower down will be dealt with subsequently), that is, four days after the removal of the source of infection. This would suggest that the means taken to limit the outbreak had absolutely stopped the distribution of infected milk; then taking the morning of the 6th

* Notified previous to February 6th.

February as the last time that the milk could have been infected, and allowing twelve to fifteen hours for the delivery and consumption of the milk, this would leave a probable incubation period of between three and four days.

With regard to the four cases recorded as having been attacked subsequent to February 10th, in houses not previously infected, these can be traced to other sources. For instance, the case attacked on February 14th was a child (five years) living in a small street near the dairy which was already infected; she was known to have played with other children from an infected house close by. Of the three cases attacked on the 18th February, two were children (eight and ten years) who lived in the same neighbourhood, and were also friends of, and played with, the children (mentioned above) from an infected house. The third case, on the 18th, was a young man (eighteen years) who lived in this district, and had a friend living next door suffering from scarlatina, where he used frequently to call and ask after him.

The details of the last two cases are interesting. The case notified on March 1st was a young woman (eighteen years), whose parents lived in the neighbourhood of the dairy; she was notified to the Public Health Department by the Medical Officer of Health for Blackpool with the following information: The patient while at home suffered from a sore throat and vomiting three or four weeks ago, probably February 9th. No doctor was called in, and on February 24th, when considered to be convalescent, she was sent to Blackpool for a holiday, where the diagnosis of scarlatina was made on March 1st by the Medical Officer of Health.

The other case was a woman (twenty-eight years), who lived in a distant suburb of the city, but who was supplied with milk from the infected dairy. She suffered from a sore throat about February 10th, but the doctor who saw her about five days after could not obtain any definite history of a rash, although he suspected scarlatina; subsequently, however, desquamation became marked, and his suspicions were confirmed.

BOVINE INOCULATION TUBERCULOSIS.—Lassar (*Dermatol. Zeitschrift*, Bd. X., Heft 5,—*Treatment*), showed some time ago an assistant who had developed a patch of warty tuberculosis of the skin while experimenting with secretion from the throats of tuberculous cattle. Lassar has investigated the frequency of local tuberculosis of the hands in those engaged in slaughter houses, and found over 2 per cent affected. In one case a man had tuberculous warts on the finger, and inoculated his body by scratching. Lassar concludes that tuberculous beef has contagious properties for human skin, and that Koch's contention that bovine tuberculosis is not pathogenic for man is incorrect.

PROTRACTED AND RECRUDESCENT INFECTION IN DIPHTHERIA AND SCARLET FEVER.*

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SUMMARY.

1. Instances of Protracted Infection in Scarlet Fever :—
 - 1 & 2.—Hospital cases : no recent contact with other acute cases.
 - 3.—Do. : contact with other acute cases.
 - 4.—Do. : hospital conditions unknown.
 - 5.—Do. : no recent contact with other acute cases.
 - 6.—Do. : recrudescence infection due to a catarrh.
 - 7 & 8.—Home-treated cases.
2. Alternative Explanations of these Cases :—
 - 9, 10, 11 & 12.—Prolonged latent microbism or "missed" cases.
 - 13.—Relapse after release from isolation, with "return" cases.
- 3.—Instances of Protracted Infection in Diphtheria :—
 - Case group 14.—Duration of infection over 100 days.
 - " 15.—Mixed infection of scarlet fever and diphtheria.
 - " 16.—Duration of infection probably 160 days.
 - " 17.—" " 81 days.
 - " 18.—Infection in otorrhœa.
 - " 19.—" " 52 days after onset of illness.
 - " 20.—" " 43 " "
4. Points suggested by the previous cases :—
 - (1) Recurrent infection is relatively infrequent.
 - (2) It is oftenest associated with rhinorrhœa and otorrhœa, but not always.
 - (3) Accurate records of such cases are most desirable.
 - (4) Post-isolation medical supervision of patients is required.
 - (5) The complication with which recurrent infection is most often associated, is commonly already present when the patient is first isolated.
 - (6) Is the morbid mucous membrane of the patient a storer of other patients' infection, or an incubator of self-produced infection?
 - (7) Dormant infection is sometimes rendered active after long intervals by catarrhs, etc.
 - (8) There is a close analogy between the phenomena of recurrent infection in diphtheria and scarlet fever.
5. Considerations as to Protracted Infection. History of this in Diphtheria, Greenhow, Gresswell.
6. Likelihood that the same explanation of Protracted Infection holds good for both Diseases.
7. Are "Return" Cases a Hospital Phenomenon?
8. Unsatisfactory Nature of the Statistical Evidence.
9. Causation of Septic discharges in Scarlet Fever and Diphtheria.
10. Bearing of Relapses on the Problem.
11. Analogy of Influenza and other Infectious Diseases.
12. Bearing on the Problem of the old belief in the Infectivity of the late Desquamation of Scarlet Fever.

* A paper read before the Royal Med. and Chirurg. Society, June 14, 1904.

THIS contribution is a clinical study of a number of cases occurring in my experience during the past ten years; and I propose first to describe the cases and outbreaks of disease illustrating protraction and recrudescence of infection in scarlet fever and diphtheria, commenting on each case in succession. There is ample material for one contribution in either of the diseases named; but I have preferred to discuss the two diseases together, one main object of this contribution being to bring out the close analogy between the two diseases, and the similarity of the phenomena which they display.

Although the conceptions of protracted continuous infection and of recrudescence of infection are separately stated, it is often impracticable to state to which group a given case may belong. The interval between the release from isolation of the infecting patient and the infection of the infected patient, may be longer than the incubation period of the disease, owing either to lack of earlier opportunities of contact, or to a true interval of freedom from active infectivity on the part of the infecting patient.

PROTRACTED INFECTION IN SCARLET FEVER.

Case 1.—J. I—, aged four and a half, of No. 4, R— Road, was admitted to hospital on April 14th, on the third day of scarlet fever. Her temperature remained elevated for four days, and rose again after a day's interval. On April 22nd double otorrhœa began. There was slight nasal discharge on admission. Temperature fell to normal on April 26th, and remained so. On May 3rd it was noted that there was "no desquamation, and had been none except fine and powdery on body. Both ears and nostrils still discharging." On May 8th noted that "both ears still discharging; also nose. Suspicion of desquamation on feet." She was sent home on May 12th, after having been in the hospital twenty-nine days. There was then no desquamation.

This patient was treated throughout in one ward with six other patients, no other patients being admitted to this ward after April 26th. The following is a list of the patients who were in the same ward as the above patient during some portion of her stay in the hospital :—

W. M—, aged five, 16, K— Street. Admitted February 22nd, discharged April 14th. Had profuse nasal discharge on admission, which ceased about April 7th. Had some enlargement of cervical glands about March 31st.

F. M—, aged ten, 16, K— Street. Admitted April 26th, discharged June 10th. No septic complications.

D. M—, aged three and a half, 13, C— Square. Admitted April 5th, discharged June 5th. No septic complications.

W. C—, aged four, 39, H— Road. Admitted April 8th, discharged June 4th. Otorrhœa began April 15th. Much nasal discharge on May 3rd. Was in next bed to above patient J. I—.

F. C—, aged two and a half, 39, H— Road. Admitted April 8th, discharged June 4th. Much nasal discharge on admission.

O. F—, aged eighteen, 10, L— Road. Admitted April 24th, discharged June 17th. No septic complications.

It is to be noted that J. I—, the patient in question, was admitted on April 14th to a well-ventilated, large ward, which during the whole of her stay in hospital did not contain more than six other patients. As no patients were admitted to the same ward during her convalescence, the possibility of her receiving and storing in her nasal cavities auxiliary infection from other more acute patients is excluded. Of the patients admitted to this ward, two besides herself had rhinorrhœa on admission, while three were and remained free from septic complications throughout. One of these was F. M—, a "return" case. W. C—, whose brother F. C— had nasal discharge on admission, began with otorrhœa a week after admission.

Before describing the course of events after J. I— was sent home, it will be convenient to summarize the corresponding facts for the four of the above seven patients, in whose families no secondary or return cases occurred:—

	Stay in hospital.	No. of susceptible persons in patient's home.
D. M— ..	60 days	No children in this house.
W. C— and F. C—	56 days	Father, mother, and a child aged six months; have not had scarlet fever.
O. F— ..	53 days	No children in this house.

Case 1 (continued).—J. I— left the hospital prematurely on May 12th, after twenty-nine days' isolation. She had double rhinorrhœa and otorrhœa at this time. During the first week of her stay at home, she played with her brother during the day, but slept separately. On the nights of the 5th, 6th, and 7th of June she slept with her brother, B. F. I—, aged three years eight months, and he failed with scarlet fever on June 8th. When admitted to the hospital on the 10th he had rhinorrhœa, and next day there was left otorrhœa. On the 18th right otorrhœa began. On June 12th it was noted that there was a large amount of thin nasal discharge, and the upper lip was œdematous. A swab taken from the throat was regarded as suspicious of diphtheria, though the Neisser stain failed to confirm this suspicion. From this time until a week before leaving the hospital, he was kept in a separate small room, but was attended by the nurse who attended seven or eight other patients in the general ward. On July 8th it was noted that there was double otorrhœa, less rhinorrhœa. On this day the formalin nasal and throat douche ($\frac{1}{4}$ per cent), which had been given thrice daily since June 18th, was changed to Tinct. Iodi 5ij ad Oi. On July 25th the formalin was resumed. The mother was anxious to have the child home, and took him home on August 14th, sixty-five days after admission. B. F. I— had been for eight weeks in a room alone, except during the last week of his stay in the hospital. During this week he was in the general ward, which at this time contained only one patient, a convalescent who was sent home on August 21st without any recurrence of infection. A child aged two years, who with the father and mother had hitherto escaped infection, was sent away to friends before B. F. I— went home, and remained from home for a couple of months. This child was at home when J. I—'s return home was followed by B. F. I—'s attack.

On August 23rd, Mrs. I—, aged thirty-one, the mother of the two last patients, failed with scarlet fever, and was admitted to hospital on the 25th. Since B. F. I—'s return home, she had syringed out his ears daily as directed.

Mrs. I— attributed B. F. I—'s attack to infection by a pair of boots worn by J. I— during his illness. These had been disinfected by soaking in a solution of lysol. They were played with and cut up by J. I— and B. F. I—. I incline to the view that both B. F. I—'s and Mrs. I—'s cases were true "return" cases. Taking this view, the following points of interest present themselves:—

1. Mrs. I— was not infected by J. I— on his return home, although she was apparently as much exposed to infection from him as was B. F. I—, who appears to have been infected by J. I— on or about the fifty-sixth day of his disease, *i.e.*, about twenty-four days after he had been sent home on the thirty-second day of disease.

2. The child, aged two years, and J. I—'s father, who were also in close contact with J. I—, were not infected.

3. There was an interval of twenty-seven days between the day when J. I— left the hospital and the onset of B. F. I—'s attack, but the two did not sleep together until three days before the latter event.

4. Mrs. I—, who had escaped or successfully resisted infection for twenty-seven days or more from J. I—, was infected apparently by B. F. I— after only nine days' exposure to infection. There was no reason to believe that meanwhile she had deteriorated in health. Her husband (who has not had scarlet fever) remained well.

Thus Mrs. I— was probably exposed to infection on three occasions, and only became infected on the third: (a) For three days before J. I—'s admission to hospital; (b) For twenty-seven days or longer from J. I— after his return home, and for three days from B. F. I— before admission to hospital; (c) For nine days from B. F. I— after his return home.

Why should Mrs. I— succumb to infection on this third exposure? Assuming that this was not mere accident, it is desirable in attempting to answer this question to pursue our study of the patients who were in the same ward as B. F. I—.

B. F. I—, aged three years eight months. Admitted June 10th, discharged August 14th. Had otorrhœa and rhinorrhœa when discharged, and continuously from day of or day after admission.

Mrs. I—, aged thirty-one. Admitted August 25th, discharged October 4th. No complications.

During the week at the end of which B. F. I— was discharged, the only patients in the same large ward were:—

(1) F. F—, aged seven and a half. Admitted on May 26th with chorea, scarlet fever, and eczema capitis. Discharged on August 21st.

(2) F. A—, aged one year two months. Admitted July 10th with scarlet fever complicated by stomatitis. This was followed by pneumonia, and the patient died on August 8th.

Two brothers, Harry H—, aged two and a half years, and Hugh H—, aged 11 months, were admitted on June 22nd with scarlet fever and whooping cough, and were therefore put in a separate room with separate nursing throughout. On admission, both these children had greatly enlarged cervical glands, nasal discharge, and otorrhœa. These two patients are mentioned to indicate the then prevalent type of disease. There was no inter-communication between them and any other patients.

It may be added that every patient has a separate towel and comb and a separate syringe, the nozzle of which is kept by the bedside in lysol solution in the intervals of using.

Of the patients who were nursed along with one or other of the two children, J. I— and B. F. I— :—

1. Of the total number (eight) four had septic complications (*i.e.*, rhinorrhœa, or otorrhœa, or stomatitis, or eczema) on admission. One (W. C—) apparently developed it later, but his sister had much rhinorrhœa when admitted on the same date as W. C—. Three other patients in the same ward had no septic complications throughout.

It is clear, therefore, that in nearly every instance the type of disease was determined before the patient's admission to hospital, by the previous environment of the patient, or by the condition of the patient's mucous membrane, or by the natural history of the disease, or by an undetermined combination of these and possibly other circumstances.

2. There was no overcrowding in the ward in which the above cases occurred. It was capable of accommodating sixteen patients, each having ample floor space.

3. The only circumstance pointing to the possibility of the scarlatinal contagium of B. F. I— being rendered more infective by hospital conditions, consists in the presence of F. F— in the same ward, and this is not a sufficient explanation of the fact that B. F. I— infected his mother, while J. I— had not done so. The facts point to the view that the capacity to produce "return" cases in these instances was independent of the hospital conditions under which the patients were treated; and that the protracted and increasing infectivity of these cases was a phenomenon in the natural history of the disease, irrespective of their environment, and probably due to the then prevalent type of disease.

Case 2.—W. M—, aged five, of 16, K— Street, failed with scarlet fever on February 18th, and was admitted to hospital on February 22nd. On admission he had profuse nasal discharge, which ceased one week before he left the hospital on April 14th. On March 31st he had enlarged cervical glands.

On April 7th this patient's sister, F. M—, aged nine, complained of sore throat, but continued to attend school until April 23rd. She suffered from headache on April 24th, and on the 26th had a scarlatinal rash, twelve days after her brother's return home. In the same house were the father and mother, and boys aged fifteen, thirteen, five, and half a year old respectively. None of these have had scarlet fever. F. M— had no mucous discharges or other complications during her attack of scarlet fever.

At the time when W. M— was sent home, there were in the same pavilion eleven other convalescent children. These children were as follows :—

	Admitted.	On admission.
J. P. ..	Jan. 21st ..	Nasal discharge and enlarged glands.
C. F. & ..	Feb. 20th & ..	No complications throughout.
A. F. ..	19th ..	?
E. S. ..	? ..	?
F. W. ..	Feb. 15th ..	No complications throughout.
H. K. ..	Feb. 17th ..	Enlarged glands.
Mrs. E. ..	Feb. 28th ..	No complications.
J. B. ..	March 1st ..	No complications.
R. D. ..	March 5th ..	Much nasal discharge. Otorrhœa later.
F. F. ..	March 17th ..	No complications.
C. L. ..	? ..	No complications.

In this instance also the rhinorrhœa, which is a common index of chronic infection, was present when the patient was admitted to hospital.

For four weeks before being sent home the patient was in contact with none except convalescent cases, and in this, as in all the other instances recorded in this paper, the patient's nares were washed out twice daily during the whole of the convalescent stage, with a 1-200 solution of lysol.

Case 3.—F. N—, aged three, of No. 2, E— Street, was admitted to hospital with scarlet fever on September 20th, and discharged on November 3rd. While in the hospital he had purulent nasal discharge, which was first noted two days after admission. On September 27th right otorrhœa began. When he was discharged he had a hard cough, but no rhinorrhœa or otorrhœa, and no roughness of skin. When examined on November 20th he was apparently in a normal condition. After leaving the hospital, F. N— slept in a separate bed for two nights, afterwards in the same bed as D. N—. There were in this house two families. Of the patient's family, the mother, a girl aged ten, and boys aged eight, and one year nine months, who had not previously had scarlet fever, remained well. In the second family the mother had scarlet fever some years ago, the father and a child, who had not had scarlet fever, remained well.

On November 11th, D. N—, aged six years, failed with scarlet fever, and was admitted to hospital on the 12th. This patient was in more intimate contact with F. N— than the rest of the family. He had attended school during the last three weeks before F. N— returned home, but during this time no cases of scarlet fever were notified among the children attending this school.

At the time when F. N— was sent home, there were twenty-six other patients in the same pavilion, divided into two wards. Of this number,

seven had no rhinorrhœa. Among the remainder, the following complications had existed :—

Admitted		On admission.
A. B.	.. Sept. 15th	.. Earache, swollen glands, otorrhœa later.
D. D.	.. Sept. 19th	.. No rhinorrhœa; this began three days later.
B. W.	.. Sept. 19th	.. Rhinorrhœa and eczema.
D. W.	.. Sept. 19th	.. Rhinorrhœa and glands.
F. N.	.. Sept. 20th	.. Profuse rhinorrhœa two days after admission.
D. W.	.. Sept. 21st	.. Rhinorrhœa.
R. M.	.. Sept. 22nd	.. Ditto
L. M.	.. Sept. 22nd	.. Rhinorrhœa and double otorrhœa.
K. M.	.. ?	.. ?
A. S.	.. ?	.. Rhinorrhœa and double otorrhœa.
F. A.	.. Oct. 11th	.. Rhinorrhœa.
A. S.	.. Oct. 20th	.. Slight rhinorrhœa.
B. F.	.. Oct. 21st	.. Rhinorrhœa.
W. F.	.. Oct. 20th	.. Ditto.
F. F.	.. Oct. 24th	.. Ditto.
C. W.	.. Oct. 21st	.. Slight rhinorrhœa.
A. W.	.. Oct. 21st	.. Slight rhinorrhœa and otorrhœa.
E. W.	.. Oct. 21st	.. Slight rhinorrhœa.

At this time it will be noted that there was no separation between acute and convalescent cases. One patient had been admitted to the same pavilion within ten days of the time that F. N— was sent home. It should also be noted that of the cases in the ward when F. N— went home, while seven had no mucous discharges, eleven had been noted as having rhinorrhœa on admission, two rhinorrhœa and otorrhœa on admission, one rhinorrhœa three days after admission, and one swollen glands on admission. This case, therefore, is open to the interpretation that the "return" case was caused by the accumulation of acute infective material from other patients in the nasal passages of F. N—. It is equally capable of explanation on the supposition that the persistence of infection was determined by the storing and probably the continued multiplication of personal infection in his mucous crypts and follicles, continuing in this instance in the absence of rhinorrhœa or otorrhœa.

In the following instance the source of infection appeared to be an otorrhœal discharge :—

Case 4.—E. H.—, aged five, of 36, L— Road, was discharged from a metropolitan fever hospital on October 22nd, having been there sixty-nine days with scarlet fever. She returned directly home to the above address, having otorrhœa at the time. This was attended to by the mother, Mrs. H—, aged thirty-one, who failed with scarlet fever on October 25th. The note made on E. H.—'s bed-ticket on October 20th was "Skin, mucous membrane, and urine normal."

The following hospital "return" case occurred in connection with a patient discharged from the Southampton isolation hospital :—

Case 5.—On July 6th, 1903, I received a letter from Dr. Lauder, the Medical Officer of Health of Southampton, stating that J. S—, aged three, had been in his isolation hospital with scarlet fever for fifty-five days, and was discharged that day and going to a certain house in Brighton where his parents lived. He added "Yesterday I discovered some eczema behind his ears . . . and I give you notice to this effect. I may say that on June 30th he was disinfected and put in a ward specially prepared, so that he has had a week away from infection. He will again be disinfected before discharge." The Brighton address given was unfortunately erroneous, and I could not find the child. He lived with his parents at 26, K— Street from the 7th to the 18th. They then removed to 41, C— Street, and from that time J. S— slept in the same bed as J. C—, aged three, the landlady's child. J. C— failed with scarlet fever on July 20th, and was admitted to our sanatorium on July 22nd. His brother, N. C—, aged two, failed with scarlet fever on July 28th. In a further letter Dr. Lauder informed me that J. S—, on the day he left hospital, "had a slight watery discharge from the nose."

In this instance the exceptional circumstance arose that I was warned by my *confrère* of the possibility that J. S— might still be infective, but was unable to trace his movements owing to a mistake in the supposed address.* J. C—, who slept with J. S—, was infected within two days of the first contact between the two, and nineteen days after J. S— had been removed from any source of infection except himself. There could, therefore, be no question of accumulation of infection from acute cases other than the patient himself, unless this accumulation persists much longer than has hitherto been supposed, and than can reasonably be supposed to occur. The more probable hypothesis is that J. S—, notwithstanding all the precautions taken, continued to harbour scarlatinal germs in the deeper parts of his naso-pharyngeal mucous membrane, or to act as an "incubating chamber" of them.

Obvious difficulties are presented in attempting to distinguish between recurrent infection caused by a return of infectivity which had previously become dormant, and persistent infection, which only waited for susceptible material to work upon. In the following instances there appears to have been *return of infectivity* after its temporary disappearance, as also in Case 1.

Case 6.—X. B—, aged six, failed with scarlet fever on September 10th; admitted to hospital September 12th; sent home on October 23rd. During his stay his temperature occasionally rose to 100° F., for which no cause could be detected. No mucous discharges. Hands and feet

* This case occurred during the time that Dr. Lauder was conducting an interesting experiment in treating convalescent and acute cases, complicated and uncomplicated cases, in different wards. The details of the experiment are given in the *Lancet*, March 12th, 1904, p. 712.

rough when sent home. Remained well until November 14th, when he had his hair cut. "Seemed to have a cold next day," and when seen by me on the 19th had a tickling cough, but no sore nose or mucous discharge. The sister, E. B—, aged four and a half years, failed with scarlet fever on November 17th.

It appears probable that although sixty-five days had elapsed since the onset of X. B—'s attack, twenty-three days had elapsed since he left the hospital, and thirty-five days had elapsed since he had been in contact with acute cases, recrudescence of lurking infection occurred, the exciting cause being the "cold" starting on Nov. 14th.

This explanation is confirmed by the following two instances of "return" infection occurring in home practice during the same year as the last:—

Case 7.—G. U—, aged five, failed with scarlet fever on August 1st at I—, was nursed at home and isolated until September 12th, when disinfection was carried out. This appears to have been drastic. She had ear discharge in the first week of her illness, not afterwards; no nose discharge. For the three weeks after September 12th, G. U— and her sister E. U—, played together, but did not sleep together. The family came to Brighton on October 1st. On the way down they stayed with a married sister, who had ten children all at home. These have remained well. After arrival in Brighton, G. U— slept alone until October 10th. On this night she slept in the same bed with her mother and sister, and the latter failed with scarlet fever on October 12th. The reason for their sleeping in the same bed was that G. U— "appeared to have got a cold from a draught at the window and the rain coming in." No outside infection could be discovered.

Case 8.—N. C—, aged eight, failed with scarlet fever on July 31st, at Y—. Disinfection carried out September 15th, there having been isolation for seven weeks. The disinfection appears to have been most thorough. Her sister, F. C—, and the above patient occupied the same bed at Y— from the 19th to 21st September inclusive. They then returned home together to H—, and still slept in one bed until October 14th, when they arrived in Brighton. On the day of arrival the sister, F. C—, aged ten, failed with scarlet fever.

In considering the origin of the preceding "return" cases, several alternatives present themselves:—

1. The case is a true "return" case.
2. Infection has been caused from the source which caused the first case in the household.
3. There has been failure of disinfection.
4. Missed cases explain the recurrence of infection.
5. Latent microbism (producing "carrier cases") explains this recurrence.
6. The infecting patient has had, while isolated, or after release from isolation, a true relapse of scarlet fever, or an abortive relapse in the form of a scarlatinal sore throat, and has, owing to this being overlooked, been released prematurely from isolation.

The second of these alternatives can usually be excluded with some approach to exactitude. The third is more difficult, and involves a certain amount of error. Failure in a minute detail may involve recurrent infection, not infrequently near the time when the first patient returns home. This, however, is probably an exceptional occurrence. "Missed cases" are a much-neglected source of recurrent infection. Nor as a matter of coincidence is it surprising that a certain number of instances of "missed cases" should infect others about the time of the return of the first patient from hospital. Diphtheritic infection may persist for several months in an apparently healthy naso-pharynx, and it is not surprising that this occasionally happens in scarlet fever. The following case possibly comes under this head. It illustrates the occurrence of what would, if the first patient had been sent home after the usual period of isolation, have been regarded as a "return" case.

Case 9.—D. J—, aged seven and a half, failed with scarlet fever on December 14th; was admitted to hospital on December 16th. Her attack was complicated by peri- and endocarditis, and she had not returned home on February 5th, when the brother, J. J—, aged two and a half, failed with scarlet fever, fifty-one days after his sister's removal. There are also in the same house a baby aged ten months, and the father and mother, none of whom have had scarlet fever, and all of whom remain well. The father is a coachman, and the family live in rooms over the coach-house. J. J— is a rachitic child. He has not been out of the house since D. J—'s removal, and no visitors have been in the house. No outside source of infection could be discovered. Disinfection had apparently been rigidly carried out, and inquiries, when the second case occurred, failed to reveal any carelessness.

Latent microbism is another explanation of such cases. The following cases possibly come under this head:—

Case 10.—G. R—, aged five, failed with scarlet fever on December 6th, removed to hospital December 8th. F. R—, aged seven, failed with scarlet fever December 25th, removed December 26th. K. R—, aged four, failed January 7th. There were no other children in this house. Father and mother had no sore throat or other symptoms. Thus secondary cases occurred at intervals of eighteen and fourteen days respectively. No outside infection after the first case. Disinfection very thorough.

Case 11.—B. C—, aged five, failed with scarlet fever on September 24th, admitted to hospital September 29th. H. C—, aged four, failed with scarlet fever October 13th. Is stated to have "had a cold" all the time since the removal of B. C—. When seen by me on September 30th had a "stuffy nose." A brother, aged eight, remained well; father and mother same. Interval of fifteen days between the two cases. Disinfection thorough.

Case 12.—O. D—, aged nine, failed with scarlet fever September 21st, admitted to hospital September 23rd. B. D—, aged six, failed with

scarlet fever October 6th, thirteen days interval. In this and the above cases, no evidence of further outside infection. B. D— stated to be "poorly" when O. D— was removed.

These cases may be explicable like Case 9, on the supposition that there was a "missed case," *i.e.*, a case in which although there were symptoms, *e.g.*, a scarlatinal sore throat, these symptoms were unrecognizable or unrecognized. It is possible, however, that they are to be regarded as "carrier cases," *i.e.*, instances of patients who harbour scarlatinal germs on or in their mucous membranes for a considerable time; these only eventually "taking root" if or when a catarrh or some other condition lowers resistance to infection. We know that such cases occur in diphtheria. Why not also in scarlet fever?

In other cases recurrence of infection in the household to which the patient belongs is due to the patient suffering from a relapse of scarlet fever during convalescence or after release from isolation. The following case deals with the second of these possibilities:—

Case 13.—B. F—, aged twelve, fell ill on November 1st, with vomiting and sore throat, and on admission to hospital on November 4th there was a well-marked scarlatinal rash. The attack pursued a normal course, there being no nasal or aural discharge. She returned home on December 20th, having been in hospital forty-nine days. On the 23rd she was re-admitted to the scarlet fever ward on the certificate of a different doctor from the one who notified her first attack. It was stated that she was quite well on the previous evening, but the scarlatinal rash was noticed on the morning of admission. She had had a gum-boil two days previously. The temperature was normal on re-admission, and remained so. She had a slight sore throat. The rash was scarlatiniform. There were enlarged post cervical glands, and the possibility of röteln was considered. This was, however, excluded at the time, and no subsequent cases of röteln occurred in this ward. On January 9th she had joint pains, but no elevation of temperature. There was no rhinorrhœa or otorrhœa while in the hospital, but she had some soreness of the septum naris, which was apparently well when she left the hospital on February 10th. When the two next cases were notified, B. F—'s nose was again found to be sore. C. F—, aged eight, failed with scarlet fever on February 18th. D. F—, aged ten, failed with scarlet fever on February 20th.

There appears to be no doubt that they were infected by B. F—. Assuming this to be the fact, these two sisters (the only susceptible persons in the house) escaped infection on two occasions: (1) In the days preceding B. F—'s removal to hospital with her first attack; (2) In the day preceding B. F—'s removal with her second attack or relapse of scarlet fever.

Several explanations of the earlier escape and the final sickening with scarlet fever of C. F— and D. F— suggest themselves: (a) The earlier escape may have been merely accidental; this is unlikely.

(b) Their resistance to infection became almost simultaneously lowered at a later date, which is also unlikely. (c) A more infective type of scarlet fever capable of infecting previously insusceptible subjects was bred, not in a second patient, but in the same patient, who had previously suffered from a presumably less infective type of that disease. If this last hypothesis be accepted, what caused B. F— to be more infective in her second than in her first attack? The following facts as to the hospital circumstances under which B. F— was treated during each attack of scarlet fever, are here inserted in view of their possible bearing on the problem.

During the last seventeen days of B. F—'s first stay in hospital, except the last three days, she was in a corrugated iron building, having a partition 6ft. 6in. high between its two halves, the convalescent patients being on one side and the acute patients on the other side of the partition. The last three days B. F— was in a separate room before she left the hospital. The following figures include the patients on each side of the above partition. Fourteen patients were in the same ward when B. F— was discharged, and seven others had been discharged during the previous fortnight. Of these twenty-one patients five had been in the hospital less than three weeks, one only one week. One other patient, admitted October 28th, had a relapse on December 4th.

During B. F—'s second stay in hospital she spent a considerable part of her time in a separate small room, possibly the whole time, though this cannot be definitely stated, as the record is incomplete on this point. Assuming, however, that she was at least occasionally in contact with the patients in the general ward, we may note that nineteen patients were in this ward when B. F— was finally discharged, and three had been discharged during the previous fortnight. Of these twenty-two patients ten had been in the hospital less than three weeks, four of them less than two weeks.

Thus there were ten acute cases in the general ward, from which she was finally discharged, as compared with five when she was discharged in the first instance. Against this is to be set the fact that B. F— was kept partially or entirely in a separate room, and was certainly discharged after being isolated at least three days in this room.

The greater infectivity of the relapse was in my judgment a cycle in the life-history of the contagion, totally unconnected with hospital conditions. I also regard the relapse as self-generated.

PROTRACTED INFECTION IN DIPHTHERIA.

It is unnecessary to enumerate a large number of instances, as prolonged infectivity in this disease is well recognized. The two following instances dealing with localized outbreaks of diphtheria, bring out the close analogy between diphtheria and scarlet fever in regard to protracted infection:—

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Case Group 14.—Mrs. W—, aged twenty-seven, failed with diphtheria on November 15th, 1903, and was admitted to the hospital on November 18th. There were living in this house two families, as follows: Mrs. E. W—, Mr. W—, Thomas W—, aged three, baby, aged five months; Mr. H—, Mrs. H—, A. H—, aged ten, G. H—, aged eight, C. H—, aged five, D. H—, aged three, E. H—, aged one year eight months.

C. H—, aged five, failed with a second attack of diphtheria on November 20th; admitted to hospital on November 21st. No history of school infection. G. H—, aged eight, failed with diphtheria on November 22nd; admitted to hospital on November 23rd. Investigation of the household drew suspicion to Thomas W—, aged three. A nasal swab was taken from him on November 23rd, and showed diphtheria bacilli, and he was admitted to hospital the same day. On admission he had eczema naris extending over face. December 7th, throat swab positive; December 15th, throat swab negative; December 16th, nose swab positive; December 20th, noted that slight rhinorrhœa continues; December 21st, eczema below lobe of right ear; December 28th, no nasal discharge; December 30th, nose swab positive, throat swab negative. A culture from the nose swab was sent to Dr. Eyre, Guy's Hospital. He reported that he isolated the diphtheria bacillus from a sub-culture on blood serum and cultivated it in a parallel series with a true *Bac. diphtherie*, and then inoculated it into the subcutaneous tissue of 250 gramme guinea-pigs, with a fatal result within forty-eight and seventy-two hours respectively. It was further found that 1 c.c. of a filtered three-day old broth culture would kill a guinea-pig of 250 grams weight. The simultaneous injection of 1,000 units of diphtheria antitoxin neutralized the toxin, and prevented any ill-effects on other guinea-pigs of similar weight.

On January 7th, 1904, throat swab was again positive; next day the same, but no growth in the nose swab. January 22nd, no nasal discharge for five days and no sore places. January 24th, nose and throat swab both negative. January 25th, nose swab positive, throat swab negative. February 7th, nose swab positive, throat swab negative. February 10th, still thick purulent discharge from the nose when syringed. At the end of March consistent negative swabs were obtained, and shortly afterwards he was sent home.

The previous history of Thomas W—, kindly furnished by Mr. A. J. Hutchison, Surgeon to the Brighton Throat and Ear Hospital, has important bearings on his protracted infectivity. He first attended this hospital on December 29th, 1902, with a history that he had had right otorrhœa since the age of four days. On examination, pus was found in the right ear and in both nasal fossæ. The tonsils were enlarged, and there were adenoids. The child improved under treatment, the ear discharge having ceased and the nose discharge diminished by January 5th, 1903. January 12th noted that ear and nose both dry. January 26th, nasal discharge had reappeared. Something unusual was noticed about the appearance of the nose at this time, and on January 28th the nose was probed for a foreign body under an anæsthetic, but none found, and at the same time tonsillotomy done and adenoids removed. On February 5th noted that the child breathed quietly through the nose. The child was not seen again at the Throat Hospital until November 5th. Then the history was given that he had been well until a month previously, when he complained of pain in the back of the head, return of discharge from nose, but not from ear; has had several fits. Not seen by Mr. Hutchison after this. On November 23rd, as noted above, he was

admitted to the Isolation Hospital, though showing no ordinary clinical evidence of diphtheria.

	Onset diphtheria.	Removed to hospital.
Geo. W—, aged 12, 43 X— St.	Oct. 17th, 1902	Oct. 17th, 1902
Thomas W—, aged 3, 39 X— St.	?	Nov. 23rd, 1903
C. H—, aged 5, 39 X— St.	May 4th, 1903	May 16th, 1903
D. H—, aged 3, 39 X— St.	(Bacteriological case, discovered May 23rd)	
R. D—, aged 4, 41 X— St.	Oct. 23rd, 1903	Home treated. Positive nasal swab until Jan. 30th
N. D—, aged 3, 41 X— St.	Nov. 13th, 1903	Nov. 21st, 1903
Mrs. W—, aged 27, 39 X— St.	Nov. 15th, 1903	Nov. 18th, 1903
C. H—*, aged 5, 39 X— St.	Nov. 20th, 1903	Nov. 21st, 1903
G. H—, aged 8, 39 X— St.	Nov. 22nd, 1903	Nov. 23rd, 1903

There had, as shown in the preceding tabular statement, been diphtheria in this same house in May, 1903. C. H—, aged five, failed with diphtheria on May 4th; there was no history of school infection or of cases in the vicinity. D. H—, aged three, was swabbed (nasal) on May 23rd, and diphtheria bacilli found. Instructions were given for her isolation at home as a "contact" case.

Two doors from the above house lived R. D—, aged four, who played with Thomas W— on October 20th. (No school infection.) A few days later he is said to have had "sore thumbs," but no history of sore throat. On November 9th he was taken as an out-patient to a general hospital because he seemed languid and out of sorts, and had swollen cervical glands. He again attended the same hospital on November 16th. Meanwhile his sister, N. D—, aged three, failed with diphtheria on November 13th. N. D—'s notification on November 22nd led us to swab R. D—'s throat on November 23rd, with a negative result. A nasal swab next day was positive. R. D— remained at home, and was swabbed at intervals. A throat swab on January 30th was still positive, i.e., 102 days after apparently the only contact with infection, and 82 days after he was being attended by a doctor for enlarged cervical glands.

The question arises what was the true order of events, and how far was Thomas W— responsible for them?

Further light is thrown on the problem by the history of a household living four doors away, who were on visiting terms at the time the following case occurred, but ceased to intermingle afterwards in consequence of a quarrel. This was a family of cousins, consisting of father and mother and four children, and a second family, consisting of two adults and an infant. Geo. W—, aged twelve, in the cousin's family, failed with diphtheria on October 17th, 1902, and was removed to hospital the same day. No other cases followed.

It is conceivable that Thomas W— acquired nasal diphtheria at this time, but did not infect any one among the two families living at No. 39 until May 4th, 1903, when C. H— failed with her first attack, and D. H— followed with a non-clinical attack; that R. D—, and secondarily N. D—, were also infected by Thomas W— in Oct. 1903,

* Second attack.

his own mother on November 15th, and C. H— a second time on November 20th.

Compare with the above possibility the history of Thomas W—'s septic nose and ear.

Thomas W—.
Right ear discharge for a few days
after birth.

Patients possibly infecting or infected
by Thomas W—.

Cousin and neighbour, George W—,
failed with diphtheria, Oct. 17th,
1902.

Dec. 29th, 1902.—First examined.
Right ear purulent and both
nasal fossæ, enlarged tonsils and
adenoids.

Jan. 12th, 1903.—Both ear and
nose dry.

Jan. 26th, 1903.—Nasal discharge
had reappeared.

Jan. 28th, 1903.—Adenoids and
tonsils removed.

Feb. 5th, 1903.—Breathing nasally.
Said to have been free from
discharge from February to
beginning of October.

Did not attend Throat Hospital
again until Nov. 5th, 1903.
Now stated to have had return
of rhinorrhœa since about Oct.
5th.

Lodger's child failed with diph-
theria, May 4th, 1903. Sister of
this child a "contact" case.

Another neighbour's child failed
with diphtheria, Oct. 23rd, 1903.
A second child in same family
failed with diphtheria, Nov. 13th,
1903.

Mother of Thomas W— failed with
diphtheria, Nov. 15th, 1903.

Lodger's child failed with second
attack of diphtheria, Nov. 20th,
1903, and another child in the
same family on Nov. 22nd, 1903.

The above facts are quite consistent with the view that Thomas W—, in October, 1902, received from his cousin the infection of diphtheria, which was grafted on the chronic septic condition of his nose without causing any obvious symptoms of diphtheria; that this infection became quiescent, but that in May, 1903, when Thomas W— was not under medical observation, he infected the lodger's child; and that in October, 1903, when he is known to have had a

recrudescence of purulent nasal discharge, he infected a neighbour's child with whom he played. On November 15th, while still being treated for rhinorrhœa, he infected his mother, and a few days later re-infected the same lodger's child as before. It is even possible that Thomas W— was infected with diphtheria at an earlier date, and that he gave this disease to his cousin G. W—.

Incidentally the case illustrates the importance of careful and repeated bacteriological examination of purulent nasal discharges. It is further noteworthy that R. D— at home, and Thomas W— first at home and later in hospital, were persistently infectious, the first for over 100 days, the latter probably much longer than this. Although Thomas W— received nasal syringing with various germicidal solutions daily during the whole time he was in hospital, diphtheria bacilli did not fail to reappear in the nasal discharge two or three days after the syringing was discontinued.

The following cases, like Group 14, illustrate protracted infectivity in diphtheria, under circumstances rendering the explanation that this was caused by hospital aggregation inadmissible. They appear also to illustrate the simultaneous protracted infectivity of scarlet fever and diphtheria in the same patients, though the proof of this as regards scarlet fever is incomplete.

Case Group 15.—William F—, aged two years nine months, of 10, I— Cottages, failed with diphtheria on July 14th, 1902, and was admitted to hospital on the 16th. On admission he had considerable exudate on fauces, and his nostrils were blocked (8000 antitoxin given). Next day there was some epistaxis and the breath was foul. On the 19th throat exudate had gone, but there was still nasal discharge. On August 3rd it was noted that there was regurgitation, and this was marked for three days about August 27th. On August 30th a negative bacteriological result was obtained from swabbing. On September 12th noted that no regurgitation for several days, and no nasal discharge. On September 15th a second negative swab was obtained, and the patient went home next day. No desquamation was discovered in this patient, although frequently looked for in connection with the suspicion aroused by the next case.

Grace F—, aged four years three months, sister of the above, failed with diphtheria on July 17th, and was admitted to hospital on the same day. On admission only a slight white exudate was found, but next day diphtheria bacilli were detected. On July 31st she had a rash, with pain in ankles, and a temperature not over 98·8°. This rash was ascribed to the 4000 units antitoxin she had on admission. On August 6th desquamation on the hands and feet was noticed, "pin-hole" in character, and fairly extensive. The mother stated at this time that the child had "measles" twice within the last year, the last time said to be "three or four months ago," since when she had noticed the child's hands peeling on several occasions. On August 9th, 10th, 15th, and 17th, consecutive bacteriological examination of swabs failed to detect diphtheria bacilli. The patient went home on August 19th. She had no nasal discharge

throughout. She was again medically examined on August 28th, and was then quite well, there being no desquamation and no ear or nose discharge.

The family from which the above patients came consists, in addition to the above patients, of father, mother, and girls aged thirteen, ten, and eight, who have never had diphtheria.

The two above children on July 31st were put into a small room adjoining the main diphtheria ward, owing to the suspicion attaching to Grace F—'s rash. William F— never desquamated, and when his sister was sent home on August 19th he was allowed to return to the diphtheria ward. Four cases of scarlet fever shortly afterwards occurred in this ward.

	Admitted with diphtheria.	Onset with scarlet fever.
D. C—, aged 6	August 1st ..	August 22nd.
B. C—, aged 4	July 31st ..	August 22nd.
D. F—, aged 1 yr. 10 mos.	July 28th ..	August 23rd.
W. W—, aged 6	July 31st ..	August 22nd.

My deputy, who was then on duty, appears to have used every reasonable precaution in regard to Grace F—, the balance of available evidence being against the supposition that her desquamation was due to scarlet fever. It is possible that one of the above four attacks was a relapse of scarlet fever, for both B. C— and D. F— had evanescent rashes on admission. Such rashes may be caused by the administration of antitoxin, but they may also be due to very slight scarlet fever. There were twelve patients in this diphtheria ward; no further cases of scarlet fever occurred. The above patients were at once transferred to a separate ward, and William F— was placed with them. He did not develop scarlet fever while with them. He was sent home on September 16th, after two consecutive negative swabs had been obtained, and after remaining in hospital sixty-one days. It will be noted that from July 16th to 31st he was in the general diphtheria ward with ten to twelve other patients. From August 1st to 19th he was in a detached room with his sister. From August 19th to 23rd he was again in the general diphtheria ward; and from that time until sent home on September 16th he was in a separate pavilion with one or more of the above four patients suffering from scarlet fever and diphtheria.

Subsequent events showed that this patient's infection recrudesced after leaving the hospital, as shown by the following cases in the same and an adjoining small street, which there is reason to suspect were infected by him :—

	Left hospital.	Re-admitted to hospital.	Onset of diphtheria.
Grace F—, aged 4½ ..	Aug. 19th ..	Oct. 4th.	
William F—, aged 2½ ..	Sept. 16th ..	Oct. 4th.	
Onset of diphtheria.			
(Louisa M—, aged 1, of 3, I— Cottages ..			Sept. 19th.)
(George M—, aged 3, of 3, I— Cottages ..			Sept. 30th.)
William T—, aged 4, of 7, I— Cottages ..			Sept. 22nd
(J. G. C—, aged 2½, of 6, T— Street ..			Oct. 4th.)
(Mrs. C—, aged 32, of 6, T— Street ..			Oct. 8th.)

The occurrence of the first of the cases in these three neighbouring houses led us to re-examine William and Grace F—, and both children

were now found to have eczema naris, Grace having thin watery discharge, and William thick yellow discharge from the nostrils. A nasal swab from William on October 2nd showed diphtheria bacilli; confirmed by the Neisser test. The following further bacteriological examinations were made :—

Date of test.	William F—.	Grace F—.
Oct. 2nd ..	Positive (nose)	—
Oct. 4th ..	Negative (throat and nose)	Positive (nose) confirmed by Neisser. Negative (throat).
Oct. 29th ..	Negative (nose) ..	Positive (nose), a pure culture of long variety, and note made that nasal discharge now thick yellow.
Nov. 2nd ..	Negative (throat)	Positive (throat), negative (nose).
Nov. 19th ..	Negative ..	—

On November 5th a specimen from Grace F—'s throat was sent to the Jenner Institute, and Dr. MacFadyen reported that "diphtheria bacilli were isolated, which were found to be pathogenic to guinea-pigs."

William F— was allowed to return home on November 22nd after several negative swabs. Grace F— was kept in hospital until December 16th, the swabs not being satisfactory, although characteristic diphtheria bacilli were not discovered after November 5th.

It is somewhat difficult to give the correct interpretation of the course of events in the preceding cases. Was Grace F— re-infected when her brother returned home on September 16th, or was she infectious before this? More probably the latter view is correct. If so, the infection of diphtheria persisted in an overt or covert form in this case from July 17th to November 5th at least—i.e., 110 days, probably longer. As during the last nineteen out of her thirty-two days' stay in hospital she was in a separate room with her brother, this persistence of infection cannot be regarded as due to any unfavourable hospital influence. There is the further fact that she was suspected of causing through her brother a small outbreak of scarlet fever in the diphtheria ward. I believe that she had suffered some time previously from scarlet fever (called "measles") and that the infection of this disease, like that of diphtheria, assumed a chronic form, both infections persisting in her nasal passages.

If this view be correct, why did she not infect the children in the general ward with scarlet fever between July 17th and 31st? At this time she was kept in bed, which would go far to explain immunity from cross-infection, contained *ex hypothesi* in her nasal mucous membrane. If it be assumed that the slight rash on July 31st was the commencement of her scarlet fever, we have to face the difficulty that some undetected source of scarlet fever must have been present in this ward, and this only began to operate and then operated almost simultaneously on four patients, three days after W. F—'s return to

the general ward. The progress of Grace F—'s desquamation does not fit in with this supposition. There can, I think, be little doubt that W. F— caused the outbreak of scarlet fever in the general ward, when he returned to it on August 19th convalescent and was not kept in bed. But he had not been known to have scarlet fever. It is probable, therefore, that he, like Grace F—, was harbouring a persistent form of scarlatinal infection in his nose. He almost certainly was immune against further scarlet fever, as from August 23rd to September 16th he was treated along with four scarlatinal patients without developing an attack.

In the preceding instances there was protracted infection before hospital isolation was secured and in hospital (in Thomas W—, Case 14), in a patient who was never treated for diphtheria (R. D—, Case 14), and in William and Grace F— (Case 15), who were isolated in hospital under conditions which rendered it highly improbable that they would subsequently harbour the diphtheria bacilli from other patients than themselves.

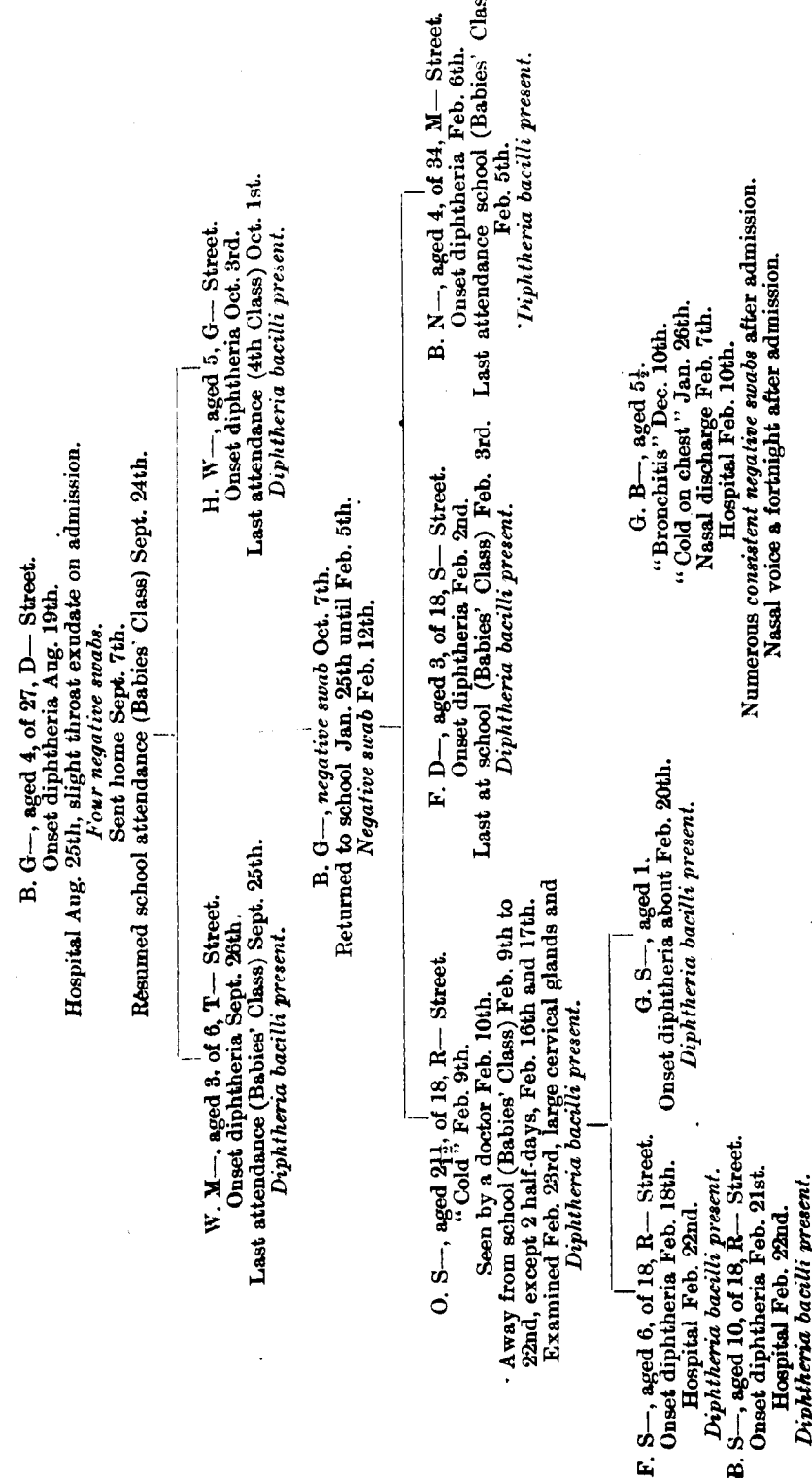
In the following instance a patient who had clinical diphtheria, but in whose exudate Klebs-Loeffler bacilli could not be found, was infectious for 170 days, if the view taken as to the cause of the cases shown in the scheme on the next page be correct.

Case 16.—B. G—, aged four, failed with diphtheria on August 19th, admitted to hospital on the 25th. On admission, moderate exudate on tonsils. No diphtheria bacilli found. A second negative swab on the 26th. On September 5th Hofmann bacilli found; on September 6th no diphtheria bacilli found. The child returned home on September 7th, directions being given that she was not to resume school attendance for six weeks from the following Monday.

B. G— resumed attendance in the Babies' Class of — School on September 24th, contrary to directions. This class and the Fourth Class of the same school have a common cloak-room. On September 26th W. M—, aged three, failed with diphtheria in the Babies' Class, and on October 3rd H. W—, aged five, failed with the same disease in the Fourth Class. Diphtheria bacilli were found in each of these. No actual contact between these children and B. G— could be proved. It was now discovered that B. G— had improperly resumed attendance at school. A swab was taken from her throat with a negative result. She was quite well, and had no nasal discharge.

B. G— did not again attend school until January 25th of the following year, attending until February 5th. The following cases occurred in the same class at this school: F. D—, aged three, onset February 2nd; O. S—, aged three, onset February 9th, and B. U—, aged four, onset February 6th. Diphtheria bacilli were found in each of these. No other likely sources of infection for the above children were discovered except B. G—, and as on the first occasion, further cases abruptly ceased when B. G— was again excluded from school. Three secondary cases occurred in O. S—'s family.

B. G—'s family consists of father and mother, boy aged 5, and a child



aged two and a half years. These have all remained well, except that the child aged two and a half had "a cold" on February 3rd, when a negative swab was obtained from him, and a negative swab once more from B. G—.

In the same house lives another family consisting of father and mother, a child aged two, who had bronchitis near Christmas, and a boy, G. B—, aged five and a half, who had "bronchitis" beginning about December 10th, had again a "cold on his chest," onset January 26th, nasal discharge beginning February 7th, seen by a doctor on February 10th, and notified as diphtheria the same day. No diphtheria bacilli were found in his nasal or throat secretions, although these were examined repeatedly after his admission to hospital. He was very pallid, and a fortnight after admission developed a nasal voice.

In the following instance a similar sequence of events occurred, but the connection of F. M— with F. S—'s attack was confirmed by finding diphtheria bacilli in F. M—'s throat, fifty-three days after she had been discharged from hospital on the strength of three consecutive negative swabs. It should here be stated that, with the exceptions noted in the accounts of cases, negative results have not been accepted unless they have been repeated on three days, and unless on each of these days the specimens have given a negative result, both with methylene blue and with Neisser stain.

Case 17.—F. M—, aged ten, failed with diphtheria on November 19th; admitted to hospital on November 20th. Infected at school. Had pharyngeal diphtheria; no nasal discharge. Three consecutive negative swabs were obtained from her throat on December 14th, 15th, and 16th, and she was discharged on the 17th.

In the same family were father and mother, and two sisters, aged eight and seven, none of whom had diphtheria. The two sisters returned to school on December 20th. The ex-patient returned to school on February 1st, six weeks after leaving hospital, in accordance with our usual procedure.

F. S—, who is in the same class with F. M— at school, failed with diphtheria on February 4th. No other cases occurred in this class, and no other source of infection for F. S—'s attack could be discovered. Suspicion being directed to F. M—, a swab was taken from her throat on February 8th, with a positive result. She was carefully examined, and found to have no nasal discharge, and had been quite well since returning home. Her two sisters have slept in the same bed with her since the week before Christmas. On February 10th swabs were taken from the three sisters again, with a negative result in each case.

In neither of the preceding cases was there nasal discharge, or any other symptom leading one to suspect the possibility of continuance of infectivity.

This is a convenient opportunity for alluding to protracted infectivity in ear discharges, which I do not remember to have seen mentioned in connection with diphtheria. It is probably more frequent than has hitherto been recognized, though in diphtheria,

as in scarlet fever, persistent ear-discharges are less likely to be actively infective than throat and nasal discharges, owing to the absence of coughing and sneezing from the infecting surface.

Case 18 (*simulating a "return" case*).—N. B—, aged five, failed with diphtheria on February 5th; admitted to hospital February 10th, and discharged March 18th. She slept at home this night in a separate bed, and next morning was taken to another town, returning home on March 28th. On March 25th K. N—, aged 2, a step-sister of the above, failed with diphtheria, and it was suspected that she might be a "return" case. The above dates, however, do not fit in with this supposition, and the following appears to be the probable source of K. N—'s infection. The baby brother of N. B—, aged nine months, began with discharging ear on or about February 24th, a fortnight after N. B—'s admission to hospital. When K. N— failed with diphtheria this baby's ear was examined, and a pure culture of diphtheria bacilli obtained by cultivation of the discharge on blood serum.

Case 19.—K. S—, aged four, was infected with diphtheria at ——— School, and failed on November 14th. He was admitted to hospital on November 15th and discharged on December 21st, after three consecutive negative swabs from the throat. Immediately after K. S—'s admission to hospital the brother, D. S—, aged four, and sister, W. S—, aged one, were given prophylactic doses of antitoxic serum. At this time a swab from D. S—'s throat gave a negative result. K. S—, while in hospital, had left otorrhœa, which began November 28th, and on December 11th had ceased. He had profuse nasal discharge on admission, but this had ceased when he went home. The otorrhœa returned after he came home. He occupied a separate bedroom, but played with D. S— and W. S— during the day. W. S— remained well, but on January 3rd, fourteen days after K. S— came home, D. S— failed with diphtheria, and was removed to hospital next day. K. S— was now re-examined, and found to be anæmic, and still had left otorrhœa. A swab from the left ear on January 5th showed diphtheria bacilli.

Case 20.—D. R—, aged one year, failed with diphtheria on November 7th; admitted to hospital on November 18th with pharyngeal and nasal diphtheria. On November 28th right otorrhœa began; on December 9th there was double otorrhœa and some evidence of pharyngeal paralysis. On December 31st a negative swab was obtained from the throat, but the discharge from both ears showed diphtheria bacilli. On January 5th throat and ear swabs all negative. On January 7th throat swab negative. January 9th throat swab negative, ear swab growth too scant for diagnosis. January 11th swabs from both ears negative; only very slight ear discharge, and no nasal discharge. The patient was sent home on January 12th. The serum-growth taken on the 31st December was tested by Dr. Eyre, and found to be virulent.

Instances have been given of scarlet fever occurring in households, at intervals after the removal of the first patient to an isolation hospital beyond the ordinary incubation period. A similar sequence is not uncommon in diphtheria, but it is unnecessary to quote cases.

SUMMARY OF CONCLUSIONS.

The preceding instances suffice to suggest, and in some respects to elucidate, some of the most important points in connection with

cases of protracted and recrudescence infection. These will be next considered, before discussing in further detail the same problems in relation to the hospital or home treatment of these diseases.

Firstly, it must be borne in mind that cases of protracted and recrudescence infection are relatively infrequent, representing only a very small percentage of the total cases of these two diseases. For many years I have acted in the dual capacity of Medical Officer of Health, and Medical Superintendent of the Fever Hospital, in a town in which nearly every case of scarlet fever and diphtheria has been personally investigated, and have therefore viewed the problem from both standpoints. The number of "return" cases is small, and not such as seriously to invalidate the enormous benefit which patients and their friends receive from the hospital, even if it be assumed that "return" cases are special hospital phenomena.

Secondly, cases of protracted and recrudescence infection are oftenest associated with nasal and aural discharges, though not always so. The proportion between "return" cases in which such discharges have been present, and those in which they have been absent, cannot be stated in the absence of statistics of the most accurate and detailed description on a large scale, the data for which do not at present exist. In my experience the proportion in which there are no mucous discharges is small, but their occurrence is undoubted.

Thirdly, the absence of this information indicates the necessity for accurate records, both in hospital and home practice, of all cases of protracted and recrudescence infection, and the following schedule is suggested as embodying the minimum information which ought to be obtained in every such case. Similar information should be available for our entire experience of scarlet fever and diphtheria, in order that trustworthy comparisons may be instituted.

SCARLET FEVER.

Schedule of Information as to Cases of Recurrent Infection.

- (A)—1. Name and age of infecting patient.
 2. Day of disease on which patient admitted to hospital.
 3. Name of hospital.
 4. Date of onset of following complications if present
 (1) Ear discharge.
 (2) Nasal discharge.
 (3) Any eczematous condition.
 (4) Enlarged cervical glands.
 5. Last date on which these symptoms were present :
 (1) Ear discharge.
 (2) Nasal discharge.
 (3) Any eczematous condition.
 (4) Enlarged cervical glands.
 6. Date of leaving hospital.
 7. Method of discharging from hospital.

8. Number of patients in the ward from which ——— was discharged.
 9. How many of these had been in hospital three weeks or under ?
 10. How many of these had any of the above complications (1) (2) (3) (4) at the time ——— was discharged ?

(B)—*The infected patient.*

1. Date of onset of attack.
 2. Age and name of patient.
 3. Character and extent of contact between B and A.
 (A similar sheet with obvious alterations for home cases.)

Fourthly, the occasional occurrence of such "return" cases, emphasizes the necessity for post-isolation supervision of patients, whether treated at home or in hospital. This supervision must necessarily be medical; and as most patients are poor, it can only be carried out officially. Short of systematic medical supervision, much may be done by warning patients as to precautionary measures, and by communicating with the doctor who first notified the case.

In Brighton, scarlatinal patients are not permitted to return to school until four weeks, and diphtheria patients not until six weeks after they have been released from home or hospital isolation. This is in the interest of the convalescent patients; also in the interest of others, in the event of the patient being one of the exceptional "chronics" who form the subject of this paper.

Fifthly, a study of the preceding cases indicates that in most instances the rhinorrhœa, which is oftener than any other morbid condition associated with protracted infection, was already present when the patient was first isolated, or appeared soon afterwards. This fact has an important, and hitherto neglected, bearing on the origin of "return" cases. It suggests the belief that a condition determining protracted infectivity may have been similarly present from the first in the infecting patients,* in whom no obvious mucous discharge occurred.

Sixthly, if it be assumed that a morbid condition of the nasopharynx is a necessary condition of protracted infectivity, do this morbid mucous membrane and its crypts act as a continuing incubator of scarlatinal or diphtherial germs originating from those which caused the patient's illness, or do they act merely as a suitable storehouse for germs derived from other acute patients in the same room—a storehouse which can only be emptied by one or more weeks' absence from acute patients? This point will be discussed more fully later. As bearing on it, I need only say here that instances have been given in the preceding pages of protracted infection in which the infecting patients had been in contact with acute cases (Cases 1, 3), in which

* Patients causing "return" cases are "infecting patients." Patients infected by these are "return" cases.

there had been no such contact (Cases 2, 5, 15), and of home-treated cases in which this cause of secondary infection is excluded (Cases 7, 8, and 14).*

Seventhly, there is definite evidence that in some instances infection has become dormant, to be again roused into activity by various circumstances, as by the disturbance caused by cessation of isolation, possibly in connection with baths at the time of discharge, or at a later period by a catarrh or other means tending to lower personal resistance.

Eighthly, the cases bring out the close analogy between the phenomena of protracted and recrudescence infection in scarlet fever and in diphtheria. (1) In both diseases infection is occasionally exceptionally prolonged. The percentage of "return" cases in most statistics is stated to be much lower in diphtheria. We have no certain knowledge how long the scarlatinal germ will survive in the naso-pharynx, though probably in exceptional instances quite as long as the diphtheria bacillus (see Case Groups 14 and 15). From a clinical standpoint it must, I think, be regarded as still an open question whether protracted infectivity is more common in one of these diseases than in the other. Considerations arising from the absence of bacteriological diagnosis in scarlet fever, the necessity for making inoculation experiments to test the virulence of diphtheria bacilli, and above all from the incompleteness of our observations, especially in regard to home-treated cases, are sufficiently obvious. (2) In both diseases infection occasionally recrudescence. This may occur (a) in the form of a definite relapse having all the clinical features of the disease in question; but more commonly (b) the only accompaniment of recrudescence infection is the recurrence of a mucous discharge, and even this indication of the possibility of recrudescence may be absent.

EXPLANATION OF PROTRACTED INFECTIVITY.

The persistence of active and the occasional recrudescence of dormant infection, may be compared with corresponding phenomena in ringworm. Most cases of scarlet fever or diphtheria are like tinea of the face or body—the contagium quickly disappears. The exceptional cases are like tinea capitis. No difficulty arises in destroying the contagium on the scalp surface, but it reappears with the growth of the hairs from their follicles. And this comparison incidentally furnishes what is, I believe, the correct view of the causation of persistence of infection in scarlet fever and diphtheria. The specific

* Numerous instances of "return" cases in home practice are recorded in the medical journals, e.g. *Lancet*, August 25th, 1877, p. 800; also in Dr. E. Squire's "Collected Essays in Preventive Medicine."

micro-organisms of these diseases remain in crypts of the naso-pharynx, which act as active "incubators" of them. This applies to the cases continuously infectious. In those cases in which infection temporarily disappears, to recur under the influence of a catarrh or some traumatism, etc., it may be supposed that the specific micro-organisms have been lodged and at least partly incarcerated in the follicles, and possibly in deeper lymphatic tissues or glands. The occasional protracted persistence of the Klebs-Loeffler bacillus in the throats of certain healthy individuals who have been in contact with diphtheria, and in the throats of convalescents from this disease, is well known. Cases 14, 15, 16, 17, 18, 19, and 20 illustrate these facts. Mr. Jonathan Hutchinson, F.R.S.,* has observed:—

"Upon our knowledge in respect to the possible latency of germs will often depend the measures which we take for the prevention of infection. . . . It may be, indeed, that a very large fallacy underlies much of our present creed as to infection, and that in many instances what we attribute to fresh infection is really consequent upon some change in the conditions of the subject which have favoured the development of pre-existing germs."

Diphtheria forms an excellent example of this contention. My experience has been that it is especially in the very mild attacks of diphtheria, that it is difficult to secure within a reasonable time freedom from infection as tested by bacteriological standards. The brothers and sisters of cases of clinical diphtheria, who have apparently had nothing beyond nasal catarrh or a non-membranous sore throat, appear to retain diphtheria bacilli in the naso-pharynx longer than the marked cases, even when subjected to the same local treatment. Professor Theobald Smith has pointed out that the invading micro-organisms, in their struggle for existence, are liable to be put at a disadvantage by an excess of virulence, just as in a bacteriological culture the products of metabolism of the micro-organisms appear to retard or inhibit the growth. A patient may, owing to the natural antitoxic properties of his tissues, aided by the further antitoxic strength acquired during the very slight attack which he has had, continue to harbour, without further harm to himself, diphtheria bacilli which are competent to produce severe disease in more susceptible persons. This is well seen in Thomas W—'s case (Case 14), and probably such cases are much more numerous than is at present realized. The facts as to protracted scarlet fever are not so well recognized, but exactly the same phenomena occur in this disease as in diphtheria. In each disease the morbid phenomena are the resultant of the interaction of the micro-organism and the patient.

* "The Latency of Parasitic Germs or Specific Poisons in Animal Tissues," *Proc. Med. Chir. Society of London*, November 26th, 1895.

If the latter is only slightly susceptible, or if he is insusceptible, the micro-organism is not necessarily destroyed, but may continue to exist in a virulent form on or in the mucous membranes of the resistant person, and may be capable of conveying virulent infection to others.

The conception of protracted infection in diphtheria is not novel. Thus Greenhow, in 1860, said,* "Unlike scarlet fever, which is always an acute disease, running a very definite course, diphtheria is sometimes of protracted duration, and occasionally becomes almost chronic." Evidently Greenhow, like many others, while recognizing the persistent form of diphtheria, had overlooked the persistent form of the more widely prevalent disease, scarlet fever. Gresswell, in 1886,† brought forward certain facts which appear to show that "diphtheria in certain individuals may become a chronic disease, and from time to time enter upon an active and infectious phase; and that this may play an important part in maintaining the malady in a community." He gave a number of instances of persons who "having been affected with diphtheria years ago have suffered almost constantly ever since with throat affection and acute tonsillitis on exposure to change of weather, and diphtheria has occurred among those who associate with persons suffering from this condition."

I have carefully read the scanty details of his cases, and cannot find that in any of them there was nasal discharge. The cases furthermore occurred before bacteriological confirmation of diagnosis was practicable. In one case the inference is drawn that if the sequence of events is correct, "a person once infected with diphtheria may remain capable of transmitting infection for a period of nearly two years." This fact need not cause surprise in view of the history of Thomas W— (page 704).

HOSPITAL TREATMENT IN RELATION TO "RETURN" CASES.

In the preceding pages instances have been given of protracted infection in scarlet fever, in which there had been no recent contact with acute cases of that disease, and of cases in which there had been no contact during the patient's illness with any except personal infection; and it has been shown that in some of these cases infection recrudesced after an interval of apparent freedom from infection.

It has also been shown that such instances of protracted and recrudescence occur in diphtheria when patients are treated at home; and in this disease no suggestion, so far as I am aware, has been made or could be supported of any special hospital influence

* "On Diphtheria," by E. H. Greenhow, M.D. p. 110.

† "Diphtheria as a Chronic Malady in Particular Individuals with Liability to Recrudescence," by D. A. Gresswell, B.A., M.B. (*Epidem. Soc. Trans.*, p. 57, new series, vol. v).

favouring "return" cases. The known close relationship and analogy between the two diseases suggests, that the explanation of the above occurrences for one disease will apply equally for the other.

How do these facts and considerations bear on the suggestion that the occasional persistence of infection in scarlet fever is due to hospital infection? The aggregation of cases in hospital wards has been widely taught to be the cause of "return" cases in scarlet fever. Dr. Niven, for instance, has described such cases as "a hospital phenomenon,"* and he was the first to recommend the separate treatment of convalescent and acute cases of scarlet fever. Whatever view be taken of the origin of "return" cases, the desirability on general grounds of such separate treatment of acute and convalescent cases is undoubted.

In view of the preceding facts and considerations, I maintain that in scarlet fever, as in diphtheria, the occasional persistence of infection is a phenomenon in the natural history of the disease, irrespective of and in the main uninfluenced by the external conditions to which patients are ordinarily subjected. This view (a) is not contradicted by the statistical evidence as to the excess of "return" cases in hospital experience; and (b) it is strongly confirmed by the facts and considerations already advanced; (c) by the facts as to relapses in scarlet fever; and (d) by the analogous facts as to protracted infection in other infectious diseases besides scarlet fever and diphtheria.

Statistical Evidence.—Statistical evidence supports the view that "return" cases occur in disproportionate numbers in connection with hospital-treated cases of scarlet fever. But it needs to be remembered that the number of "return" cases in any experience is relatively small, and that home-treated cases have not hitherto been rigidly investigated in regard to "return" infection. It is known that from 1 to 4 per cent of "return" cases ordinarily occur after hospital treatment of scarlet fever. When home-treated

* In a letter to me he states "by 'return' cases being a hospital phenomenon, I go beyond the facts and make an inference, viz., that something happens at the hospital which does not happen at home. This something was, as far as I could judge, storage of fresh infectious matter in the nostrils, as the result of the presence of acute cases in the same ward. It is not intended to deny that the infective element of scarlet fever remains viable in the case discharged from hospital, or that it has lost all power of infectivity, but it is suggested that the strains of infectious material foreign to the individual, when stored up in his nasal cavities, remain less impaired by the action of his tissues than the infective material peculiar to himself." For particulars of the facts on which he bases this conclusion, see Dr. Niven's *Annual Reports*, from 1891 onwards. Professor W. J. R. Simpson in his report (1899) to the Metropolitan Asylums Board, on "Return Cases of Scarlet Fever and Diphtheria," evidently takes a somewhat similar view, as he concludes that "long detention in infective wards will not reduce the percentage of return cases," and that "local and antiseptic treatment combined with transference to less infective wards, are likely to be more effective in this direction" (page 24).

"return" cases have occurred, they have commonly been ascribed to failure of disinfection rather than, as in hospital cases, to persistent or recrudescence personal infection. I am at present totally unable to accept as satisfactory the statistical evidence that "return" cases are a special hospital phenomenon. It has to be remembered that home-treated cases are picked cases, allowed to be treated at home, because there were no susceptible children in the same house, or because the home conditions as to isolation and cleanliness were good. Before any accurate conclusions can be drawn, it will be necessary to know, both for hospital and for home-treated cases of scarlet fever, the number, age, and sex of all the persons in the same household not previously having had scarlet fever, and to state the incidence of recurrent infection with due regard to these facts.*

One statistical reason for the under-statement of home-treated "return" cases is illustrated by Cases 7 and 8. A considerable proportion of the total home-treated cases are furnished by families in easy circumstances, with whom change of air during convalescence is a matter of routine.

Even if it be ultimately found that there is a real excess of "return" cases in connection with the hospital treatment of scarlet fever, the facts already recorded, showing (a) that "return" cases occur when single cases are treated at home (Cases 7 and 8), and (b) that they occur in hospital-treated patients for whom either the conditions of home treatment have been secured, or for whom separate treatment in convalescent wards has been secured (Cases 1, 2, 5), indicate that "return" cases are not essentially hospital phenomena, *i.e.*, that treatment alongside of other acute scarlatinal patients is not the unconditional invariable antecedent of protracted or recrudescence infection. Consequently hospital treatment is degraded to the position of a non-essential concomitant, at the most an auxiliary, of such infection.

The Causation of Septic Complications.—The excess of "return" cases in hospital practice does not prove that hospital aggregation of patients is even an auxiliary in producing such "return" cases. The possibility of *non ceteris paribus* has to be borne in mind.

It needs to be remembered that: (1) The homes of the poor from which the hospital cases come are often dirty, the patients' nasal passages are exceptionally septic or sepsigenic from the beginning, the infection of scarlet fever opening up the way for septic complications in connection with which the contagium of scarlet fever is able to enjoy a protracted life; (2) The poor are less resistant to the

* Some statistics on these lines are given in my *Annual Reports* for 1901 and 1902; and Dr. Malet has compiled similar statistics for Wolverhampton.

inroads of combined scarlatinal and septic infection than the well-to-do, who are better nourished. The mouth and naso-pharynx contain various micro-organisms, which on the occurrence of scarlet fever set up secondary mischief, and are responsible for the otitis, rhinitis, and other septic phenomena of scarlet fever. These septic organisms are present when the patient is admitted.*

The whole question of the origin of these septic discharges is raised by the problem of "return" cases. It can, I think, be elucidated by our knowledge of what occurs in allied conditions. We know the influence of a wound or other form of injury in favouring the origin of scarlet fever. Scarlet fever occurs in scalded children, in whom no possibility of recent external infection can be detected.† It is probable that under such circumstances a dose of the scarlatinal virus which would ordinarily be inoperative, is able to cause this disease; and that such smaller doses are more often harboured by children than is usually believed. Similarly we know that every naso-pharynx contains sepsigenic cocci. We also know that in a large proportion, and probably in most of the scarlatinal cases manifesting rhinorrhœa, and probably in most of the scarlatinal cases manifesting rhinorrhœa who are treated in hospital, the rhinorrhœa is present when the patient is admitted to hospital. Is it more reasonable to assume that in the remaining hospital patients who begin with rhinorrhœa at a later period of their isolation, this is due to external infection, or, as in the former, to secondary self-infection?

If it be not some condition peculiar to certain patients which renders them capable of causing "return" cases, the same capacity might reasonably be expected to show itself in a large majority of the patients in the ward after their return home. This special condition must be either a condition of the mucous membrane enabling the scarlatinal germs to continue to live and propagate, or the presence of a race of

* Compare Dr. Washbourn's statement, "During an attack of scarlet fever the resistance of the body is lowered, and the previously latent streptococci begin to multiply and invade the body, producing various septic troubles" (*Proc. Roy. Med. Chir. Soc.*, November 28th, 1895, p. 44).

† On this point I may quote the *Med. Mag.* (May, 1902, p. 327), which refers to articles by Dr. Lippmann in the *Wiener Klinische Rundschau*, for April 6th, 18th, and 17th, 1902. "Dr. Lippmann's attention was attracted to the subject by two curious cases of recurrent scarlatina. In the first case the patient had been well for a month with the exception of an enlarged left cervical gland. Urged by the mother to do something for it, I advised oatmeal poultices, which were diligently applied. On the second day I was called to the patient, and found him with a relapse of the scarlatina, the enlarged gland having disappeared within thirty-six hours.' In the second case, a box on the left ear started a regular attack of scarlatina, beginning with sore throat on the left side, in a boy who had had the disease twice within the last six and a quarter years. No external source of infection could be discovered, and Dr. Lippmann considers it was a case of 'traumatic scarlatina,' the blow setting free germs which had remained dormant or encapsuled for years. He has collected a large number of similar instances from medical literature."

germs capable of exceptional length of life. It is more in accordance with the clinical facts, to suppose that the scarlatinal germs multiplying and collecting in the patient's own mucous membrane will be in larger numbers and will be more efficient to produce secondary infection, than the relatively minute number which can obtain ingress from without. In short, the theory that contact with other scarlatinal patients causes to an appreciable extent increased and protracted infectivity is, in my opinion, unbiased on facts. It would be interesting to trace the origin of such a theory. Probably it owes its currency to the analogy with the brilliant work of Mr. Power, F.R.S., on the aerial convection of small-pox. The distal aerial convection of the contagium of this disease appeared to occur particularly, when there was a certain accumulation of acute cases in the wards of the small-pox hospital. Under these conditions the carrying power of the disease appeared to be magnified. It is doubtful, however, if the theory of distal aerial convection of small-pox will survive; and, if not, with it will probably die the theory (a theory to support a theory) that aggregation of acute cases of small-pox (and by analogy of other infectious diseases) tends to increase their infectivity. Such aggravation of infectivity is, in my opinion, more likely to occur in the houses of the poor, than in the airy and cross-ventilated wards of an isolation hospital; and when it occurs is, I maintain, part of the cycle of a given epidemic, and not the result of aggregation of acute cases.

Relapses in Scarlet Fever.—Relapses occur in a disease in which complete immunity has not been secured by the first attack. They are frequent in enteric fever, not uncommon in diphtheria, occur probably less frequently in scarlet fever, and are almost unknown in small-pox.* According to Dr. Caiger, a true relapse of scarlet fever occurred in 7 per cent amongst 12,000 cases observed.† In 1,520 cases under my own observation, sixteen relapses occurred, i.e., in about 1 per cent, the interval between the onset of the first and second attacks being 33, 32, 27, 66, 19, 38, 54, 35, 11, 38, 27, 40, 39, 37, 38, and 15 days respectively.

Now if it be contended that protracted infection in scarlet fever is a hospital phenomenon, and caused by the storage of infection from other acute cases, it is reasonable to suppose that relapses of scarlet fever are also due to fresh infection from acute cases of scarlet fever. Compare on this point relapses in enteric fever. In a well-regulated typhoid ward there is practically no opportunity for a patient to be

* I have, however, reported one case of this, and collected several others (*Brit. Med. Jour.*, October 10th, 1896, p. 1082).

† *Allbutt's System*, vol. ii, p. 162.

re-infected *ab extra*. It must be assumed, therefore, that relapse in enteric fever is nearly always due to self-infection. According to Murchison, relapses occur in 3 per cent, according to Griesinger in 6 per cent, and according to Shattock in over 16 per cent of the total cases.* If relapses occur so frequently and with such varying frequency in a disease in which self-infection is practically the only operative cause of a relapse, can the occasional relapses in scarlet fever be ascribed with probability to external infection? True, in this disease, unlike enteric fever, infection may be present on the floors, etc., of the hospital ward. But large doses of self-produced scarlatinal germs have recently been and probably are still *in situ* at the points where scarlatinal infection first takes root; and even if these germs be less numerous than those derived from other patients, they may be reasonably expected to be as much more potent than the floating infection *ab extra*, as the hypodermic injection of a specific contagium is than the ordinary infection *per os*. Not only is the self-produced contagium closer to the point at which it can grow, but there is every reason to believe it is much greater in amount than any contagium capable of being derived from other patients.

We know that occasionally relapses of scarlet fever occur in houses in which only one case of scarlet fever is being nursed. Here external re-infection from other patients is excluded. The conclusion is almost inevitable, that relapses of scarlet fever are due to the revival of the infection which caused the original attack.

The occurrence and frequency of such relapses in enteric fever is determined by the type of each epidemic, and by conditions personal in or to the patient, and not chiefly by his treatment, certainly not by conditions external to the patient. In measles and diphtheria the same remark holds good. So also in influenza, which might be taken as a type of the diseases which tend to relapse, and apart from a definite relapse, to recrudescence.

There is reason to believe that the degree of immunity conferred by an attack of scarlet fever is greater when this is severe. In Brighton the fatality of hospital-treated cases of this disease in the years 1898 to 1901 was 1.3 per cent, in London in the same years 3.4 per cent, and the figures already given as to relapses, although on too small a scale to warrant a positive conclusion, are not inconsistent with the view that this is actually the case.

From relapses we may extend the inquiry to protracted or recrudescence infection without a definite relapse.

Protracted Infection in Scarlet Fever.—Here, again, much light is thrown on the problem by comparison with other infective diseases.

* *Allbutt's System of Medicine*, vol. i, p. 881.

Diphtheria frequently manifests protracted infectivity in home-treated cases. We know also that the Eberth bacillus may persist for many months in the gall-bladder in periosteal abscesses (ten months after an attack of enteric fever), etc. There is no suggestion in this disease of renewed doses of external infection. Why then should the view that the occasional protracted infectivity of scarlatinal patients is caused by repeated doses of infection from without, be entertained?

In influenza the possibility that relapses and recrudescence of infection may be due to external infection from other patients, will often be tenable, in view of the fact that this disease usually runs rapidly through a family. But the influence of hospitalism cannot be urged; furthermore, all the available evidence tends to show that the contagium of this disease, like that of measles, is very short-lived when exposed to desiccation and the influence of light and air. In this disease, therefore, as in the others, the most reasonable hypothesis is that relapse and recrudescence of infection are due to the revived activity of specific micro-organisms stored in the patient himself, and derived from his own initial attack; relapse or recrudescence being brought about by some factor which temporarily removes or reduces the slight degree of immunity already established.

It is unnecessary further to summarize the converging lines of evidence given in this contribution, which appear to me irresistibly to necessitate the inference that protracted and recrudescence infection when they occur in scarlet fever, are due, as in diphtheria, in enteric fever, and in other infectious diseases, to the prevalence of a particular type of disease, and to conditions inherent in the patient himself, and not to any conditions, whether hospitalism or other, external to the patient.

I may, however, in conclusion mention one additional line of evidence to which, I think, some weight should be attached. It has long been accepted and taught by the medical profession that the desquamating is the most infectious stage of scarlet fever, and it is now very difficult to unteach the public this erroneous view. Such a general consensus of medical opinion in the past, can scarcely have obtained vogue without having a body of evidence in its favour. We now know that desquamating patients may, as a rule, safely be sent home in the sixth, or even the fifth week of their attack of scarlet fever, if they have no mucous complications. Some other cause must, therefore, have given rise to the widespread conviction that cases of scarlet fever were frequently infectious to the very end of desquamation. Such cases really occurred, or the conviction would not have arisen. Doubtless they were the cases of persistent or recrudescence

infection which now exercise our minds in relation to hospital administration. But when this conviction was formulated there were no isolation hospitals for scarlet fever. It is unnecessary to restate the conclusion to which these considerations compel us, a conclusion which considerations from every point of view confirm and strengthen.

THE Parkes Memorial Prize of 75 guineas, open to members of the Naval, Army, and Indian Medical Services, has been awarded, with a bronze medal, this year to Major R. Caldwell, R.A.M.C., for the best essay upon the "Prevention of Disease amongst Armies Engaged in the Field, with Special Reference to the Sanitary Organization of a Field Force."

SOLID MATTER IN BLACK AND BROWN SMOKE.—In order to determine how much solid matter is contained in black smoke, careful experiments were made at the Sewage Purification Works, where the manager kindly gave us free access to the flues, and produced, when necessary, black smoke at the chimney-head. Three tests were made. The first gave 201 lbs of solid matter from each million cubic feet discharged; the second 251 lbs per million; and the third, 393 lbs per million. Taking the average of these figures (281 lbs), we find that nearly 98 cwts of solid matter is cast into the atmosphere each twenty-four hours from the chimneys of two works from which nearly 39 million cubic feet of black smoke issues daily.

It was further discovered from these experiments that light-brown smoke contains only 20 lbs of solid constituents per million cubic feet, or, at the most, only one-tenth part of that of the "black" quality, or, in other words, that one minute's issue of black smoke is, at least, equal to a ten minutes' issue of smoke of a light-brown colour of equal volume.—*Ann. Report, Glasgow.*

FORMALDEHYDE.—Commercial 40 per cent formaldehyde contains up to 20 per cent of methylic alcohol,* by means of which the polymerization at the ordinary temperature of the soluble aldehyde into the sparingly soluble trioxymethylene is prevented, or at least reduced to a minimum. V. Ansay† finds that for the purposes of disinfection it is better to employ formaldehyde which is free from methylic alcohol, and has for that purpose suggested the introduction of a preparation containing 32 per cent of formaldehyde. This degree of concentration obviates the separation of paraformaldehyde. The solution has a Sp. Gr. of 1.090 and is sufficiently identified thereby, its quantitative estimation being thus generally unnecessary.

With regard to the clouding of 40 per cent formaldehyde at low temperatures, it should be noted that, as a rule, this does not occur above 0° C. This clouding is, however, of no consequence in the majority of its applications. If for any particular reason it is important that the formaldehyde should be clear, the cloudy solution should be transferred to a warm room and kept there until after repeated shaking it has become perfectly clear. This implies that the formaldehyde has not been exposed to the cold too long, say more than 8-10 days; otherwise the precipitated paraformaldehyde, which causes the cloudiness, cannot be made to dissolve by warming and shaking. In this case the fluid will irreparably remain a little cloudy.—*Merck's Annual Report.*

* Lunge Chem.-techn. Unters.-Method. 1900, Vol. III, p. 682.

† Ansay, Transactions International Congress of Hygiene, Brussels, 1903.

THE TUBERCULOSIS (ANIMALS) COMPENSATION BILL.

REPORT OF HOUSE OF COMMONS COMMITTEE.—Apart from any question of the indirect effect upon the trade in meat of the present law and practice with regard to the seizure and condemnation of carcasses of animals on account of tuberculosis, the Committee do not think that serious pecuniary loss is inflicted by such seizure and condemnation upon butchers who deal in high-class meat, the vast majority of carcasses seized being those of old dairy cows. The loss in respect of such cows is considerable, but the butcher who deals in them takes the probability of that loss into consideration in fixing the price he gives for them.

With reference to pigs, the Committee received evidence that serious loss from seizures falls upon butchers slaughtering home-bred animals, and they comment upon the difficulty of identifying foreign pigs in consequence of the practice which obtains of removing their heads and neck-glands before importation.

It appears to the Committee that the hindrance to adopting generally a system of mutual insurance is the variety of practice which at present obtains with regard to the amount of tubercular deposit the existence of which in a carcase is held to justify its total condemnation. They recommend that power should be given to the appropriate central authority in England, Scotland, and Ireland respectively to enforce uniformity in this matter upon all local authorities; and they point out that, if such uniformity were enforced, butchers would be able to insure themselves from loss by seizure on account of tuberculosis, at reasonable rates, in the case of animals presenting a healthy appearance before slaughter, and for which a fair price for the purpose of human food had been given. The Committee, however, do not think that the case of the butchers would be entirely met by provisions facilitating mutual or other insurance. They fear that if the butchers were relieved from the whole of the loss arising from seizures, the caution exercised by them in purchasing animals for slaughter might be relaxed; but they adopt the view that it would not be unreasonable to provide that, subject to certain conditions, a proportion of the loss should fall upon the public, and they recommend that that proportion should be fixed at one-half. The conditions upon which such assistance from the public funds should be granted appear to the Committee to be:—

That the butcher claiming assistance should prove to the satisfaction of a Court of summary jurisdiction: (1) That he bought the animal for slaughter in good faith, as a sound animal and fit for human food; (2) That at the time of purchase it exhibited no visible signs of tuberculosis; (3) That the price he paid for it was a fair market price for an animal of its class and weight free from tuberculosis; and (4) That he gave notice to the local authority at the earliest time reasonably possible after he became aware of the fact that he had upon his premises a carcase affected with tuberculosis.

If a butcher in possession of tuberculous meat has notified the fact to the proper authority as soon as he could be reasonably expected to be aware of it, the case should not, in the opinion of the Committee, be taken into Court. This appears to be the rule in many places, but not universally throughout the United Kingdom. In this connection the

Committee point out that the butcher, in substantiating his claim for assistance, will have, in all cases, the opportunity of proving in open Court that he acted in good faith.

In recommending that the limited assistance to butchers suggested should be provided by the Imperial Exchequer, the Committee take the line that it would be manifestly unfair to throw this burden upon the ratepayers of the great collecting and distributing centres. If the charge were to be made upon local funds it would, the Committee add, appear to be more just that it should be imposed upon the locality in which the animal contracted or developed the tuberculosis. They think, however, that the difficulty of tracing each animal in respect of which a claim is made to such locality makes the adoption of this method of distribution of the charge practically impossible.

PARLIAMENTARY NOTES.

INFANTILE MORTALITY.—In reply to Sir W. Foster, who asked whether, in view of the rate of infantile mortality in many populous districts, he would issue a circular to Boards of Guardians in the large towns calling attention to the facts connected with infantile mortality, and pointing out that no difficulty should be made to discourage poor people from applying for early medical aid when they or their children were exposed to danger from epidemic diseases, Mr. Long said: I am advised that the high rate of infantile mortality in large towns is to a considerable extent due to improper feeding, and is by no means confined to children of the pauper class. I am not aware that difficulties are made to discourage poor people who would be proper recipients of relief from applying for early medical aid in the circumstances referred to in the question, but if the hon. member is aware of cases of the kind and will furnish me particulars of them, I shall be happy to make inquiry with regard to them. At present there does not seem to me to be sufficient ground for issuing a circular of the kind suggested.

COMMITTEE ON VAGRANCY APPOINTED.—The President of the Local Government Board, after consultation with the Home Secretary, has appointed a Departmental Committee on the subject of vagrancy. The Right Hon. J. L. Wharton, M.P., will act as chairman, and the other members of the Committee will be Sir William Chance, Mr. J. S. Davy, C.B., Dr. Downes, Captain Eardley-Wilmot, Captain Showers, and Mr. H. B. Simpson. Mr. F. L. Turner, of the Local Government Board, will act as secretary to the Committee.

SEWAGE FARM PRODUCE.—Asked by Sir W. Hart Dyke whether he was aware that the sale of vegetables or fruit to be eaten uncooked had been prohibited in France when they were grown upon sewage farms, whether the attention of any of the Local Government Board's Inspectors had been called to the importation of such fruit and vegetables from France, and if he would consider the advisability of taking steps to afford some greater security to the English consumer who might purchase them, Mr. Long said: I have not received any representations as to the importation from France of fruit and vegetables grown upon sewage farms, and it appears to me that there would be considerable practical difficulty in

identifying any produce so grown. I am advised that, speaking generally, vegetables and fruit grown upon sewage farms would not be unfit for food, though uncooked, unless they had been allowed to be in contact with the sewage, and I understand that one of the model regulations issued in France last year would forbid the disposal of matters from cesspools or sewers on land on the surface of which are cultivated vegetables and fruit intended to be eaten uncooked.

VACCINATION CALVES.—In reply to a question by Mr. Field, Mr. Long said: Calves are hired at a cost of from 20s. to 25s. a week for the purpose mentioned. The number of calves used varies. At present the average number is approximately fifteen weekly. The calves are kept for about two weeks. After the lymph has been collected from them they are slaughtered, and their carcases are thoroughly examined by a veterinary expert. Sound carcases are delivered to the contractor by whom the animals are supplied, to be disposed of as he thinks fit. The concern of the Department in the matter then ceases. I am not aware that any Medical Officer of Health has made a report on the subject, but I am advised that when the carcases are found to be sound there is no reason why they should not be sold for food. I have no information as to the practice with regard to the sale of the carcases as meat. The number of the carcases delivered to the contractor in 1903-4 was about 1,000. This is above the average.

TUBERCULOSIS IN ANIMALS.—Mr. Field asked the President of the Local Government Board whether he could state how many and what local authorities had adopted the model bye-laws on tuberculosis issued by the Board; and whether, in the event of the Sanitary Authority refusing to adopt the model bye-laws, there was any means of compelling them to do so. Mr. Long, in reply, said: I presume that the hon. member has in view the model regulations issued by my Department for the guidance of local authorities in framing regulations under the Dairies, Cowsheds, and Milkshops Order of 1885. Since 1899, when the present model regulations were issued, 583 series have been made by Councils of boroughs and urban and rural districts, and they are for the most part based on the model. I am not empowered to compel local authorities to adopt the model regulations if they do not think fit to do so. Mr. Field asked whether he could state if the Medical Officers of Health who were charged with the duty of judging meat alleged to be affected with tuberculosis, had any special qualification for this position, or whether they had passed any examination in public health; and whether he would consider the necessity of issuing bye-laws for their guidance, with a view of protecting the private property of the traders in native meat, and preventing the detrimental effect of unnecessary confiscation upon the producers of home meat. Mr. Long said: I am advised that the training which every medical practitioner must have received as a student is sufficient to render him competent to detect tuberculosis in a carcase. As every Medical Officer of Health must be a registered medical practitioner, it is not necessary for the purpose mentioned in the question that he should possess any special qualification. Circulars were issued by my Department in March, 1899, and September, 1901, drawing attention to the principles which should be observed in the inspection of tuberculous carcases, and I do not think I need take any further action in the matter at the present time.

CORRESPONDENCE.

PLAGUE IN THE TRANSVAAL.

To the Editor of Public Health.

SIR,

We desire to bring to the notice of the Members of the Society of Medical Officers of Health, the conduct of Dr. W. J. Simpson, a Fellow of the Society, and also of the Royal College of Physicians, London, in reference to Public Health matters in the Transvaal generally, and to the recent outbreak of Plague in the Transvaal particularly.

In December, 1901, one of us (Dr. Porter) was appointed Medical Officer of Health for Johannesburg, and entered on his duties in March, 1902. Dr. Simpson was aware of Dr. Porter's appointment, and in a letter of congratulation suggested that Dr. Porter should call him (Dr. Simpson) in as Public Health expert adviser.

In the following month of October, a communication was received by the Town Clerk of Johannesburg from Mr. Price, C.M.G., Johannesburg, the General Manager of the Central South African Railways, covering a letter from Dr. Simpson, in effect suggesting that he (Dr. Simpson) should be called upon by the Town Council of Johannesburg to advise on the various large Public Health questions likely to require the attention of the Council, and expressing the hope that Johannesburg would not be allowed to become a place of ill-health. Mr. Price was informed by the Town Clerk, Johannesburg, that the Town Council had their own Medical Officer of Health, who possessed their confidence. (Copies of Dr. Simpson's letter and Mr. Price's covering letter are enclosed).

Notwithstanding this rebuff, when Plague appeared in Johannesburg, in March, 1904, Dr. Simpson volunteered his services as Plague Expert, for payment at the rate of £420 per month and travelling expenses; and statements which, we submit, can only have emanated from himself, were cabled to the Transvaal, where they appeared in several papers, that Dr. Simpson would start immediately "and take such steps as he thought necessary." This offer was, however, declined by H. E. the High Commissioner, upon which, on April 1st, an article appeared in the *Journal of Tropical Medicine* (of which Dr. Simpson is an editor) imputing incompetence to the Transvaal Sanitary Service to deal with the outbreak, and suggesting that Lord Milner would live to regret his refusal of the proffered (i.e., of course, Dr. Simpson's) aid.

We consider this conduct on the part of Dr. Simpson is in a high degree unprofessional, and unworthy of a Member of the Society.

We have the honour to be, Sir,

Your obedient servants,

GEORGE TURNER,

Medical Officer of Health for Transvaal.

CHARLES PORTER,

Medical Officer of Health, Johannesburg.

Office of the Medical Officer of Health for the Transvaal,
Pretoria, 13th, June, 1904.

Copy of Letter, dated October 22nd, 1902, from Mr. T. R. Price, C.M.G., Johannesburg, General Manager C.S.A. Railways, to Town Clerk, Johannesburg.

"I enclose a copy of a letter I have received from Professor Simpson, the great Plague Expert, who has had such very wide experience in regard

to plague and sanitary matters in India, as well as other places in the East, and whose services in the Cape Colony, as well as in Natal, were so valuable at the time of the outbreak of plague in South Africa.

"I saw a great deal of Professor Simpson at the time he was in South Africa in connection with the Plague, and I can only say that if you have any idea of obtaining the opinion of an expert in regard to the sanitary arrangements of Johannesburg, I know of no one whose advice it would be of greater advantage to secure and to follow than that of Professor Simpson.

"I shall take an opportunity of speaking to you on the matter when we meet, and in the meantime I hand Professor Simpson's name to your very favourable consideration. Yours faithfully,

(Signed) T. R. PRICE."

Copy of Letter from Dr. W. R. Simpson to Mr. Price, C.M.G., Johannesburg, forwarded by Mr. Price to Town Clerk, Johannesburg.

"I have just returned from China and Japan, via Canada, so I have been round the world since I saw you. I was asked to go to Hong-Kong to advise on Plague, which was seriously affecting trade, and have had a successful mission. This year there was no panic, no business dislocation, and a comparatively small number of deaths.

"I watch South African affairs with the keenest interest, and South Africa will always have a warm place in my heart, I met with so much kindness and so many friends there. I am hoping that one of these days the Johannesburg authorities will seek my advice on the large sanitary matters which must, sooner or later, engage their attention, and that this will give me an opportunity of visiting South Africa under better auspices than I did last time. I see thousands are crowding to Johannesburg, and the problems of house-building, laying out of the town in a sanitary condition, the water supply, and sewerage, and conservancy, are likely to be particularly difficult to solve. I hope matters will be considered carefully, and the town not be allowed to become a place of ill-health.

"By this time I suppose the Colonel is thinking of returning to civil life.

Yours sincerely,

(Signed) W. J. SIMPSON."

We have submitted the above correspondence to Prof. Simpson, so that his reply may appear at the same time. It is as follows:—

To the Editor of Public Health.

SIR,

I cordially thank you for your courtesy in allowing me to see Dr. Turner's and Dr. Porter's letter, in which they accuse me of conduct in a high degree unprofessional and unworthy of a Member of the Society, and for giving me an opportunity of removing such an erroneous and unwarranted impression.

My letter to Dr. Porter was an answer to his, in which he mentioned that he had been offered the Johannesburg appointment, and a request on his part to see me to consult on the problems connected with the conservancy and general sanitation of Johannesburg. I did not receive his letter until I had started for Hongkong. In my reply I offered my congratulations, and regretted I had been unable to meet him as he desired, to assist him with my advice, and I concluded by saying that as the problems with which he was confronted were exceedingly difficult, if, in

future, his local authority were to consult anyone, I should like to be the one called in.

With reference to my letter to Mr. Price two years ago, it was a private one to a friend, expressing a hope, and it will be seen that there is not even a suggestion that the contents should be made use of. To-day is the first time that I learn, to my surprise, that my friend had, with mistaken zeal on my behalf, sent it to the Council. I am accordingly quite innocent of the rebuff that is referred to, as I am innocent alike by intention or otherwise of hurting the feelings, reputation, or position of either Dr. Turner or Dr. Porter.

As regards my offer of services to the Colonial Office, it was only natural that as I had been employed by them on similar work before, I should place my services at their disposal as a specialist, at what appeared to be a grave situation in the Transvaal. The fee asked for indicated that it was in the capacity of a consultant, and not as an opponent, that I would have visited the Transvaal, and the fee is about the same as I received in Cape Colony. Dr. Porter and Dr. Turner attribute to my influence all kinds of newspaper statements, messages and paragraphs. They give me credit for much more activity than I would be inclined to exert on such a subject. I have never written a line for the newspapers, Home or Colonial, on the Johannesburg epidemic or any South African question, nor have I inspired anyone connected with the newspapers. There is one exception to this (a copy of which I enclose*), where an interviewer obtained rather cleverly access to the laboratory in which I was working. The information he gathered, however, was little beyond that it would be a good thing to destroy the rats in Johannesburg, and that the dryness and season of the year were all in favour of control of the epidemic, if promptly dealt with. My name is mentioned with reference to the interview. I noticed with regret an article in the *Journal of Tropical Medicine*, of which I am one of the editors, which appears to have given rise to certain heart-burnings, and which might be misunderstood by Lord Milner if he saw it. The article is however signed, and I cannot be held responsible for something which I only saw after it was published, and which I had not the slightest connection with, either directly or indirectly.

Again thanking you for your courtesy, I remain, Yours truly,
W. J. SIMPSON, M.D."

14, GLOUCESTER PLACE,
PORTMAN SQUARE, W.
July 12th, 1904.

THE SO-CALLED "LEICESTER METHOD" OF DEALING WITH EPIDEMIC SMALL-POX.

To the Editor of Public Health.

SIR,

The object of this letter is to protest against the Incorporated Society of Medical Officers of Health (and their Journal) being used as a dumping ground for eccentric notions, such as those enunciated by the reader of the paper at the meeting on the 11th March.

The aims of that gentleman appear to be, first, to claim for his town, as new and original, a method of dealing with epidemic small-pox which is neither the one nor the other; and second, to advocate the general

* [The Daily News, March 28rd, 1904.—ED.]

abandonment of a protective measure (re-vaccination), in which he owns his firm and implicit faith. The repudiation by his audience of the abortive production whereof the author—evidently after prolonged labour and pains—delivered himself, was the natural result of the arrival of such an illegitimate monstrosity. Notwithstanding urgent advice for its prompt suppression, the proud parent persists in dandling his offspring before the eyes of his compassionating colleagues. The preservation of the article in the pages of PUBLIC HEALTH is scarcely calculated to improve the tone of that journal, which was never intended to become the catalogue of a museum of curiosities.

The writer of every paper to be read before the Society should be required to forward his article to the Secretaries, together with an abstract, for their perusal. The Editor or Secretaries should have power to abridge, or reject altogether, any paper before it is read or put in type. All papers, or so much of them as might be thought desirable, should be read to the Society by the Secretaries. The Society should disclaim all responsibility as to the views expressed by the author of any paper. The adoption of the course here outlined (which I believe is that followed by the Institute of Civil Engineers and other scientific bodies) will save both the time of the Society and the reputation of its journal.

I am, yours faithfully,

HENRY E. ARMSTRONG.

TOWN HALL, NEWCASTLE-UPON-TYNE,
March 19th, 1904.

THE FATALITY OF SMALL-POX IN PRE-VACCINATION TIMES.

To the Editor of Public Health.

SIR,

In your editorial on my paper, "The Leicester Method of dealing with Small-pox," you raise a question of considerable interest and importance, viz., the fatality of small-pox, (proportion of cases proving fatal) in pre-vaccination times.

I believe you are only expressing the view which many hold, when you state that "Then, as now, the death-rate of unvaccinated persons was between 30 and 40 per cent of those attacked."

With your kind permission I should like to take exception to this statement.

My own belief in the matter is of little importance, but I would point out that there are high authorities who give a much lower estimate than yours. Mr. Vail, in *Vaccination Vindicated*, page 57, in considering this point, quotes Jurin's statistics as follows:—

"In the year 1722, Dr. Jurin began to collect and publish, in successive annual reports, all the statistics of small-pox death-rates that he could get hold of. . . . By 1726 they (his figures) had grown to 17,151 with 2,848 deaths, or 16.6 per cent."

McVail admits that this is a lower fatality than that usually seen amongst the unvaccinated in modern epidemics, and explains it by saying (page 59), "Small-pox, apart from vaccination, has become a more fatal disease."

Dr. J. E. Edwards, in his "*History of Small-pox and Vaccination in Europe*," states on page 21, in big type, "About one-sixth or one-eighth of the attacks were fatal (one third in young children, Bernouilli)." This is equivalent to 16.6 per cent, or 12.5 per cent respectively.

Of course, fatality varied greatly in different epidemics, just as it does

now, and no doubt sometimes, and in some places, it reached and even exceeded the figures you give; but I suggest that these high figures should be regarded as exceptions rather than as true averages. It is only natural that the more severe epidemics would be recorded in the pages of history, whilst the mild and therefore unimportant outbreaks, comparable to that which has recently prevailed in this town, would be quickly forgotten. This year, I may say, we have had in Leicester over 160 cases in unvaccinated persons with three deaths (one of these did not belong to Leicester, and was not infected in Leicester). If we had a fatality of 30 or 40 per cent instead of 2 per cent, I venture to think more would have been heard of the outbreak, just as I suggest was the case in pre-vaccination times.

One other point. Jurin's figures were collected in the eighteenth century, but it is admitted that the ravages of small-pox were more severe in that century than in the immediately preceding ones. It is possible, therefore, that before the eighteenth century small-pox was less fatal than during that period.

Allow me to refer also to one or two other points in your editorial. You compare Leicester with Bristol, which town, you say, has been even more successful in controlling small-pox than has Leicester. But then you also tell us that Bristol is not so well vaccinated as Leicester, so that it would seem that Leicester is not the only badly-vaccinated town which is able to control small-pox by "common-sense methods."

You are under a slight misapprehension when you say that "since 1898, some twelve or fifteen thousand children seem to have been vaccinated there (in Leicester)." The correct number of primary vaccinations registered in Leicester (not children only) for the six years, 1898-1903, is 4,672, as against 37,132 births. I may add that for the twenty years, 1883-1902, the number of primary vaccinations registered has only been 10,807 as against 110,103 births.

Yours faithfully,

C. KILICK MILLARD,

Medical Officer of Health.

TOWN HALL, LEICESTER.

July 15th, 1904.

SMALL-POX PREVENTION.

(To the Editor of Public Health).

DEAR SIR,

In the interesting editorial in PUBLIC HEALTH for the current month, on page 590 it is stated that while Bristol is not so well vaccinated as Leicester, yet small-pox, although frequently introduced into the former town, has been kept under absolute control by "common-sense methods." It is further implied that the Bristol "method" is more successful than the Leicester method. It would be interesting to know exactly what the "common-sense methods" applied at Bristol are. They evidently must be something other than notification, isolation, disinfection, observation of contacts, and re-vaccination, for these latter are the methods applied at Leicester. I say they must be, for unless they are so, the difference between Leicester and Bristol is that the latter town is, as you expressly state, the worst vaccinated of the two, and in strict logic it is this difference which accounts for the more favourable results which you say have been obtained at Bristol.

I am, dear Sir, Faithfully yours,

F. GRAHAM CROOKSHANK,
M.O.H., Barnes.

July 6th, 1904.

SMALL-POX AND PREVENTIVE MEASURES. THE INFLUENCE OF EPIDEMICITY.

(To the Editor of Public Health).

DEAR SIR,

In the various articles in the July number of PUBLIC HEALTH, and indeed in all discussions on the effect of preventive measures on small-pox, the fact of epidemicity hardly receives sufficient attention. By epidemicity I mean the tendency of zymotic diseases to assume at different times and places varying degrees of infectivity and fatality. Pre-vaccination small-pox behaved as measles and scarlet fever do now; it was rarely altogether absent from a locality, but its degree of prevalence (that is its infectivity) and fatality varied between extreme limits; at times it was virulently infectious and fatal, causing severe epidemics, at other times it was quite the reverse of this. And probably even in the worst epidemics a majority of the people of the locality would escape infection. There is no reason for supposing that the unknown conditions that at certain times and places caused small-pox to be more or less epidemic have altered, and therefore it is illogical to assume that everywhere and when a case of small-pox gets into an unvaccinated household, most of the contacts will become infected; or into a badly vaccinated locality, that there will be an epidemic. In each case the probability of such occurring will be in proportion to the unknown epidemicity. Even in my own brief experience of not much over twenty years, I have seen a marked difference both in infectivity and severity at different periods; at the present time we are having some serious exposures to infection with remarkably little result (either amongst vaccinated or unvaccinated). Vaccinists are apt to forget the above facts, and to make over-statements of what would occur when unvaccinated persons are exposed to infection. On the other hand, results such as those obtained at Leicester prove nothing in favour of their methods, unless it can be shown that epidemic conditions prevailed at the time; and (as stated in your review) the low fatality (both in vaccinated and unvaccinated) strongly indicates that the periods in question were non-epidemic. I am fearfully confident that the time will come when small-pox will be introduced into Leicester in the presence of epidemic conditions, and then even 40 per cent of unvaccinated will be beyond the powers of isolation to deal with.

As regards the high fatality of some modern epidemics alluded to in Dr. Millard's paper, such fatality is higher than the average fatality of pre-vaccination times, but it is certainly not higher than the fatality of a locality suffering from a severe epidemic in those days. This would indicate that the protection afforded to a locality by even imperfect general vaccination is such that an epidemic only occurs when the unknown conditions causing epidemicity are especially virulent. Such an explanation of the high fatality of modern epidemics is much more consistent with our other knowledge, than Dr. Millard's reckless assumption of "some subtle unsuspected influence" in vaccination which increases the severity of the type; an assumption in contradiction to all we know of modified disease, but which is interesting as indicating the writer's bias. It is instructive to note that Dr. Millard's report has already been quoted by anti-vaccinators in our local papers as a reason why we should not "expose our bodies to an injection of filth on one or more occasions, to render ourselves liable to spread the disease to others with no beneficial results."

I am, dear Sir, Yours faithfully,

Health Offices, Wolverhampton,

July 4th, 1904.

HENRY MALET.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED, 1888. INCORPORATED, 1891.

PROVINCIAL MEETING.

THE annual provincial meeting of the Incorporated Society was held at the Town Hall, Newcastle-upon-Tyne, on Saturday, July 2nd, 1904. Present: Dr. Joseph Groves, B.A. (President) in the chair; Drs. Eustace Hill, Henry Armstrong, J. W. Hembrough, John Taylor, J. G. Willis, J. E. Gofton, J. A. Harris, D. Jackson, J. J. Boyd, T. Wilson, Sydney G. Mostyn, W. W. Stainthorpe, Herbert Jones, and others. The following visitors were also present: Mr. John Imrie, Chairman of the Public Health Committee, South Shields, and Mr. Thos. Richardson, Vice-chairman Chester-le-Street Rural District Council.

The Minutes of the meeting held at Wakefield on July 11th, 1903, were taken as read and signed by the chairman as a correct record of the proceedings.*

The Hon. Secretary read letters of regret at inability to be present from Dr. J. C. McVail and Dr. Edmund Smith.

ELECTIONS.

The President declared the following candidates duly elected:—

AS FELLOWS.

Carnall, Edward, L.R.C.P., M.R.C.S., D.P.H., Abergele, N. Wales, late M.O.H. Uitenage, S. Africa.
Dey, Alexander, M.B., C.M., Millvale, Wooler, Northumberland, M.O.H. Glendale R.D.
Fraser, Kenneth, M.B. Ch.B., D.P.H., Ashleigh House, Orrell, Nr. Wigan, M.O.H. Pemberton, U.D.
Goode, Henry Norman, M.B. Lond., D.P.H., 8, St. Leonard's, York, Deputy M.O.H. County Borough of York.
Iredale, J., L.R.C.P., L.R.C.S., Mablethorpe, Lincolnshire, M.O.H. Mablethorpe U.D.
Peacock, William Edwin, M.D., B.S., D.P.H. Holly Villa, Felling, R.S.O., M.O.H. Felling U.D.
Straton, C. R., F.R.C.S. Edin., L.S.Sc., West Lodge, Wilton, M.O.H. Wilton U. and R. Districts.

AS ASSOCIATES.

Dibdin, William Joseph, F.I.C., F.C.S., Mayfield, Grange Road, Sutton, Surrey.
Matthews, W. H., Bath.

Several candidates were then nominated for election at the next meeting.

Dr. J. J. Boyd read a paper entitled "Observations on the Incidence of Scarlet Fever in different Districts of the same Town," and a discussion followed.†

Dr. Armstrong laid before the meeting Dr. Francis T. Bond's *Girbola*, and in recommending the use of the skipping rope, said it was well known that athletes and persons desirous of making themselves fit practised skipping assiduously. He thought that if children were kept away from

* *Public Health*, August, 1903, p. 677.

† See p. 658.

school until seven years of age and given this exercise, they would be much better able to assimilate instruction when they did go to school.

The President said that the Council of the Society had interested itself very much in the question of the physical training of children as distinguished from military drill. There were a great many methods of physical training, and Dr. Bond had adapted one of the most pleasant means to this end, but he doubted very much whether it was suited to persons of any age, or to those of an age, much beyond childhood.

The President proposed, and Dr. Hembrough seconded the following resolution, which was carried unanimously.

"That the best thanks of the Society be accorded the Mayor of Newcastle (Alderman Andersen) for the use of the Town Hall in which to hold this meeting."

The members and their friends subsequently lunched at the Station Hotel. At the conclusion of the luncheon, after the loyal toasts had been given, Mr. Imrie proposed the toast of "The Incorporated Society of Medical Officers of Health," to which the President responded.

A visit was afterwards paid to the Walker-gate Isolation Hospital, where Dr. Sydney Mostyn, the Medical Superintendent, demonstrated the use of the steam sterilizer for excreta, which was designed in 1894 by Dr. Armstrong and Mr. W. George Laws, M. Inst. C.E., late Engineer to the Newcastle Corporation, and which has been improved within the last few years. The essential features of the sterilizer are the admission of steam into a cylinder into which the excreta have been discharged, and the cooling of the contents of the cylinder after sterilization and prior to being emptied into the sewer. Non-return valves are provided completely to close the cylinder to all openings except that of the steam-pipe. Steam can also be admitted to the interior of the soil-pipe and of the waste-pipe from the slop sink.

From Walker-gate the members of the Society travelled by the new electric trains of the North Eastern Railway Company to Tynemouth, where the Northern Branch had provided tea. The return to Newcastle was made by steam launch.

Yorkshire Branch.—The Annual Meeting of the Branch was held in the Town Hall, Huddersfield, on Friday, July 15th. There were present the following: Drs. Percival (Knottingley), Gibson (Wakefield), Milburn (Wakefield), Erskine (Goole), Hunter (Pudsey), Neech (Halifax), Stuart (Batley), Martin (Brighouse), Anderson (Wortley), Riddell (Rotherham), Scurfield (Sheffield), Moore (Huddersfield), Gellatly (Meltham), Ross (Penistone), Housley (Retford), Dittmar (Scarborough), Muschamp (Yeadon), Divine (Huddersfield), Davidson (Hipperholme), Smith (York), Burman (Wath-on-Dearne), Smailes (Honley), Wade (Wakefield), Johnstone (Ilkley), Kennedy (Shepley), and J. R. Kaye (Hon. Sec., Wakefield).

Dr. Johnstone, in the absence of the President, occupied the Chair.

Previous to the meeting the Branch was entertained to luncheon by the Mayor (Mr. Alderman Inman), and Mr. Councillor Broadbent, to whom a very cordial vote of thanks was given for their hospitality.

Mr. Alderman Woodhead in acknowledging the vote of thanks, expressed his unqualified sympathy with the high motives of Medical Officers of Health, and said he was proud of the low death-rate of an industrial centre like Huddersfield, the result no doubt to a large extent of the work of the Health Department.

Councillor Broadbent also referred to the growing importance of health

administration, but said that very few, if any, authorities had attained to the highest conception of public health administration. Opinion was gradually waking up that the deeper the study in problems of public health, the more there was to do, and the country in that matter had enormous scope for advance to attain those possibilities still within reach. He held that what had been done was as nothing to the future, if we can only fasten public opinion upon the subject, and he urged the individual members to continue to press forward without regard to any susceptibilities the most ambitious aim of public health.

At the General Meeting an encouraging Annual Report was presented by Dr. Kaye, the honorary secretary. Dr. Scatterty, of Keighley, was elected President for the forthcoming session; Drs. Kaye, Percival, Mitchell Wilson, Robinson, and Wade, Vice-Presidents, with the following as Members of the Council: A. Anderson, D. L. Anderson, Buchanan, Burman, Cameron, Dittmar, Evans, Forsyth, Hick, Housley, Hunter, Johnstone, Martin, McLean, Neech, Smith, and Scurfield. The Honorary Secretary and Treasurer, J. R. Kaye. Representatives on the Council, Drs. Mitchell Wilson and Kaye.

The various resolutions of the Central Society regarding Food Adulteration were considered, and accepted unanimously without alteration.

The adjourned discussion on "The Practical Difficulties in the Restriction of Epidemic Diphtheria" was opened by a Paper from Dr. Erskine, of Goole. The Paper created an interesting discussion, as evidenced by the fact that practically everyone of those present took part in it, with the result that only half of the agenda paper was got through. All of them agreed so far with Dr. Erskine, that school attendance played an important part in the dissemination of the disease. Several, however, were of the opinion that many cases of simple sore throat were diagnosed and reported as diphtheria. Particular reference was also made to rainfall in relation to diphtheria, and it was pointed out that Goole was one of the driest places in the Riding, but on the other hand that Skipton and Keighley, which have a large rainfall, had also been subjected to the prevalence of diphtheria.

The members then adjourned for tea, kindly given by the Mayor of Huddersfield, Mr. Alderman Inman.

North Western Branch.—A Special Meeting of the above Branch was held at the Victoria Hotel on July 8th. Present: Dr. F. Vacher, in the Chair; Drs. Garstang, Chadwick, Sergeant, Henry, Greenwood, Pringle, and M. Young.

A letter of apology for unavoidable absence was read from Dr. Berry. The minutes of the last meeting were read, confirmed, and adopted.

The meeting then considered a letter from the Honorary Secretary of the Incorporated Society enclosing certain resolutions, and asking for the observations of the Branch thereon.

On resolution 1 of the Society, passed January 8th, 1904, and relating to Food Adulteration, a vote of non-approval by the North-Western Branch was recorded, the Branch being of opinion that the resolution of the Society if carried into effect would not substantially improve the position of the purchaser.

On resolutions 2 and 3 a vote in support was recorded, a further suggestion being made on resolution 3, that inasmuch as misleading warranties are frequently given (or warranties in such a form that their full significance was not appreciated by the retailers), the Local Government Board

should prescribe a definite and simple form of warranty, the use of which should be compulsory, and any deviation from which should be treated as an offence under the Food and Drugs Act.

On resolution 4 a vote of non-approval was recorded, the Branch being of opinion that the fixing of standards similar to those recently fixed by the Board of Agriculture was frequently other than helpful.

Resolution 5 was unanimously approved.

On resolution 6 the Branch recorded a vote of non-approval, being of opinion that the recommendations of the Departmental Committee were in some respects not entirely satisfactory.

On the resolutions of the Metropolitan Branch, a vote of non-approval was recorded in reference to Nos. 1 and 2, and a unanimous vote of approval on resolution No. 3.

Midland Branch.—A meeting was held in the Council House, Birmingham, on July 7th, 1904. Present: Henry May (Vice-President) in the Chair, Messrs. Chatelier, Clendinnen, Reginald Green, F. H. May, Malet, Millard, Richmond, John Robertson, Snell, and J. H. Wilkinson.

An apology for non-attendance was received from the President.

A communication from the Society asking the Branch to consider some resolutions (a) of the Society, and (b) of the Metropolitan Branch, re the Food and Drugs Acts, was read.

It was resolved that, with regard to (a) the Society's resolutions:—

1. Be approved of.
2. Be amended by inserting the words "in a conspicuous manner" after the word "declared."
3. Be amended by deleting the words "be so worded." and that the words "be in a form to be specified in the Act, so" be inserted in their place.
4. The Midland Branch sees no reason why the Board of Trade should have the power of declaring standards of adulteration.
5. Be approved of.
6. Be approved of.

It was resolved with regard to (b) the resolutions of the Metropolitan Branch, that they be approved of.

The election of Officers and Council for 1904-5 then took place. Dr. Richmond was re-elected Honorary Secretary, Dr. Bostock Hill was re-elected Honorary Treasurer, and Messrs. Barwise, Boobyer, Malet, Millard, Mabyon Read, Geo. Reid, and Snell, were elected members of the Council. For the Session 1905-6, Dr. John Robertson, of Birmingham, was unanimously elected President. For the Session 1904-5 the President will be Dr. Howard Wilkinson, of Dudley.

Dr. Doig McCrindle then read a paper on "The Small-pox Epidemic in Birmingham in 1903."

In the discussion which followed, Drs. Snell, Malet, Wilkinson, F. H. May, Henry May, Robertson, Orton, and Chatelier took part. A feeling was generally voiced by the speakers that, in order to cope effectually with small-pox epidemics, it was absolutely necessary for the Sanitary Authorities to have control of Vaccination.

SUGGESTED FORMATION OF AN EASTERN COUNTIES BRANCH.

A meeting of Medical Officers of Health residing in the Eastern counties was held in the new Medical School, Cambridge, on Saturday, July 9th, for the purpose of discussing the desirability of forming a Branch of the

Society for that district. The chair was taken by Dr. Joseph Groves (President of the Society), and there were also present Professor G. Sims Woodhead, Drs. W. Armistead, Bushell Annington, Henry W. Beach, H. Cooper Pattin, and Herbert Jones.

Letters of regret at inability to be present were read from Drs. Savage, Poyntz Wright, and W. R. Grove.

DR. GROVES said that it was a great pleasure to him and to Dr. Herbert Jones to come to Cambridge, because they felt that in attending that meeting they were advancing the interests of a very important Society, and they would be also advancing the interests of those who lived in East Anglia, if they encouraged them to form a Branch of the Society. The responsibilities of Medical Officers of Health were enormous, and after a considerable experience, he felt more and more that these duties demanded from them consultations with their fellows engaged upon the same work, and the discussion of various subjects one with another. He had never attended a meeting of any society without learning something, and it was their duty in honour, and as becoming honourable men, to keep themselves up with the questions of the day as regarded the health of the people, and they could not do that, he believed, unless they met frequently. It was not possible for many men to attend the meetings in London, and it was necessary that there should be local centres, so that they might meet one another periodically. Some of the branches were very large indeed, and it was their habit to hold the meetings in various parts. It was their duty to meet one another and discuss, not only scientific questions, but also the social and other questions which concerned them and the people. They had many disabilities, and it was desirable that they should get sympathy from one another, and be able, as professional brethren, to get one another's advice as to the best way to meet those difficulties. One of those difficulties and disabilities was the insecurity of their office. It was impossible, as far as his experience went, and the majority of the Council of the Society were of the same opinion, to perform the full measure of service to the public which they ought to perform, because of the insecurity of their tenure of office. They were appointed for short terms, and at the end they might be dropped, and had no redress. They might be dropped simply because, in the interests of public health, they insisted upon carrying out the law in their district. It had happened to members of their Society again and again, that because they insisted upon doing their duty they were refused re-appointment. If measures absolutely necessary for the good of the public happened to run counter to the interests of jerry-builders and other members of Councils, the Medical Officers of Health were refused re-election. As an individual, the Sanitary Inspector was exactly in the same plight. They were dependent on the sanitary inspector in their work, and whilst they spoke of their own disabilities, they also thought of the disabilities of the sanitary inspector. The Society had been doing its best to redress this particular disability from which Medical Officers of Health suffered. He had had the honour and the good fortune of being associated with the British Medical Association as well as the Society of Medical Officers of Health, and he thought he had been able to persuade the Council of the former body that it was the duty of the whole profession to do their best to remove the disabilities he had mentioned. The outcome of that was that the Association drafted a Bill, which had been presented to Parliament again and again. The Association behaved with particular courtesy to their Society, because they submitted a draft of the Bill to their Council with a request for suggestions, and they made them. The Council of the

Association assented to their suggestions, and Sanitary Inspectors had been included in the Bill. The Bill had been blocked by certain members of Parliament, and opposed in various ways, but now they had determined to re-introduce the Bill with the superannuation clause cut out. They thought that some of those Members of Parliament who had a dislike to pensions, would not find it so necessary to their consciences to oppose a Bill which simply required that a medical or sanitary officer should be appointed, as any other officer was, while he did his duty to the satisfaction of society. It was proposed that if an officer were dismissed, there should be an appeal to the Local Government Board, and that the decision of the Board should be final. Referring to the desirability of forming a Local Branch, the President said that there were certain advantages in being fellows of the Society. The provincial members could help very much in the working of the Society through their representatives. They had a representative in the Council of the Society, and he might try to bring about any change they might like in the organization or working of the Society. There was also the journal *Public Health*, which was of great value to them in their work. In connection with the Society they could attend monthly meetings, at which papers were read on most important subjects, and they had the opportunity of listening to the discussions, and forming their opinions upon the subject before them. But there were so many advantages that he did not intend to take up their time by enumerating them.

DR. HERBERT JONES (one of the Hon. Secretaries) said the Society was almost the oldest Public Health Society in the whole world. It was founded in 1856, shortly after the formation of the Epidemiological Society. Their journal, *Public Health*, had a recognized standing amongst technical journals. Their library, which was now being formed, would be of immense value to members of the Society, and it was proposed to make arrangements for sending parcels of books on loan to those living outside London. Speaking of the advantages of forming a Branch of the Society, Dr. Jones said that when matters were discussed by the Society they were not only discussed by the central body, but also by the Branches, so that when a resolution came out from the Society, it was not the resolution of forty or fifty members, but the opinion of the whole of the nine Branches. Last year, for example, they discussed the question of underground bakehouses, and the Society had drawn up numerous recommendations it was considered desirable to make. These recommendations were printed, and copies were sent to every Branch. Meetings of the Branches were then held, and the recommendations were thoroughly threshed out. Amendments were sent up to the Council and fully discussed there, and the outcome was a final resolution from the whole Society, representing the opinions of 900 or 1000 Medical Officers of Health all over the country. The constitution of the Society was that there was a Council, which included a President, Vice-presidents (who were the ex-Presidents), and Presidents of Branches. Then the Council contained members who were elected by the branches, each branch electing two representatives, with the exception of the metropolis, which elected one member and as many other members as there were branches, making at the present time ten members. So that was another advantage they got in having a branch—they had three members on the Council. For every member's subscription of a guinea, the Branch got back 7s. 6d., and from every associate's they got 2s. 6d. back. There was no area prescribed in Branches. A Fellow of the Society might belong to any branch he pleased, and the 7s. 6d. from

his subscription would be allocated to that branch. With regard to the proposed East Anglian Branch, he had sent out cards to every Medical Officer of Health in Cambridgeshire, Lincolnshire, Suffolk, Norfolk, Huntingdonshire, and to a great many in Essex. In those five counties he sent out notices to twenty-seven Medical Officers of Health who were already Fellows of the Society, and to eighty-three who were not Fellows, so that there was a nucleus of twenty-seven Fellows, and there were eighty-three potential Fellows.

DR. COOPER PATTIN, of Norwich, said he had great pleasure in moving the following resolution: "That the Council of the Incorporated Society of Medical Officers of Health be requested to establish a Branch of the Society for the Eastern Counties." The fact that they had a small beginning should be no reason for not proceeding with the formation of the branch. He had been in favour of the project for years.

DR. ARMISTEAD, as one of the oldest members of the Society, seconded the resolution, which was carried unanimously.

The provisional election of officers was then proceeded with.

On the proposition of Dr. Cooper Pattin, seconded by Dr. Anningson, Dr. Armistead was unanimously elected President.

DR. COOPER PATTIN asked if it would be practicable to associate the offices of Secretary and Treasurer. He thought it would be more economical if the offices became joint, and were held by one man.

DR. HERBERT JONES said that although there was not much work for the Treasurer to do, he always thought that the more men they got interested in the Society the better it was. Some of the branches had joined the offices.

The Chairman thought that some men tried to do more than their fair share, and after a time they got rather tired of it.

Dr. Anningson agreed with the suggestion that the two offices should be joined.

It was decided to combine the two offices, and on the proposition of Dr. Cooper Pattin, seconded by Dr. Anningson, Dr. Beach, (Yarmouth) was unanimously elected Secretary and Treasurer.

Dr. J. Sinclair Holden, of Sudbury, and Dr. Cooper Pattin were suggested as representatives on the Council, and the following were elected on the Branch Council: Dr. Bushell Anningson (Cambridge), Dr. G. S. Elliston (Ipswich), Dr. W. G. Savage (Colchester), and Dr. Plowright (King's Lynn).

On the proposition of Dr. Anningson, seconded by Prof. Sims Woodhead, a hearty vote of thanks was passed to the Chairman and the Hon. Secretary, and the meeting concluded with a vote of thanks to the authorities of the Medical Schools for the use of the room.

Luncheon was subsequently served in the Hall of Caius College. The President was in the chair, and the following visitors were present: Mr. W. W. Buckland, M.A., Fellow and Tutor, Gonville and Caius College; Mr. J. E. Purvis, M.A., Assistant to the Professor of Chemistry; Mr. E. Wareham Harry, C.E.; and Mr. Alfred Ransford, C.C., Isle of Ely.

The toast of "the King" was briefly proposed and duly honoured.

DR. COOPER PATTIN then said: There is one feature of our meeting we have rather lost sight of, and I want the present meeting to pass a resolution I am going to propose. It is a thing we have forgotten. We have provided ourselves with no Vice-President, and I beg to move a resolution to the effect that Dr. Anningson be appointed our first Vice-President. We shall never have another opportunity of offering to him or any successor this position, because the automatic working of arrangements will secure

that the new President will be the Vice-President. Therefore, I have very great pleasure in proposing that Dr. Anningson be our first Vice-President.

DR. ARMISTEAD seconded, and said that he wished that things had been reversed, and that Dr. Anningson had been President and himself Vice-President.

The PRESIDENT: Our proceedings to-day have been rather informal. Dr. Herbert Jones and I have no business to be in evidence, because the movement for the creation of a branch is supposed to come from the branch itself; but you must suppose we are not, for a moment, in sight. I think we may very well admit this resolution, and as President of this Society, as well as a private individual, I am very glad indeed you have appointed my old fellow-student, Dr. Anningson, as Vice-President, because he succeeds to the Presidency next year, and if it had not been for you, sir, no doubt the Presidency would have been offered to Dr. Anningson. You are his senior, and we are a very autocratic profession. We have our rules and we follow them, and we follow them to the common good. I am sure everybody is delighted to find that Dr. Armistead, an old member of the Council, who has done much good work in his time, and who was up to recently a very active member of the Incorporated Society of Medical Officers of Health, is to be your first President.

The resolution was carried with applause.

DR. ANNINGSON said: This resolution has come to me as a very great surprise, and I am very much obliged to you. Nothing gives me greater pleasure than to be preceded by my old friend, Dr. Armistead, who is my senior. It is extremely kind of you. I don't know that it is altogether right, considering that there are a large number of counties represented in the Branch, that the next President should be in the county of Cambridge. I should rather have had it given to Suffolk or Norfolk. I am a little unwilling to give way to the application of the principle which I have been advocating all through. It is a mere accident, perhaps, that I should come next in seniority to Dr. Armistead, but if it is your wish, I will accept the office with great pleasure.

The PRESIDENT then proposed the toast of "The Master and Fellows of Caius College," associated with the name of Mr. Buckland, who they were very pleased indeed to see there. Mr. Buckland, the President continued, would not allow me to say just now that we regard Caius College as the Medical College of Cambridge. At any rate, we know, if we look back to the past, and sometimes it is a long past (it is in my case), that medical men, or those who propose to be medical men, when they come to Cambridge to study, gravitate to Caius. And when anything went wrong with Caius it was always due to the medical element here. I do not know how many years it is ago—I do not care to reckon it up—but I happened to be tutor in my college in London, when men who failed in the London first M.B. or preliminary scientific or something of the kind, came down to Cambridge to get through something easier, and they came to Caius. I was sent down by the authorities of my College to see how those students were behaving themselves. That was my first visit to Cambridge, and I have not been here since. I came into contact with dignified College authorities. I suppose they were tutors and predecessors of Mr. Buckland. I had to go into the behaviour of the men who came from us, and one said to me one day, "Why bother yourself so much about it? They are here under a discipline of a sort, and seem to answer to the discipline;" and I said, "I suppose it is because our fellows think that if they don't behave themselves it will be assumed

it is because of the very bad training they had before they came here, so they have sent me to encourage them to do their duty, stick to their work, and mind their conduct." It is fitting, of course, that when men who are concerned in the public good more than anything else come to the University of Cambridge, one of the two old seats of learning, to do a public work, they should be received by the College which they have a sort of notion in a way belongs to them. I have very much pleasure in proposing the Master and Fellows of Caius, coupled with the name of Mr. Buckland.

MR. BUCKLAND, in reply, said, your President has said that Caius is essentially a medical college. I do not feel myself at all inclined to dispute that proposition, as long as it is rightly understood, nor could I do so. When looking at one end of this hall I see a portrait of Dr. Paget, and at the other one of Dr. Caius. It is idle under such circumstances to say that we are not a medical college. One biographical detail your President left out, with regard to the gentlemen who came here from his College in London. The little detail he left out was that failing to pass in London, they could not pass here either. I can assure you on behalf of the College, that they are very glad to see you.

PROFESSOR SIMS WOODHEAD said: I should like to propose a toast that has been put into my hands, and I esteem it a very great privilege to do so. The toast is that of "The Incorporated Society of Medical Officers of Health," and I wish to associate with it the name of our esteemed President of the Society, Dr. Groves. To-day I have heard a very great deal about the antiquity of the Society, and I began to reckon matters up, and I found if the Society was so very old I must be getting into the sere and yellow leaf, as it was founded one year after I was born. That is a good long time to look back upon as an individual, but in the life of a Society we may say it is practically a very short period. However, as we well know, it is in those comparatively early years of a Society that so much of the energetic work is done, and it depends really upon the first few years of the existence of a Society whether that Society is going to continue a flourishing, healthy, vigorous Society. As far as one can learn, this Society, though comparatively old in years, is still very energetic and vigorous, and although we know it has done a very great deal of excellent work in the past, we feel, some of us here who have come more closely into contact with the working of the Society to-day than we have perhaps, hitherto done, that it gives great promise of very energetic and very vigorous manhood. All we can say is, we hope that that manhood will be prolonged for a very long period, and that it will be a very long time before it actually lapses into the sere and yellow leaf. We hope you may long remain, though perhaps not in the President's chair, to take an interest in the work of what we hope will continue to be a very flourishing Society. I propose "The Incorporated Society of Medical Officers of Health."

The PRESIDENT, in reply, said: It is very kind of you to toast so cordially the Incorporated Society of Medical Officers of Health, and to include my name, and I take it also that of Dr. Herbert Jones, therein. We are, as individuals, nobodies. We are simply figure-heads. We have in the last few years taken a great step forward. We have realized our responsibilities. It is particularly gratifying to the Society of Medical Officers of Health—I think I may say so in their name—to have this toast proposed by such a distinguished citizen and member of our profession as Dr. Sims Woodhead, who has shown by his presence among us to-day that he undoubtedly believes that in associating with us he is helping forward

the public good. That is the position, at any rate, our Society takes up. We are a body of public servants. We are bound by very definite laws to do certain things, and we have to do those things not only as good citizens but as gentlemen, and if we have to suffer, we have to suffer. I thank you very much on behalf of the Society.

DR. HERBERT JONES said: I have already said that the Secretary feels he has to rely upon the President of the Society for speaking, and that his duties lie in the actual secretarial and clerical work of the Society. The Incorporated Society of Medical Officers of Health is a Society which is very dear to me, because I consider it is a Society which has done a great deal in the past, which may do a great deal in the future, and which, I think, is doing a great deal now. Medical Officers of Health look upon their work, I am certain, or at least a great many of them do, as the priest looks upon his work. The reason many of them cannot do their work as they conscientiously desire, is that which Dr. Groves, our President, has given you. The Incorporated Society are determined that this disability shall be taken away from them, and that Medical Officers of Health shall be enabled to do their duty as conscientiously and honestly as a priest would expect to do his. On behalf of the Society, I thank you most sincerely for the way you have received the toast.

The proceedings then closed, and a round of visits was made to the University and College buildings.

Mr. Buckland invited the guests to inspect the College Combination Room, and drew their attention to various portraits and other exhibits of interest to the medical profession. Visits were afterwards paid to the Chemical Laboratory, the new Medical School, and Humphry Museum, the Botanical Laboratory, the Sedgwick Museum of Geology, and the new Botanical Laboratory, which was opened by the King and Queen on March 1st.

An adjournment was then made to the Master's garden of Trinity Hall, where the Society was received by Professor Sims Woodhead and Mrs. Woodhead, and entertained at tea on the lawn. Mr. Beck, the Master, joined the party.

Subsequently, a visit was made to the Corporation Pumping Station, where were inspected the Destructor, and the low-pressure Disinfector, the working of which was explained by Dr. Anningson and Mr. E. W. Harry, the Borough Surveyor. Time did not permit of a visit to the Sewage Farm, which had been arranged.

METHODS OF ANALYSIS OF SEPARATED SKIM MILK.—C. Barthel (*Nord. Mejeri Tidn.*, 18 (1903), No. 35). A comparison of the Adams and Gottlieb methods for the analysis of skim milk shows that if the fat content is greatly increased through the application of self-cleansing pasteurizers, the stirrer of which is turned at a considerable speed, the Adams method fails to show any appreciable increase in the percentage of fat in the skim milk, while Gottlieb's method gives all the fat contained therein.

THE INCINERATION OF ANTHRAX CARCASSES.—L. Fabritius (*Berlin. Tierärztl. Wchnschr.*, 1903, No. 4), calls attention to the desirability of burning bodies of animals dead of anthrax in order to prevent the further spread of this disease. In burning such bodies, he recommends that the carcasses be dumped into ditches in such a manner that no material which may escape from the effect of the heat will be in a position where it is likely to cause reinfection of other animals with anthrax.

DEATH OF SIR JOHN SIMON.

WE regret to announce the death of Sir John Simon, K.C.B., which occurred on July 23rd, at his house, 40 Kensington Square, in the eighty-eighth year of his age. Sir John Simon was one of the original members of the Society in the year 1856, and was its first President, a position he filled with much distinction for five years. From the excellent and appreciative notice in *The Times* of July 25th we extract the following:—

"John Simon was born in London on October 16th, 1816; after school life it was decided he should enter the medical profession, and in 1833, in accordance with the custom of the day, he was placed as a pupil, for a period of six years, with Mr. Joseph Henry Green, then Surgeon to St. Thomas's Hospital and Professor of Surgery at King's College. His ability and industry were from the first conspicuous, and he became a member of the Royal College of Surgeons in 1838, Mr. Green excusing him from the last year of his pupilage. In 1840, on the opening of the new King's College Hospital, he was appointed assistant surgeon, and in 1845, after the communication of a paper on the comparative anatomy of the thyroid gland, he was elected a Fellow of the Royal Society. In 1847 he became Professor of Surgery at St. Thomas's Hospital. In 1848 he was elected to the newly-constituted post of Medical Officer of Health to the City of London. In 1850 he published his lectures, delivered at St. Thomas's, 'On General Pathology as conducive to Rational Principles for the Diagnosis and Treatment of Disease,' a work of inconsiderable bulk, displaying in every page so complete a technical knowledge, so firm a grasp of great principles, and so remarkable a power of generalization, as to show at once that a new star of no small magnitude had appeared above the horizon of surgery. From this time forward a distinguished career in his profession was clearly open to him, and he would certainly have become one of the leading surgical practitioners of his day had not his course been otherwise directed by events. The qualities of mind displayed in his lectures were equally conspicuous in his official reports as Medical Officer of Health for the City, reports in which he laid down the principles upon which alone any public sanitary administration can repose with safety; and in 1855 the excellence of his work in this direction led the Government to offer him the newly-created post of Medical Officer to the Privy Council. After some anxious consideration the offer was accepted, Simon surrendering his growing private practice and the large income which was opening to his view, but stipulating for permission to retain his appointment as Surgeon to St. Thomas's Hospital and for time in which to discharge its duties. Except for this one diversion of his energy, a diversion so far conducive to his efficiency as a public servant that it kept him fully conversant with the general progress of medicine and surgery, the rest of his professional life, until his time for retirement came, was of a purely official character.

On his appointment to be Medical Officer of Health to the City of London in 1848 the chief subjects requiring his attention were the water supply of the City, the offensive or injurious trades carried on within its limits, the intramural interments, the impossibility of ventilation in its blind alleys and courts, and the lack of proper scavenging. More fortunate in the City than in his later contests with politicians, the great sanitary reformer was not hampered by obstruction in the beginning of

his career, and there is scarcely a single report after the first in which he was not able to congratulate the authorities upon the accomplishment of salutary changes, and upon the obvious benefits which these changes had already produced.

The reports made as Health Officer to the Privy Council cover, of course, a far wider area of observation than those made as Health Officer to the City; and they are, in their essential nature, consecutive and complementary to each other, although, for the benefit of short memories, it was the author's custom sometimes to quote a demonstration or an argument which he had supplied or advanced on a previous occasion. Even when working for the City he had perceived and clearly laid down that contagious emanations proceeding from the sick must consist of definite particles, since they obeyed the laws of definite particles and no others; and that these particles must differ among themselves, being in every case peculiar to the disease which alone produced them, and which alone they could reproduce. This doctrine has since received its proof and its complete development in the growth of the science of bacteriology; but, before the disease-producing bacteria had been either identified or cultivated, Simon saw that the doctrine, if established, would greatly increase the definiteness and the success of measures of sanitary reform; and he diligently pursued any lines of investigation by which its correctness might be tested. Under his direction and superintendence the conditions productive of local outbreaks of disease were constantly inquired into on the spot by the distinguished staff of observers whom he gathered around him in the capacity of medical inspectors, and who became thoroughly imbued with the scientific spirit of their chief. The principal business of these gentlemen was to trace out all ascertainable facts in connection with any local excess of mortality; and, from the materials with which he was thus furnished, it was the custom of Mr. Simon to build up a superstructure of careful reasoning on the causes from which the various evils brought to light had proceeded, on the extent to which their action was injurious to individuals and to the community, and on the means, legislative, administrative, or other, by which they might be obviated. He was a consummate master of a style at once terse, forcible, and graphic, constantly leading up to expressions of unexpected quaintness and felicity, and adorned by descriptive phrases many of which have become the household words of sanitary reformers, and by which compositions relating to drains and cesspools were elevated to the position of literature. His admission, in dealing with unsavoury odours, that it would be an infringement of the liberty of the subject to prevent any man from producing an evil smell 'for his own separate inhalation,' his description of 'the paper plausibilities of quarantine,' or of the 'futile ceremonial of vague chemical libations and powderings' as supposed means of 'disinfection,' are among the many illustrations of happy phraseology which it would be easy to collect from his reports—reports which are really state papers of high importance and of perennial interest, and which, after the Local Government Board had refused to meet the frequent demand for them by sanctioning an official reprint, were at last rescued from the living death of interment in old Blue-books by the energy of the Sanitary Institute, and, together with the reports to the City, and with essays of great value upon contagion and upon experimentation on living animals, were published in two volumes with the assistance of the author, and under the editorship of Dr. Seaton, the Medical Officer of Health for Surrey. It is only by a careful perusal of these volumes that we can appreciate

the general nature of Simon's work, and the spirit in which he addressed himself to the removal of the evils against which it was his official duty to contend.

Taking the series of reports as a whole, and passing with bare mention certain sections of them in which the absurdities of the anti-vaccination fanatics are exposed with the most pitiless logic and the most complete mastery of the facts, we may say of them that they advance, from the clearest possible exposition of existing defects of legislation or administration to comprehensive and carefully-considered suggestions for reform, which, if they could have been brought fully into operation, would have greatly increased even the vast improvement in the state of the public health which has been the obvious result of Simon's labours. In the 11th report, published in 1868, he felt himself able to deal completely with the existing defects of sanitary law, and, after describing the apparent intentions of the Legislature, he proceeded as follows:—

If we turn from contemplating these intentions to consider the degree in which they are realized, the contrast is curiously great. Not only have permissive enactments remained for the most part unapplied in places where their application has been desirable, not only have various optional constructions and organizations which would have conduced to physical well-being, and which such enactments were designed to facilitate, remained in an immense majority of cases unbegun, but even nuisances which the law imperatively declares intolerable have, on an enormous scale, been suffered to continue, while diseases which mainly represent the inoperativeness of nuisance-law have still been occasioning, I believe, fully a fourth part of the entire mortality of the country. And when inquiry is made into the meaning of this strange unprogressiveness in reforms intended and in great part commanded by the Legislature, the explanation is not far to seek. Its essence is in the form, or perhaps I may rather say the formlessness, of the law. No doubt there are here and there other faults. But the essential fault is that laws which ought to be in the utmost possible degree simple, coherent, and intelligible are often, in nearly the utmost possible degree, complex, disjointed, and obscure. Authorities and persons wishing to give them effect may often find almost insuperable difficulties in their way; and authorities and persons with contrary disposition can scarcely fail to find excuse or impunity for any amount of malfeasance or evasion.

Such, broadly stated, was the condition of things against which Simon found himself called upon to strive; and the paragraph just quoted formed the introduction for comprehensive proposals for the amendment and consolidation of the law upon lines calculated to render it an effective instrument for the fulfilment of its apparent intentions. The manifest urgency of many of the questions dealt with became gradually impressed upon the public mind; and in November, 1868, a Royal warrant was issued appointing a Commission to make inquiry into the operation and administration of sanitary laws. Almost immediately afterwards a change of Government occurred; and the warrant remained inoperative until, in the following April, it was revoked by another, which appointed a fresh Commission. The new warrant, differing somewhat from the old, provided expressly for inquiry into the central, as well as the local, organizations of authority; and instead of extending, as did the old, to the whole of the United Kingdom, it applied only to England and Wales, with express exclusion of the metropolis. This Commission reported in 1871, advising that 'the present fragmentary and confused sanitary legislation should be consolidated, that the administration of sanitary

law should be made uniform, universal, and imperative throughout the kingdom, and that all powers requisite for the health of towns and country should in every place be possessed by one responsible local authority kept in action and assisted by a superior authority.' The report further recommended that all the more general objects of sanitary legislation should be dealt with by one comprehensive statute, which, subject to a few exceptions, should be not for optional, but for universal, application to localities; and, on the constitution of the central authority, it recommended that 'the administration of the laws concerning the public health and the relief of the poor should be presided over by one Minister, whose title should clearly signify that he has charge of both departments an arrangement which would probably render necessary the appointment under him of permanent secretaries to represent the respective departments.'

The recommendations contained in this report were criticised by Mr. Simon in much detail and with considerable freedom, and the forebodings which he expressed were abundantly justified by the event. The new Local Government Board was at first merely the old Poor Law Board writ large, and it carried its old functionaries and its old methods into the new and enlarged sphere of its operations. The old Board, wrote Simon, had relied very unduly on the sufficiency of non-medical officers in the discharge of essentially medical duties.

The original theory seems to have been that on any extraordinary occasion extraordinary assistance could be obtained, but that for the ordinary medical business of the Board the common sense of secretaries, assistant secretaries, and secretarial inspectors did not require to be helped by doctors. Outsiders competent in the matter knew that, within the special sphere of Poor Law medical administration, this system of secretarial common sense had not worked successfully for the health interests of the poor. How it had tended to work in the health-control of establishments for pauper children had been sufficiently shown, as long ago as 1849, before the coroners' courts, on occasion of a memorable outbreak of cholera in a large boarding-out establishment at Tooting; how it had worked in respect of the contracts for public vaccination I myself had had painful official occasion for many years to observe and occasionally to report; how it had worked in respect of the outdoor sick poor had been severely, but I believe not unjustly, criticized by many skilled witnesses; how it had operated in respect of workhouses and workhouse infirmaries had been revealed during the years 1865-67 in exposure of scandalous mismanagement.

Apart from any question of the incapacity of the Poor Law officials to adjust themselves to the wider environment of their new positions, the influence of their chief seems to have been steadily exercised in the direction of placing difficulties in the way of sanitary reform. Mr. Stansfeld had, it was believed by many at the time, been selected in part for this especial purpose. The owners of insanitary property, the creators of dangerous nuisances, industrial or other, the promoters of overcrowding, the purveyors of unwholesome or adulterated food and of polluted water, and, generally speaking, all who made pecuniary profit out of conditions which sacrificed the lives of the poor, were at that time to a large degree active supporters of the Liberal Government, and the pockets of the classes referred to were regarded with undue tenderness. Against this condition of things Simon raged furiously, but in vain. Those who were much with him in the early seventies could not witness without pain the struggle which he underwent. He had already succeeded in rousing large

numbers of local authorities to some knowledge and recognition of their duties, and he had laid the foundations of a system which has given to his country the best sanitary record in the world; but all this fell far short of what he knew to be practicable and longed to see accomplished. The certainty that every year in England there died 120,000 people, 14 every hour, who might have been and ought to have been kept alive, seemed never absent from his consciousness. It haunted his waking thoughts, and 'returned, horrible, in dreams.' On Mr. Disraeli's accession to the Premiership in 1874, Mr. Stansfeld was succeeded as President of the Local Government Board by Mr. Sclater-Booth, afterwards Lord Basing; and the dawn of a better day seemed to be approaching. The Premier had spoken strongly only the year before on the importance of public health; and the new President, as soon as the reins of office were firmly in his hands, began to promote useful legislation for sanitary purposes, and carried the Sale of Drugs Act and the consolidating Public Health Act of 1875, as well as the Pollution of Rivers Act of 1876. But the machinery established by Mr. Stansfeld had mainly consisted of elaborate contrivances for the hindrance of effective action, and Simon was weary. In the early part of 1876 he resigned his office, and was succeeded by his old friend and colleague Dr. Seaton. Simon received the C.B. on his retirement, and, as was written of him a few years afterwards:—

The master of sanitary science, the organizer and for years the official head of a system of public health preservation which is without equal in the world, the philosopher whose teaching has saved the lives of hundreds of thousands of our people, whose name is a household word wherever preventive medicine is studied, and whose writings form the classical literature of the subject to which much of his life has been devoted, this man was suffered to retire from the public service of his country with the pension of a meritorious clerk, and with no other privilege or distinction than that of being styled a Companion of the Bath.

On his retirement Simon was appointed a Crown member of the General Medical Council, a position which he had previously always refused, considering it to be incompatible with the duties of his office, but which, since he relinquished it, has always been held by one or other of his successors at the Local Government Board. His ripe wisdom and his impressive speech rendered him a great power in the council; and he was especially active in framing and in carrying regulations under which it is required that diplomas in sanitary science, which are now usually demanded from candidates for medical officerships of health, should only be conferred under conditions which secure 'a high and distinctive proficiency' in the branches of knowledge to which they relate. He retired from the council in 1895, and has passed the remainder of his honoured old age at the house in Kensington Square, which has been his home for many years.

A complete list of his distinctions, as derived from learned bodies at home and abroad, would be a long one. He was made a K.C.B. at the Jubilee of 1887.

The written memorials of his life, as already mentioned, are chiefly to be found in his official reports, but the edifice thus formed was crowned in 1890 by the publication of his great work on 'English Sanitary Institutions, reviewed in their course of development, and in some of their political and social relations.' With the concluding paragraph of that work the present notice may fitly be brought to a close:—

'Great physicists set before us from time to time the gloomiest horoscopes of the earth's destiny. They warn us of successive glacial periods yet to come, when, again and again, our northern camps of civilization

must shift themselves to what they can, perhaps, reach of negroland; they warn us that, in remoter doom, there bides for all earth the one sepulchral frost when the sun which now cheers us will have grown dim with age. From those dark prophecies of dead mechanical nature one turns with gladness to read the pointing of the human index. While our unconscious planet, "with inoffensive pace that spinning sleeps on her soft axle," glides by successive yearly rounds towards her last haven, whether of darkness or of light, man—her "paramount creature"—is seen ripening in his ordained development. Beast of prey is not yet all extinct in him, but his organs of higher life are in growth. More and more, as the cycles are trodden, he rises to the religion of mutual helpfulness. Stronger now than ever in the history of the world, and of wider range than ever in that history, thoughts of loyalty to his kind are gaining sway with him. And surely in the years to come, so far forward as man's moral outlook can reach, they who shall be in the front will more and more have to count it sin and shame for themselves if their souls fail of answering to that high appeal, and they strive not with all their strength to fulfil the claims of that allegiance."

The Birmingham City Council has adopted a recommendation by the Health Committee in favour of the voluntary notification of tuberculosis of the lungs.

VAGRANTS AND DISEASE.—A conference of sanitary authorities of England and Wales is to meet in the coming autumn, to consider the question of the spread of infectious disease by vagabonds, and the remedial measures which should be adopted in the matter.

IMPORTANCE OF MEDICINE AND SANITATION OF ANCIENT EGYPT.—Dr. Richard Caton in the Harveian Oration (1904) said: It is clear from the study of medical papyri that medicine advanced considerably among the Egyptians, and from them medical and sanitary knowledge has descended to us by two channels, namely, by the Greeks and through the Jewish race, while probably much of it was lost irrevocably. Josephus quote: from Manetho a statement that Osarsiph, who, Josephus says, was the great Hebrew leader Moses, was a priest at Heliopolis, where medicine was taught. It is highly probable that the sanitary laws of the Jews were derived from the Egyptians. Just as the Jews remembered the diseases of Egypt (Deut. xxviii. 60), so they also remembered the sanitary and remedial measures they had learnt there. Those who have seen in the later excavations at Knossos the evidences of sanitary knowledge of a somewhat high type possessed by the Cretans, and exemplified among other things by drainage pipes, scarcely excelled by the best of our own to-day, knowing as we do the close connection between Crete and Egypt, may well believe that there we have an example of sanitation derived from Egyptian sources.

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EDITORIAL.

THE TEACHING OF HYGIENE IN SCHOOLS.

"THIS is the year 1904 of the Christian era, and this is a country which prides itself upon being in the forefront of civilization, and piques itself upon its common sense and its practical intelligence. It is three hundred years since Bacon and the men of his time broke the fetters of medievalism, and showed the way to advance knowledge by observation and experiment. This country has tens of thousands of ministers of religion, who are supposed to assist in making men and women good citizens. It has a very large body of medical men, each of whom ought surely to be a centre of intelligence as regards the elementary laws of health. It is covered with all sorts of benevolent agencies for dealing with isolated aspects of disease or misfortune. It has Universities, public schools, secondary schools, and a costly system of compulsory elementary education. Yet in this favoured land a deputation of medical men yesterday waited upon the Minister of Education to beg him, in view of appalling and increasing degeneration among the people, to take steps to have the rudimentary laws of health taught in the public schools. The Minister expressed his entire sympathy with the objects of the deputation, but was obliged to confess that he could not promise any immediate help, because his department does not possess teachers who themselves know what the deputation desire to have taught. His department is doing what it can to induce the existing teachers to learn, and two years hence it hopes that every teacher admitted to its staff will be adequately instructed. So that in about a generation it may be possible that the fathers and mothers of the next will learn at school a little of what it most nearly concerns them to know. It would need the pen of a Swift to do justice to this mordant satire upon the

way in which this nation carries on the highly important business of training its men and women. At this time of day, not only do we not teach the population at large how to live, but when attention is called to the defect, it turns out that we are only beginning in a mild and tentative way to produce the necessary teachers. It is a striking illustration of that inefficiency which mars so many of our national undertakings, and which depends in the last resort upon lack of practical knowledge in our governing classes. In every direction our national weakness is to set up some showy system, at best a compromise between a number of unpractical theories, and then to expect it to work out automatically some desirable result."

So wrote *The Times*, the day after a deputation had presented to Lord Londonderry a petition signed by 14,718 registered medical practitioners. We are glad to note that the Board of Education are to issue a volume of suggestions for teachers, containing advice on the various matters connected with the daily conduct of the school, and that among these directions they propose to insert a statement to the effect that "a course of instruction in hygiene should form part of the work for the two upper classes of every girl's school. Such instruction will naturally find its place in the existing curriculum where a course of household management is taken, and where this is not the case instruction under the head of knowledge of common things should develop in this direction in the later years of school life. Such instruction should comprise lessons applicable to the home circumstances of the children, dealing in an absolutely non-technical way with questions of feeding, clothing, rest, air, light, warmth, exercise, cleanliness, and the general care of health. In some cases it will be well to include in addition some instruction on the care of young children."

With this instruction all Medical Officers of Health will agree, and the advantages of cleanliness, pure air, temperance, and proper food should be taught as a matter of routine, and by example rather than by precept. To practise these things, there is no need for teaching children anatomy or even physiology. Dr. Harry Campbell, writing in the *Lancet* on this subject (and we thoroughly agree with him), says:—

"All that is necessary is to point out in the simplest possible language the good that comes from breathing pure air, and the harm that comes from breathing impure air. The child should be made to realize that human beings need, like the flowers in the fields, fresh air and sunlight, and cannot, any more than the flowers can, flourish in dark and stuffy chambers, but without light and fresh air must, like these, wither away and die. The child's imagination may

further be appealed to by telling him how many of our poor soldiers used to die from consumption, in the old days when they were huddled together in imperfectly-ventilated barracks, and how, when they were provided with larger and better ventilated dormitories, this disease became much less common; or, again, by depicting the terrible tragedy of the Black Hole of Calcutta. Having given a few such homely illustrations of the good that comes from fresh air and sunlight, and the evil that lurks in dark and foul-smelling places, what more is there to be said on the matter beyond giving a few practical hints as to the best way of securing proper ventilation in the home?

"The mere teaching of principles is, however, not enough: they need to be put into operation; otherwise they are apt to become nothing more than formulæ, like the catechism that is so diligently taught, and so often repeated that it soon becomes a mere jargon of words to be ground out upon occasion after the manner of the phonograph. It was, I believe, Herbert Spencer who insisted that preaching alone does little good: ethics is not only a science, but an art—and to some a very difficult one—only to be acquired after much painstaking practice. And so it is with hygiene. If real good is to be achieved in this direction, the teacher must not rest content with enunciating its principles, but must see to it that they are as far as possible put into practice."

The appointment of a veterinary inspector has proved most beneficial in St. Helens, both as regards meat inspection, and the work which was done in the examination of cows in the various shippens.—*Ann. Rept.*

PERSISTENCE OF TYPHOID FEVER INFECTIVITY.—At the Folkestone Congress a paper was read in which a case was mentioned of an individual who for more than two years was employed to milk cows in several different towns and farms of Kent. Wherever he went cases of typhoid fever occurred among those who drank the milk of the cows which he tended. The names and the fullest details were given, and typhoid fever only ceased when the man, having thus injured his own son's business, was persuaded to give up altogether his occupation of tending and milking cows.

THE PRESENCE OF TYPHOID BACILLI IN OTHER MEMBERS OF A FAMILY IN WHICH THERE IS A TYPICAL CASE.—Jürgens of Berlin holds (*Zeitschr. f. klin. Med.*, LII, Nos. 1 & 2) that the presence of the typhoid bacilli is far from being synonymous with the disease. Following Koch's example, all the persons in an infected family were examined for typhoid bacilli, regardless of whether they were sick or well. This revealed a number of slight, atypical cases of typhoid, and also disclosed the presence of the bacilli in certain absolutely healthy subjects. The bacilli in the milder cases were sometimes far more virulent than in the severe ones. The resistance of the individual is evidently the determining factor. The disease process is identical for all, but differs in its degree.

SCARLET FEVER,

FROM A PUBLIC HEALTH POINT OF VIEW WITH SOME INVESTIGATION INTO ITS BACTERIOLOGY.*

By ALFRED HARRIS, M.B., Ch.B. Vict., D.P.H. Cambridge,
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LAST year I conducted some research work at the Birmingham Bacteriological Laboratory, first under Professor Leith, and afterwards privately, concerning scarlet fever, and as probably some of the members of this Society have been engaged some time or other on this subject, I presume it will possess some interest to them. Owing to the difficulties of the subject, research work by an isolated individual must be very slow, and hence any hints as to future work obtainable by a discussion of the procedure by members of this Society will be very acceptable to me, and may prove extremely helpful. These are my reasons for submitting to you the results of my bacteriological investigations before completion. Briefly put, I set to work in the following way: Having selected typical cases from the Lodge Road Fever Hospital, I swabbed the throats with sterile pieces of cotton-wool, and made cultivations in agar, blood serum, and nutrient broth. After a day's growth at 37° C., I examined for organisms, staining by Gram's method and counter-staining. Very little information was gained by this method, except that I noticed that there were a large number of micrococci that did not stain with Gram. Of course, as you all know, the ordinary micrococci or staphylococci take Gram's stain readily, except when they are degenerated, and this is shown by their becoming distorted in shape and swollen. These micrococci that did not stain with Gram were smaller than usual, and to all appearances quite vigorous. The colonies did not show any difference from those of the ordinary *Staphylococcus albus*, being creamy-white, round, and convex. I was not able to separate them from the ordinary Gram-staining staphylococci, but intend to further attempt it. I was therefore unable to determine their other properties or their pathogenic effect. My next procedure was to take a loopful of these mixed organisms and pour agar plates, using the third and fourth degrees of dilution. I separated and examined a large number of organisms in this way, but I wish here to describe only two of them. I describe these two because I constantly met with them.

* Read at a meeting of the North Western Branch of the Society of Medical Officers of Health, April 5th, 1904.

1. To the naked eye the first organism, when viewed in colonies growing on agar-agar, was seen to consist of small, rounded, minute, nearly transparent masses. Microscopically it was seen to stain well by Gram's method, and to consist of short chains of streptococci, some members of the chain of which were greatly enlarged. This large coccus sometimes occupied the middle and sometimes the end of the chain. It sometimes formed an irregular staphylococcoid mass, with here and there an enlarged coccus. In other parts of the field a uniformly-enlarged staphylococcoid mass could be seen. On potato the growth was almost invisible. It grew in broth, the broth remaining clear. Microscopic examination of the broth culture showed a few diplococci, and a few short chains of streptococci, but no enlarged cocci. In this medium there was no staphylococcoid formation, and the appearance was exactly like that of *Streptococcus brevis*. In this connection I may observe that some species of streptococci, when grown for some time in a solid medium, tend sometimes to become irregular in formation and to resemble in certain ways the staphylococci or pneumococci. However, when the streptococcus is grown in nutrient broth it quickly assumes the characteristic chain formation, and thus is easily distinguished. I mention this because I have not seen it recorded in any book on bacteriology.

To return to the *Streptococcus brevis*. I draw your attention to it because it is found in all the swabs I took, and also because Klein, so long ago as 1885, described the organism of scarlet fever as being a streptococcus, differing only slightly from *Streptococcus pyogenes*. I presume you will all have read his paper, which was in connection with the often-quoted Hendon outbreak of scarlet fever. In my opinion it is only a form of the *Streptococcus pyogenes*, and is simply an organism associated with the scarlatina organism, and most likely the cause of the relationship that apparently exists between scarlet fever on the one hand, and puerperal fever and erysipelas on the other. Erysipelas has been proved to result from a streptococcic infection. That there was some relationship between scarlet fever, erysipelas, and puerperal fever has been known for some time past. In 1890 or thereabouts Dr. Longstaff drew charts representing the mortality from scarlet fever, erysipelas, puerperal fever, and other diseases, extending from 1855 to 1880. He specially remarked on the broad points of agreement between all the curves of what he called the scarlatinal group of diseases. In the chart that he gives it is well seen that the elevations and depressions so well marked in the scarlet fever curve, are more or less traceable in both the others.

2. The second organism puzzled me very much, because of the multiplicity of the forms that it assumed. The appearance of the tube

was always that of a pure culture. On agar it appeared to the naked eye as small, scattered, greyish, round, minute colonies somewhat smaller than a streptococcus. By making repeated sub-cultures I assured myself that it was pure. The cultivation soon died out when it was made from agar to agar, but it became more vigorous when passed through milk. The milk was clotted after forty-eight hours' growth, but not before. It formed acid in litmus milk, as shown by the change in colour. When grown in broth the broth remained clear; microscopically it was seen to be a non-motile, Gram-staining organism, markedly pleomorphic. In some parts of the field it was like an elongated diplococcus. In other parts of the field it was like a small bacillus, swollen in the centre, with pointed, sharp ends, somewhat spindle-shaped. In yet other parts of the field larger rods could be seen with part of the rods swollen, and these sometimes occurred in chains. I isolated this organism from most of the tubes taken from the swabs, and was for some time puzzled whether to classify it as a bacillus or a coccus. I looked through several descriptions of organisms mentioned in different books and pamphlets on bacteriology, without success, until I happened to alight on an organism described by Dr. Gordon in the *Local Government Board Report* for 1900-01, which tallied in every way with that which I was examining. He separated the organism and thus describes it: "Attention is drawn to a morphological feature which this organism exhibits to a remarkable degree, namely, irregularity in the size and shape of the individuals, the occurrence of spindle and rod-shaped individuals in cultures of which the purity was beyond doubt. This pleomorphic faculty (bacillus formation) distinguishes *Streptococcus scarlatinae* from all other pathogenic organisms hitherto described. The extent to which spindle- and rod-shaped individuals may occur in pure cultures of *Streptococcus scarlatinae* is found to vary. In some cases such forms are so plentiful as to suggest the possibility of its being mistaken for a bacillus, such as *Bacillus diphtheriae* (Klebs-Loeffler), if only a hasty morphological examination were made."

Dr. Gordon isolated the organism from a serous effusion occurring in a case of scarlet fever. He obtained it from the nasal discharge in 2 out of 12 cases, but in 12 aural discharges its presence was not detected; however, he obtained the organism always from the tonsillar secretion. He inoculated mice and recovered the organism from the blood. He found that the bacillus formation in this way was sometimes increased, but at other times it was diminished, and the organism approached morphologically the ordinary *Streptococcus pyogenes*. A point also worth noting is that he isolated the *Streptococcus scarlatinae* from the throat of a patient in the fifth week of the

disease. In addition to examining the organisms in the throat, I also examined the nasal discharges from two patients, from one of which I was able to separate a pure culture of pneumococcus. I mention this fact because it emphasizes what, however, is pretty well established, namely, that in the treatment of a disease like scarlet fever in a large hospital, the greatest amount of fresh air and air-space should be allowed. It also points to the advisability of having a number of smaller wards where cases might be differentiated, instead of one large common ward for the reception of all the cases. Cases with discharges and complications are now being separated in larger hospitals.

From the ear discharges I did not obtain any satisfactory results. Dr. Gordon has described as generally being present in them a diphtheria-like bacillus, which, however, differs from the diphtheria bacillus in not producing acid when grown on neutral litmus agar, and in not being pathogenic to guinea-pigs. Some time ago I read a communication to the *Lancet*, in which the medical superintendent of a large fever hospital stated that he had isolated diphtheria bacilli from a certain number of ear discharges, and he concluded that this was one of the ways in which post-scarlatinal diphtheria manifests itself. It is a point which might be discussed with advantage. However, Dr. Lauder, Medical Officer of Health for Southampton, always has a bacteriological examination made of the throat in every case in order to exclude diphtheria, and he states that he has not had any cases of diphtheria breaking out in his scarlet fever wards. I believe this might be followed with advantage in all fever hospitals. I obtained samples of the urine from two cases of scarlet fever, sterilizing the parts first, but was not successful in obtaining any results worth quoting.

As regards the skin, I made cultures from several pieces of integument obtained from patients in the peeling stage (third and fourth week). The most noteworthy feature of the cultures made from these was the large number of sarcinae, mostly *Sarcina lutea*, which are non-pathogenic organisms commonly present in air and water. *Staphylococcus albus* was also present. The organisms present were such as are found in ordinary skin.

Up to recently, peeling has always been considered as a sign of infectivity in the case of scarlet fever, upon apparently insufficient grounds. In this connection a very interesting paper was read on January 20th, 1904, by the Medical Officer of Health for Southampton, before the local Medical Society. After stating that the doubt cast on the value of isolation hospitals in the case of scarlet fever may be due to faulty methods of administration (the faulty methods being,

of course, due to older teachings), he made the assertion that return cases are attributable, not to the peeling condition of the skin, but mainly to undetected discharges from the respiratory passages and ears of those who have left the hospital. He regarded the upper respiratory passages, and particularly the pharyngeal and faucial tonsils, as responsible for the reception and propagation of the infection. In his hospital he separated cases that are complicated with nasal or aural discharges, enlarged glands, or tonsils. The uncomplicated cases, at the end of the third week, are transferred to a separate ward which has been disinfected, the patients being bathed and disinfected before admission to this ward; here they are kept for one week, the nose, ears, and throat being douched with a disinfecting solution. At the end of the week, that is, at the end of the fourth week of the disease, they are discharged, regardless of whether they are peeling or not. In this way he has fewer return cases. His figures are: 1902, 208 cases in hospital; average number of days in hospital, 48; return cases, 7. 1903: 353 cases in hospital; average number of days in hospital, 34; return cases, 7. His new method of administration was only in operation in 1903. Percentage of return cases in 1902 was 4.27; in 1903, 2.15. During the year 204 cases were discharged peeling, but without any complications, and only two of them gave rise to return cases; in one of these a discharge from the nose developed after leaving the hospital. In these days, when it is almost the fashion to malign public institutions, and especially scarlet fever hospitals, it is important to note that the death-rate in this hospital was only 1.5 per cent, while in the case of the 74 cases treated outside, the mortality was 4.1 per cent. It is well known that certain drugs, e.g., belladonna, copaiba, morphia, quinine, the antitoxins of diphtheria and tetanus, and tuberculin, all produce rashes followed by desquamation; so it is quite possible that the desquamation in scarlet fever may be caused by a chemical product, a ptomaine, secreted by the organisms present in the upper respiratory passages, and desquamation, when once started, may go on long after the organisms have disappeared.

In connection with infection, I would like to ask whether the excretions from the kidneys and bowels can convey infection in the case of scarlet fever? I usually, in a question of this kind, proceed on the assumption that it does, as precautions of this nature are easily carried out. If such be the case, one would expect to find scarlet fever more prevalent in a town where the conservancy system of disposing of refuse is used. I collected statistics bearing on this, but I regard them as valueless, because there are many other conditions which influence the spread of scarlet

fever. To mention a few: age distribution of the population, hospital accommodation, facilities of isolation in the case of patients nursed at home, poverty of the district, etc., etc.

Finally, I would like to point out a defect in the Public Health Acts, especially in so far as they relate to a disease possessing such a long period of infectivity as scarlet fever. The Act specially forbids a patient from wilfully exposing himself in any street, public place, shop, or in a public conveyance; but a child suffering from the disease may be nursed downstairs in a room abutting on the street; such room may be used as a common playroom for the youthful population of the neighbourhood, or as a common debating room for the mothers, and no penalty can be enforced. Doubtless infection is more active in a stuffy, confined room (such as they mostly are) than in an open street, and I cannot help thinking that this is a common way in which scarlet fever is spread in a poor neighbourhood.

In conclusion, I beg to thank you for the hearing you have given to a paper which is necessarily incomplete. I am fully aware that before any definite conclusion can be drawn as to the causal organism of scarlet fever, hundreds of cases must be examined. I hope to be able to do this in a fever hospital, and to have the pleasure of reading a further paper on this subject before this Society.

PROTECTION OF MILK.—Southend Town Council has passed a regulation under Article 13 of the Dairies, Cowsheds, and Milkshops Order of 1885, which has been approved by the Local Government Board, and reads as follows: "Every retail purveyor of milk shall cause every vessel containing milk to be protected from dust, flies, and other sources of contamination by means of suitable covers."

MUNICIPAL MILK DEPOTS.—The Lambeth Borough Council has decided to establish a Municipal Milk Depot. It is understood that the Council will be prepared to defray the expenses out of the private pockets of its individual members, should the Local Government Board refuse to sanction such out of the rates. It is expected, however, that the Local Government Board, should the auditor surcharge, will remit, "by virtue of the equitable jurisdiction conferred upon the Board," the expenses, as has already been done in the case of Battersea Borough.

SANITARY CONDITION OF SHIPS.—The following resolution was adopted at the Sanitary Institute Congress: "In consideration of the insanitary condition of the mercantile marine, this section is of opinion that the sanitary control of ships, both during and after construction, should be vested in port sanitary authorities, and that medical inspectorships for shipping should be created on the staffs of the Local Government Boards of England, Ireland, and Scotland, to supervise all suggestions from such port authorities for the consideration and approval of the Board, and the section recommend the Council of the Institute to bring the proposition under the notice of the proper authorities."

THE DIFFICULTIES IN THE RESTRICTION OF DIPHTHERIA IN EPIDEMIC FORM.*

By WM. SCATTERTY, M.A., M.D., C.M.,
Medical Officer of Health for Keighley.

IN discussing the means taken to combat diphtheria in epidemic form, and the difficulties met with, I wish to limit my remarks to the experience we had in Keighley, during an epidemic of diphtheria which began in 1898 and continued for the following three years. I have tried as far as possible to arrange my notes so that they may best present subjects for discussion.

As a preliminary, let me say that prior to 1898 Keighley had comparatively few cases of diphtheria—an average of 16 for the three preceding years. Our record for the three subsequent years ran up to an average of 170, the population being approximately 40,000. The outbreak of diphtheria was sudden, and, in view of the difficulties met with later, it was very misleading. In a small class of 10 children, 7 were notified as suffering from diphtheria within two or three days. The usual steps to prevent spread of infection were taken, and, no further cases occurring in that school, the health officials were deceived into thinking that their efforts had averted an epidemic. Not many days passed, however, before another and larger school was invaded, and for the next twelve months cases cropped up in nearly every school in the borough. During 1899 there were fewer cases reported, but a recrudescence took place in 1900, until over 50 cases a month were notified. Altogether 553 cases with 129 deaths occurred, before the epidemic could be looked upon as checked. Over 90 per cent of these cases were children attending school, and younger children from the same families. Before mentioning the result of closing the schools I will briefly give an outline of the other means adopted to restrict the spread of infection.

First, of course, come notification and hospital isolation. By notification I mean not simply that medical men reported cases, but teachers, Attendance Officer, Inspector of Cruelty to Children, etc., were encouraged to report every instance of sore throat coming to their notice. Owing to the large number of cases, and to the fact that scarlet fever was also epidemic during part of the time, we could not hope to accommodate nearly all the cases in hospital, and consequently 60 per cent of the cases had to be treated at home. I hesitate to use the expression "home isolation," because in a cottage house

* Paper read at a meeting of the Yorkshire Branch of the Society of Medical Officers of Health, on 22nd April, 1904.

such a thing is impossible. We all know how easy it is for even trained nurses to overlook "little" details in disinfection; and to expect an untrained, overworked, and over-anxious mother to carry out efficient isolation in a crowded tenement is to court failure. Not only so, but, unfortunately, the popular idea seems to be that isolation is only necessary so long as the patient bears evident signs of being ill, and that as soon as convalescence is established, the need for fresh air out of doors takes precedence of the claims of others to be protected against any spread of infection. For this reason it became necessary for an inspector to visit "in season and out of season" all cases treated at home, until the medical attendant gave a clean bill of health and disinfection was completed.

When a school was not closed all cases of "sore throat" were excluded, as well as all children from infected families, and these were not allowed to return until the teacher was notified that the homes were disinfected. In the case of children treated in hospital, the County Bacteriologist had to report the swabs as negative before the patients were discharged; but, unfortunately, this evidence of freedom from infection was only received occasionally from those treated at home.

Disinfection of infected rooms was carried out by formalin spray and formalin fumigation; bedding, clothes, etc., by superheated steam. School class-rooms were similarly treated, the school books being spread open so as to secure more thorough fumigation. Slates and pencils were regularly washed in corrosive sublimate solution, and children were prohibited from using each other's books, slates, pencils, etc.

Infected houses and schools were systematically inspected, and insanitary conditions remedied. Such defects were not, however, common, and did not seem to have any influence upon the prevalence of the disease.

Inspection was made of all dairy cows by the Borough Veterinary Inspector; the dairy farms, milk purveyors, etc., were all examined, with negative results.

Along with free distribution of disinfectants, instructions were given as to their proper use. A circular letter was sent to all medical men in the borough, requesting their co-operation in securing more thorough home isolation and disinfection.

Circulars were also sent to superintendents of Sunday schools, pointing out that diphtheria is a disease closely associated with school life, and recommending closure of Sunday schools, etc. Good results, I believe, followed this, not merely by preventing spread of infection along its recognized channels, but indirectly by giving the public an object lesson on the need for uniting individual with municipal effort in combating so insidious a foe.

Lastly, but, in my opinion, equal to all other means of checking

infection, is the closure of schools, and more particularly of infant departments. As showing the benefit to be derived from this course, I may mention that in one school with over 1,600 scholars 70 cases of diphtheria were notified in a very short time, but during a period of three weeks when the junior department was closed no further case occurred. After re-opening, new cases were reported, and the school was closed for a month. During that month only one case occurred, and again this school was opened. Fresh cases of diphtheria broke out, and the school was next closed for six weeks. Only two cases came to our notice during this period of closure, and when for the third time the school was re-opened, it was found that no fresh cases occurred in that district.

Although care was taken to exclude every case of "sore throat," "swollen glands," etc., it seemed evident that aggregating young children in schools was conducive to the spread of infection where all clinical symptoms of disease were absent. In other words, it is the mild, undetected cases which render our whole armamentarium of little or no avail, and yet, to take a weekly swab from, say, a thousand throats for bacteriological examination, is well-nigh impossible. During the continuance of the epidemic we urged parents and teachers to suspect every sore throat as diphtheria; but in a district where damp atmosphere, clay sub-soil, etc., give rise to an unusual amount of simple and follicular tonsillitis, it is difficult to induce parents to take a view which might eventually land their children in the Fever Hospital. It was only after the disease had assumed a more virulent type, that parental indifference gave way to a studied regard for their own and their neighbour's good. The advantage of hospital treatment was generally an inducement, whereas hospital isolation for the good of others was a minor consideration. It may not be out of place to state that, thanks to antitoxin serum, the fatality in hospital was 14.1 per cent, compared with 28.1 per cent among those treated at home.

That climatic conditions, sub-soil, water, etc., have an influence on the life history of the diphtheria bacillus is highly probable; but direct personal infection was the most potent factor in propagating the disease we had to contend with. School life, especially in the infant department, seems to be the favoured field for operations, for among young children local as well as constitutional disturbances are often slight, and consequently the mildness or absence of symptoms tends to swell the number of unsuspected cases. That there is a progressive development in the life history of the diphtheria bacillus, is to my mind a further difficulty in successfully fighting an epidemic of this kind. I do not refer to the well-known fact that the type of

disease alters, or that subsequent cases are more virulent than the earlier ones. I wish rather to suggest that the pseudo-bacillus of Hoffmann may, and often does, under favourable conditions, become indistinguishable from the true Klebs-Loeffer bacillus. That both may be found together on one swab is not uncommon, and that their appearance as "long" or "short" is largely due to environment, may be inferred from the fact that frequently I have found our late County Bacteriologist, Dr. Cammidge, describe a swab as exhibiting pseudo-diphtheria bacilli one week, and a week after a swab from the same throat is pronounced to show crowds of true diphtheria bacilli. Further, a throat exhibiting true diphtheria for some time may, under treatment, so alter the environment that only short bacilli are found, and at a still later stage show no bacilli at all. How far insanitary conditions may tend to modify environment I cannot say, but my experience is that where streptococci or staphylococci are associated with the diphtheria bacillus, the type of disease is likely to be virulent.

There is another difficulty which we have doubtless experienced, and which we cannot easily overcome. I refer to the subject of allowing convalescents treated at home to mix with the public, without previous bacteriological proof that all infection is gone from the throat and nares. The private medical attendant is only expected to attend so long as the patient is ill, and should he continue to visit and take swabs for bacteriological purposes, he must do so without any hope of pecuniary remuneration in this world. For the Medical Officer of Health or Sanitary Inspector to take such swabs is impracticable, and yet we know that children may be running about, and even attending school, long before they are free from the diphtheria bacillus.

DISCUSSION.

In the comments that were made upon the paper the preponderance of opinion was in favour of the school as being the chief vehicle of infection, but Dr. Cameron of Leeds pointed out that he had noticed several outbreaks where the disease seemed to travel round the town instead of from school to school.

Dr. SMITH of York called attention to the difficulties of disinfection in cases of diphtheria, and instanced one outbreak where he was only able seemingly to obtain beneficial results by the entire destruction of the library. Dr. PORTER of Leeds thought that diphtheria varied in infectivity, and regard ought to be had to this fact in carrying out disinfection. He strongly favoured the adoption of prophylactic doses of anti-toxin, such as 300 units.

Reference was also made to the fact that although the patient became protected by the inoculation, he might still remain infectious, and in the opinion of several of those present this factor acted in the dissemination of the disease.

Dr. ANDERSON of Wortley asked for information as to the cases in which the bacillus was found in the throat twelve or fourteen weeks after

the commencement of the disease. Dr. Milburn, the bacteriologist in the County Health Department, replied to this by saying that in his opinion the virulence of the bacilli at that period was practically reduced to *nil*, and he thought that in such cases a bacteriological examination ought to be made as to the virulence, and in many cases it would follow that the patient could be discharged.

Dr. MITCHELL WILSON, of the East Riding, regarded as important the classification of cases into acute and convalescent.

Dr. SCURFIELD of Sheffield desired some information as to the condition of virulence of bacilli in the throats of patients treated at home and in the hospital, but apart from some experiments which had been made some time ago in London, nothing seems to have been done.

The discussion was then adjourned to the following meeting.

THE GRANTING OF CERTIFICATES OF SUCCESSFUL VACCINATION.—The Local Government Board for Scotland has issued a memorandum in which they state that in considering the Reports made to them by Medical Officers of Health regarding cases of small-pox, the Board have had their attention drawn to cases of children (the majority of whom were under five years of age) who presented no evidence whatever of successful vaccination either in the presence of local scars or in modification of the disease, although said by the parents to have been vaccinated. Similar cases have been observed in the course of the inspection of "contacts." Further inquiry led to the discovery that in many such cases a certificate of successful vaccination had been lodged with the Registrar. After investigation of the circumstances under which this occurred, the Board are satisfied that considerable laxity exists in the granting by medical practitioners of such certificates, in respect that they are not always founded on personal inspection of the child after a sufficient interval and occasionally have even been signed at the time of the operation, when its result was unknown and when subsequent inspection would have disclosed failure.

A practitioner who grants a certificate of successful vaccination in such circumstances places himself in a very serious position. The certificate bears that the operation was performed by the person who signs it, and that it has succeeded. If in either respect the certificate is false the signatory is liable to a criminal prosecution.

The Court regards a certificate of vaccination by a medical practitioner as a matter of public importance. In the case of *The Lord Advocate v. Webster*, 27th September, 1872, 45 Jur. 3, the judge pointed out that a medical practitioner acting under the Vaccination Act is a public officer with a public duty to perform. "The medical practitioner is, by that Act, erected into an officer who is to serve the public, and give a certificate of successful vaccination, and that certificate is a permanent document entered on a public register, and is equivalent to a clean bill of health as regards the child. The charge here is that the doctor granted certificates of successful vaccination when he had not successfully vaccinated the children and knew that he had not. . . . This must be regarded as a serious violation of public duty, involving punishment." The result of the prosecution in that case was that the practitioner, who had granted certificates of successful vaccination though the vaccination had not taken effect, was convicted and sentenced to four months' imprisonment.

The Board desire to make it publicly known that if in future any case of this nature comes to their knowledge it will be their duty to report it to the Crown with a view to proceedings being taken.

EPIDEMIC DIPHTHERIA.*

By ALEXANDER M. ERSKINE, M.D., B.Ch., D.P.H.,
Medical Officer of Health of Goole.

THE following paper is a brief account of an epidemic of diphtheria in Goole which lasted from September, 1901, to October, 1903. Out of a population of 17,000 persons there were 515 cases. The first notable record of cases of diphtheria in Goole occurred in the year 1894, when 20 cases were certified; 1895, 32; 1896, 15; 1897, 8; 1898, 9; 1899, 33; 1900, 33; 1901 until September, 3 cases. Then began the epidemic, the particulars of which I propose to lay before you. Before doing so, I might remark that Goole is a comparatively new town, and is divided into two parts, the old and new. The district is very flat, and the centre of the town is only about 8 feet above sea-level. The town lies at a lower level than the waters of the ordinary tides, which are prevented from overflowing by artificially-made banks. The subsoil is damp, consisting of about 5 feet of warp lying on a layer of peat (underneath which is the new red sandstone). We have a very small rainfall; the average for the last ten years was 23 inches. The sewers of the town are tide-locked five hours out of the twelve, and empty, untreated, into the tidal river Ouse. In the newer parts of the town the drainage generally is on the lines of the Model Bye-laws. In the older parts this is not so; many of the house drains are devoid of ventilation, or this is very improperly carried out. In other cases many of the street gullies were not trapped, and we found what were practically open cesspools in the yards of the houses.

At the census of 1901 there were 3,538 inhabited houses in the town, and of these only 400 have water-closets, the remainder consisting of 2,675 pail-closets, and 150 privy middens. Systematic scavenging is carried out in a fairly satisfactory manner.

In Goole practically none of the back streets and yards are paved, and this is the more important because the people use them as the entrance to their houses, and they form a playground for the children.

Incidence.—With regard to the incidence of the disease, the old part of the town practically escaped. The epidemic originated and had its greatest severity in the part of the town where the houses were newly built.

Predisposing Causes.—With reference to predisposing causes of

* A paper read at the Annual Meeting of the Yorkshire Branch, held at Huddersfield on 15th July, 1904.

the disease, in my experience of fourteen years' residence as a doctor practising in Goole I have been impressed with the number of cases of sore throat, more especially amongst children; indeed, one of their commonest ailments is enlarged tonsils. In 1897 the town was overbuilt, and in an inspection I made of some of the houses I was surprised to find how damp they were. The sites had either been made up with rubbish, or were simply agricultural land turned over, and had not been covered over with cement, with the result that in only a few years the boarded floors had rotted through and required renewing.

As I have already stated, the epidemic started in September, 1901, and the accompanying chart shows the number of weekly notifications. It was soon observed that a large number of these cases occurred in children attending a particular elementary school, and that the principal factor in the spread of the disease was *school attendance*. The result of closing this school is graphically illustrated in the chart: the cases dropped at once from 35 in a week to only 8 in the following week, and did not rise above 10 in the subsequent weeks. With further reference to the question of school attendance in regard to the spread of the disease, in February, 1902, the disease had spread to another ward in the town; and the cases occurring principally amongst the children attending a particular school situate in this ward, I made the following report on these cases:—

1. The epidemic which has been prevalent in the town since October, 1901, had almost abated, and the recrudescence, in my opinion, is due to two causes:—

(a). Second cases arising in previously infected houses.

(b). All the remaining cases have the infection distinctly traced to the Alexandra Street Board Schools, Infants' Department.

2. Analysis of cases for the month of February:—

(a). Four in previously infected houses.

(b). One attending Church Schools.

(c). Of the remaining 11, 8 of them had been in actual attendance at the Infants' Department of the Alexandra Street School, 2 had sisters or brothers attending the Infants' Department, and 1 was grandmother of the child affected.

(d). Five of series (c) occurred in the last three days.

3. I visited the Infants' Department to-day and found:—

(a). One child in attendance actually suffering from diphtheria. (This was confirmed by bacteriological examination.)

(b). The headmistress just returned to duty, having been ill with "sore throat."

(c). The second mistress absent from duty on account of "sore throat."

As a result of my request the schools were closed on the 27th for a fortnight; and from having 23 cases notified in February, we had only 6 cases notified in March, 3 cases in April, and 6 cases in May.

In June 37 cases were notified, and the history of these cases is interesting and instructive. 17 of them occurred in the South Ward, or old part of the town, which had hitherto escaped the epidemic. The source of infection was traced to a mother, with her children, visiting the house of a sister, who had a child ill with the disease, resulting in two of the former's children developing the disease. Then the disease spread and became centred around the children attending the Church School in Old Goole. This School was also closed, with an exactly similar result to the Alexandra Street School. Of the remaining cases, 7 occurred amongst the children in the Union.

With the closure of the schools in August we had only 8 cases, with their re-opening in September we had 26 cases.

In December we had only 14 cases; so that we may now consider that the disease has lost its epidemic character, but has become endemic, and doubtless we shall have to fight it for the next year or two. However, we hope it will be only a guerilla warfare. This, I think, proves conclusively the effect of school attendance on the spread of diphtheria, and is further borne out by the following table, which gives the age period at which the cases were attacked:—

All ages	Under 1	1-5	5-15	15-25	25-65	65 upwards
214	2	55	116	18	22	1

In Goole a large number of children under five attend school. In the latter part of October and beginning of November—the two most fatal months for diphtheria—we get a remarkable series of “return” cases, many of them adults. In this series we found that exactly a year ago in the same house there had been a case of diphtheria; so that the infection must have remained latent, and with the return of the cold weather became active again. In some of these return cases we also found that there had been a previous case next door. Probably this might be explained by the fact that these houses still have the old-fashioned privy midden, in which the infection remained.

One is inclined to believe that there is no so-called “progressive development of the property of infectiveness,” for the reason that over and over again cases with only slight sore throat, showed, on bacteriological examination, the presence of the Klebs-Loeffler bacillus, and were genuine cases of true diphtheria.

Another reason why school attendance played such an important part in our epidemic was that in the beginning of the outbreak,

sufficient care was not exercised in the discharge of the patients from the hospital; they were discharged upon the disappearance of the clinical signs only, and before a bacteriological examination of the throat was made, with the result that in many cases children with their throats teeming with diphtheria bacilli were allowed to mix with their fellows and to return to school. It can easily be seen how one of these cases attending school may infect many others.

Causation.—So far as our epidemic was concerned there was no connection, either direct or indirect, with sanitary defects, as the annexed particulars will show. Indeed, as I have already mentioned, our so-called slums have practically escaped the disease altogether, and the cases occurred principally in the newer and better part of the town. The question of the milk supply was at once excluded, and there was no evidence of any disease existing amongst domestic animals, although the practice of keeping animals in the backyards is very common in Goole. I presume we are all agreed that the disease is only due to *actual contact*. My difficulty all through the epidemic has been to impress the people with this fact. There seems to be a fixed impression that diphtheria arises from sanitary defects.

The following table gives the notifications at the different ages specified:—

Under 1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-15	15 upwards
5	25	30	33	49	55	46	40	27	27	78	87

giving a total of 60 under school age, 87 above school age, and 355 in children attending school. The number of children attending the different elementary schools during 1902 was 3,537, so that 10 per cent of these children were attacked with the disease. The greatest number occurred at the age period 5-6 and, secondly, 4-5 years. The deaths from the disease amounted to thirty-five, giving a case mortality of 6·7 per cent. This low rate was due to the universal use of antitoxin, which was supplied free; and secondly, to many of the cases being of a mild type. Dr. Newsholme has suggested a relationship between the rainfall and the outbreak of diphtheria. In Goole the rainfall for 1898 was 19 inches; 1899, 21; 1900, 24; 1901, 21; 1902, 22; and 1903, 29 inches. I have no doubt that the rainfall of 1903 was a very beneficial one for Goole in the matter of purifying the atmosphere, flushing the drains, clearing noxious effluvia from our midst, and by this means ridding us of our epidemic. Since October, 1903, up to the end of June, 1904, it is rather a remarkable fact that we have not had a single case of true diphtheria, and this introduces the question of *diphtheroid inflammation*.

During this period 10 cases were notified as diphtheria, but their

subsequent history was as follows: 4 were scarlet fever, and 6 diphtheroid inflammation. In the early stages of the epidemic the bacteriological returns from Wakefield did not specify the variety of the bacillus found, merely stating whether diphtheria bacilli were present or not. On enquiry I found that the authorities there considered the pseudo-bacillus of Hoffmann as a variety of the true diphtheria bacillus; consequently, cases in which the pseudo-bacillus was found were returned as "diphtheria bacilli present," with the result that cases which had not the clinical symptoms of diphtheria had to be notified as true diphtheria. As illustrating this point, in my own practice I had the case of a boy, aged twelve, who had suffered for years from enlarged tonsils. During the epidemic his mother brought him to see me, suffering from inflamed throat, but no membrane was present. I took a swab of his throat and sent it to Wakefield. The return came back, "Diphtheria bacilli present"; and as a result of this the boy had to be isolated for about six months, although during this time he was apparently quite well. He was then seen by a consultant, who sent a swab to another authority, which sent a negative return. During all this period I kept sending swabs to Wakefield, and always with the same result. A guinea-pig injected with a culture from this boy did not prove fatal. Finally I removed his tonsils and adenoids, with the result that at last we got a negative return from Wakefield. I should add that no other member of the family of six persons contracted the disease. Regarding the previous six cases referred to, and all of which had the pseudo-diphtheria bacillus present, Dr. Milburn writing to me says: "I have now tested the virulence of the bacilli I obtained from this case, both from the primary swab and also the repeat, and I find that both strains of bacilli are quite without virulence to guinea-pigs; by cultural methods also both these strains agree with *Bacilli Hoffmann*." My own opinion is that Medical Officers of Health are not justified in treating cases as true diphtheria, in which a bacteriological return is obtained stating the presence of pseudo-bacilli. No doubt many of these cases are mildly infectious, but I think that the course pursued by the New York Board of Health is the correct one. Certainly clinical experience bears this out.

Our method of dealing with the epidemic was as follows: On my receiving the notification of a case of diphtheria, I made a visit of inspection, and endeavoured as far as possible, especially where I was convinced there was small chance of isolation, to have the case removed to hospital; and along with the patient the bedding, etc., was removed for steam disinfection. Then the Inspector disinfected the house with formalin, and the school authorities were notified,

and the remaining children were kept from school for fourteen days. As Medical Superintendent of the hospital I exercise control over all admissions and discharges; and in the cases of diphtheria patients, before they are discharged, in all cases a swab from the throat is sent for bacteriological examination, and he is detained until a negative result is obtained. Seldom are the patients allowed to be discharged under three weeks; the average stay in hospital was twenty days. Our greatest difficulty lay with the mild cases which showed the presence of the Klebs-Loeffler bacillus, as it is this class of case which is so capable of spreading infection. This was brought home very forcibly to me in the case of a family where the mother nearly lost her life, the first case being that of one of her children who was suffering from slight sore throat; yet this gave rise to five cases out of a household of seven. When the cases were treated at home, the same course was pursued with regard to bacteriological examination, and the house was disinfected at the termination of the illness.

With regard to schools, we found it necessary to close them on three occasions during the epidemic, when the different school-rooms, including the cloak-rooms, were thoroughly sprayed with formalin, and the school slates were washed with izal. A request was made to discontinue the use of school slates, and substitute paper instead; the teachers were requested to give us immediate notice of cases of suspicious illness in their scholars, and periodical inspections of the schools were made. When the house in which a case of diphtheria had occurred was declared free from infection, the school authorities were notified to this effect.

SUMMARY.

1. That the disease is due to actual contact.
2. The principal factor in its spread is school attendance.
3. That cases in which the pseudo-diphtheria bacillus of Hoffmann is found, should not be treated as cases of true diphtheria, being only mildly contagious and not requiring isolation.

THE ESTIMATION OF FORMALDEHYDE IN MILK.—B. H. Smith (*Jour. Amer. Chem. Soc.*, 25, 1903, No. 10) states that considerable time and trouble may be saved by using a Kjeldahl flask and a round, flat evaporating burner in the distillation of milk; that the quantity of sulphuric acid added has a decided effect upon the amount of formaldehyde obtained in the first part of the distillation; that, if the treated milk is kept in a cool place, the percentage of formaldehyde found will remain practically constant for at least forty-eight hours; and that where 100 cc. of milk are treated with 1 cc. of sulphuric acid of a dilution 1:3 and distilled, the first 20 cc. of the distillate will contain very close to 33½ per cent of the total formaldehyde present.

AN OUTBREAK OF (? SEPTIC) SORE THROAT AMONG THE STAFF AT BELVIDERE HOSPITAL, WHICH COINCIDED WITH THE OCCURRENCE OF A TEAT ERUPTION IN THE HERD SUPPLYING MILK.*

By A. K. CHALMERS, M.D., D.P.H.,
Medical Officer of Health, City of Glasgow.

ON 9th May Dr. Love, Senior Assistant Resident Physician at Belvidere, developed symptoms of diphtheria; but as he was in charge of diphtheria wards, and had recently performed tracheotomy on a patient, this was accepted as the probable source of his infection.

During the following week, however (on 15th inst.), Dr. Tierney, to whom these wards had been transferred, also manifested throat symptoms, but of a milder character; and this occurrence served to bring into prominence a series of sore throats, which had been occurring among the staff since early in May.

On inquiring into the numbers so affected, Dr. Brownlee was able to obtain for me a record of thirty-eight persons in whom certain throat symptoms had been present, and one other case occurred subsequently under circumstances to be afterwards noted. In thirteen instances the symptoms had been more or less evanescent in character, and had not at the time of their occurrence been brought to the notice of the Superintendent. The date of the sickening in each of the cases is detailed in the annexed table, which may thus be summarized:—

In the week ending April 30	..	2 cases sickened.
" " May 7	..	8 "
" " " 14	..	19 "
" " " 21	..	9 "
" " " 28	..	1 "

Persons Affected.—When grouped, the numbers are as follows: Nurses 17, cleaners and maids 8, patients 4, storekeeper and assistants 3, physicians 2, house steward's household 2, dispensary staff 2, assistant matron 1.

Progress of Outbreak.—Nothing can be said of the symptoms presented by the nurse whose illness dates from April 23rd, nor of the others marked in the table as "not seen." The symptoms presented by the nurse who sickened on 30th April were regarded as due to

* From Fortnightly Report.

tonsillitis, as were also those of the house steward. It is of importance, however, in view of the facts regarding the milk supply which were subsequently ascertained, to observe that the milk supply of the house steward's family was also obtained from the same source as the Hospital, but delivered direct from the cart on passing the gate, and not, therefore, exposed to any infection to which it might be suggested the hospital supply was exposed after delivery.

In this week ending 7th May seven other persons, in addition to the house steward, were affected, comprising four nurses, the storekeeper, dispenser, and a ward maid, all of whom were occupied in separate parts of the Hospital, and none of whom, save the nurses, dined in common or slept in the same portion of the Hospital.

The nineteen who sickened in the week ending 14th May included the ward maid of Ward VIII, where a nurse had sickened in the previous week; three nurses in Ward II, where also a nurse was already ill; but five other wards were invaded—Ward IV having two patients and a nurse, and Ward XXV a patient and a nurse, both sickening together. In addition the house steward's wife, the assistant matron, assistant storekeeper, a ward maid in Ward VIII, the doctor's housemaid, and the kitchen maid of the Smallpox Hospital, were among the number. In the last week of the outbreak only one case occurred in the ward previously affected. Four in all occurred in the Small-pox Hospital.

On collecting the foregoing information, it was obvious that in a few instances only was there a suggestion of direct secondary transmission among persons closely associated in work, as when, for example, they were occupied in the same ward and might have occasion to use the same dishes. Assuming the outbreak to be due to an infective process, it appeared that the explanation was more likely to be found in a distribution of infection direct to each individual from a common source; and the circumstance that cases were occurring in the Small-pox Hospital and also in the house steward's family (in both of which the milk supply was the only circumstance which they had in common with the Fever Hospital generally) suggested this as the next point to be investigated. Against this there was apparently the remarkable immunity of the children (the four patients affected being adults), while the house steward and his wife were both affected, although their children escaped.

The milk supplied to the Fever Hospital was scalded from the 17th onward, and no case occurred thereafter among this portion of the staff or patients. But, through an error in the transmission of instructions, the portion delivered to the Small-pox Hospital was not scalded till 23rd May, and on the 27th one other case occurred there.

On ascertaining the above facts I visited, in company with Dr. Buchanan, the farm from which the milk supply was obtained, and asked the Veterinary Surgeon (Mr. Trotter) whether he could accompany us, lest occasion should arise to have the cattle examined. The following history was then told us:—

On 23rd April, after a considerable interval without change among the stock, a new cow was added to the herd, which numbers seventy-two in all. In milking it is the custom to give each milker a separate group for his individual attention; and the animal in question was first added to one group, and then, in a few days, transferred to another group, before the circumstances to be afterwards related attracted attention. Towards the end of April the group to which the new cow had first been added began to suffer from a teat eruption, and this had scarcely attracted attention until the second group to which it had been transferred was found to be similarly affected. From this it spread until about 30 per cent of the herd were attacked, the outbreak reaching its height about a fortnight previous to my visit, i.e., 6th May.

It will be remembered that in the following week nineteen of the Hospital cases occurred.

During the course of the outbreak the hands of four out of eight milkers were affected. The cattle went out to graze for the first time for the season on 28th April, and, in the minds of the milkers, the sore teats were associated with this circumstance.

About one-seventh (20 gallons) of the total supply of milk was sold in a neighbouring village. It was quite impossible to trace the particular cows from which this subsidiary quantity of milk was obtained, but it is interesting to note that, at the time of our visit to the farm, we ascertained, on applying to the local medical practitioner for information on the subject, that he had then under his treatment four cases of sore throat, in three of whom, on bacteriological examination, evidence of septic infection was found.

Sores on Milkmen's Hands.—Only two of these remained at the time of our visit, and both were healing. In one case it was situated between the forefinger and thumb; in the other it presented the appearance associated with onychia, or disease of the matrix of the nail.

Nature of the Outbreak.—There can be little hesitation in regarding the majority of the throat affections which came under observation at the Hospital, as directly resulting from the teat eruption which has been described. Its infective character is indicated by the fact of its spread among the cattle themselves, and by the coincident sores on the milkers' hands. Moreover, the illnesses ceased at the Hospital directly the milk was sterilized. It is true that bacteriological

verification would require the recovery of the infecting organism in all these instances, and this portion of the investigation is still engaging Dr. Buchanan's attention.

We have seen, however, that in Dr. Love's case the symptoms were frankly those of diphtheria, while from Dr. Tierney, and from one or two of the others, an organism was recovered which had some of the morphological and cultural characters of the diphtherial bacillus. It lacked, however, the feature of pathogenicity, *i.e.*, it was not fatal to animals. Both residents were in charge of diphtheria wards, however, at the time of sickening, and were consequently exposed to direct infection, apart from the milk supply; but the presence of this organism in others not so exposed, has an important bearing on the nature of the teat eruption. Two cases may be put as affecting the cattle:—

(1). The teat eruption was a simple cow-pox, and the throat affections were the result of septic organisms grafted on the resulting sores.

(2). The teat eruption was due to the specific organism of diphtheria.

A third case might be put on the assumption that the teat eruption was cow-pox, and that the diphtheria organism gained access to the milk from the milkers—that is, that a double infection occurred; but there is absolutely no fact to support this.

Applying the alternative propositions to the circumstances of the outbreak at the Hospital, I am disposed to regard the throat symptoms as due to a septic infection arising from the growth of secondary organisms on the affected teats, and conveyed in the milk.

Dr. Love's attack, which is the only one with definite clinical evidence of diphtheria, may quite reasonably be explained by a direct infection acquired in the wards, and to which, indeed, he may have become more liable because of the selective action on the throat tissues of the septic organism which the milk contained.

All the cases were mild, and, as has been said, thirteen of them failed to seek medical advice.

Although the outbreak is now over, there is an obvious administrative lesson in the incident which should not be overlooked. A similar outbreak occurring elsewhere than in a selected group of population such as the Hospital afforded, might readily escape notice. Yet teat eruptions among cattle are of fairly frequent recurrence. Section 84 (3) of the Burgh Police (Scotland) Act, 1903, provides for notification by the dairyman of tuberculosis of the udder, and it would be to the interest of the consumer were epizootic teat eruptions added thereto. The Clause is one of several dealing with milk infection which are included in the adoptive portion of the Act.

AN OUTBREAK OF ANTHRAX.*

By H. E. EDLIN, M.R.C.S.,
Medical Officer of Health, Levenshulme.

I VENTURE to ask for your attention and consideration of the chief features and incidents connected with a recent outbreak of anthrax, or malignant pustule, in the district of Levenshulme, which excited a large amount of interest and concern. The subject of my paper, though not of great intrinsic importance to Medical Officers of Health, yet presented a number of problems and called for some unusual methods, so that a brief survey of them should prove both interesting and instructive, especially as the text-books give little *practical* information on the subject.

Before recounting the history of the outbreak itself, I propose to recall to your memories the chief features of anthrax as it affects man and animals, and it will thus be seen to what extent this outbreak conformed to the usual characters of the disease. It will also be of advantage to mention the chief Acts and Orders describing the measures advised to deal with the disease. It will not be necessary to say much of the bacteriology of the disease, especially as it will be dealt with by Prof. Delépine, who is giving a bacteriological demonstration on the subject.

Anthrax belongs to the class of animal diseases or epizootics which are transmissible to man. The chief of these are: Anthrax, tuberculosis, glanders and farcy, rabies, actinomycosis, cow-pox, foot-and-mouth disease, and tetanus. These may be transmitted to man indirectly, or directly by inoculation in the case of many of them.

With the object of preventing the spread of disease in cattle, powers were given in the Diseases of Animals' Act, 1894, to the Board of Agriculture to issue Orders prescribing and regulating the procedure in all cases of diseases in animals, and such Orders have been issued with reference to anthrax (1895), glanders and farcy (1894), and rabies (1897). The Act of 1894, section 4, provides that:—

1. Every person having in his possession or under his charge an animal affected with disease shall:—

(a.) As far as practicable keep that animal separate from animals not so affected; and

(b.) With all practicable speed give notice of the fact of the animal being so affected to a constable of the police force for the police area wherein the animal so affected is.

* Paper read before the North Western Branch of the Society of Medical Officers of Health, on May 20th, 1904.

The local authorities to administer the Act in England and Wales are the Borough Councils and the County Councils, and the measures with regard to cattle are carried out by the police authorities under special inspectors. They are ordered to report the occurrence of a case to the Medical Officer of Health of the district affected.

Offences are punished by fines not exceeding £20 or by imprisonment.

The methods of procedure are drastic, and include compulsory notification, isolation, prohibition of movement of animals and persons into or out of the infected area, disinfection, slaughter of infected or suspicious animals, and destruction of fodder, manure, etc. Compensation may be given in the event of slaughter of cattle if properly notified by the owner.

Anthrax has been known as a disease of cattle for a long period of time, though its actual cause, the bacillus, has not been known for many years. It was discovered by Davaine in 1863, and this was confirmed by Koch in 1876. The *bacillus anthracis* is easy of growth and recognition, and well illustrates the morphology and characteristics of bacteria, and is thus very useful to the student of bacteriology and we are all very much more familiar with the bacillus than with the disease it gives rise to. The bacilli occur in the blood and spleen of an infected animal in enormous numbers, and can be stained readily and easily recognized as large non-motile bacilli growing end-to-end in chains, each one 6 to 8 $\mu\mu$. long and 1.2 $\mu\mu$. thick. They are readily cultivated, and the plate cultures and the stab in gelatin present characteristic appearances. They grow best at 35° C., and do not multiply below 12° C. or above 45° C.; they have low powers of resistance; at the ordinary temperature, when dry, they die in a few days. The action of the gastric juice is rapidly fatal to them, and they are destroyed in the stomachs of healthy animals, and they are soon killed in the process of putrefaction; they are easily destroyed by heat or disinfectants. They can grow without oxygen, but grow best with it. Spore formation does not occur without oxygen, and never occurs within the body of an animal suffering from anthrax, nor in the carcase after death, owing to the absence of free oxygen; but with free access to air forms readily. The spores, when formed, have extremely high powers of resistance, survive for very long periods of time, resist boiling for five minutes and dry heat at 140° C. for several hours; they also resist the action of the gastric juice. Animals can be infected by inhaling or swallowing spores, but not by bacilli without abrasion, and Klein found that on inoculation bacilli caused a slight and localized malady, and spores a severe constitutional affection, usually fatal.

Anthrax in Animals.—It occurs epidemically in sheep, cattle,

goats, swine, horses, and deer, and is extremely prevalent in certain districts and countries. Owing to preventive measures it has become less common in France and England, though it has increased here the last ten years. Animals are usually infected by inhalation and swallowing of spores on infected fodder or grass. A field becomes infected by the discharges from an infected animal, and may cause a fresh outbreak after the lapse of months or years. In sheep and cattle it is specially virulent, and death may occur in a few minutes after the first symptoms, or in twelve to forty-eight hours. It is known by several names: Splenic fever, splenic apoplexy, black-quarter, black-leg, "hind." These names indicate the chief features of the disease, the sudden and fatal attack, the characteristic affection of the spleen, and the erysipelatous oedema of the quarters of the body.

The chief symptoms are the usual signs of sickness: The animal stands immovable, head depressed, refuses to eat, rigors or shivers occur, eyes are fixed and staring, there may be swellings (around the throat) which are extremely hot to the touch, and on examination a small quantity of blood may be found trickling from the nose or upon the voided faeces; death ensues, as a rule, very rapidly. The secretion of milk is checked at an early stage in cows. On *post-mortem* examination the spleen is found to be very large and soft, two or three times its natural size, dark red in colour, and the pulp very soft and friable; the liver and kidneys are enlarged and congested, as are also the lungs; the blood generally is fluid and of a dark colour; the lymphatic system is much affected. Bacilli are present in all the organs and the blood, and can readily be obtained and examined.

The susceptibility to anthrax varies greatly with different species of animals. Guinea-pigs and mice are very susceptible, and are generally used for test inoculations; the guinea-pig dies in two days; rabbits are only slightly susceptible; adult carnivora are very immune. The human subject occupies a medium position.

It has been found that animals can be immunized against anthrax by vaccination with special cultures of the bacilli, and this is now extensively practised in France.

It may be assumed that anthrax can be acquired by eating the flesh of diseased animals, and it is said to occur in pigs from this cause, and also in human beings. The hides and wool of diseased cattle are frequently contaminated, and are the usual cause of infection in man.

Anthrax in Man.—The disease is communicated to man in three ways: By inoculation of a wound or abrasion, or even through the hair follicles, causing malignant pustule or carbuncle; by inhalation of the spores; or by swallowing particles contaminated. Those

liable to be affected are slaughterers, skimmers, unloaders of hides, tanners, wool-sorters. Malignant pustule is common in South-Eastern London, and I am informed that seven or eight cases are treated each year at St. Bartholomew's Hospital. The internal form, usually called wool-sorters' disease, is most prevalent in Yorkshire, at Bradford and elsewhere among the woollen industry, the skins and wool from certain districts of Persia and Asiatic Turkey being especially dangerous.

Malignant pustule usually occurs on exposed parts—the face, hands, forearm, and back. One to three days usually after inoculation a small, red pimple appears; this develops into a vesicle with congestion around; an eschar forms, or black slough; the surrounding tissues become swollen, indurated, and inflamed, and a secondary ring of vesicles forms. The lymphatic system, vessels, and glands are affected, and the whole limb becomes œdematous. Feverish symptoms develop even while the bacilli may be confined to the pustule and neighbourhood. The disease may stop here and end in resolution or in suppuration, or be checked by excision of the pustule. If this does not occur, the blood is invaded, general symptoms of prostration follow, and death ensues. It may be fatal in twenty-four hours, or in three or four days. In man the spleen is not enlarged, and the organs generally contain few bacilli. The cause of death is due to the absorption of the toxins produced by the bacilli. Early excision of the pustule, especially when in the extremities, is followed in a large proportion of cases by recovery. Early recognition of the true nature of the disease is therefore of the greatest importance.

Wool-sorters' disease, caused usually by inhalation of dust and spores, affects the trachea and bronchi, the lungs, and the mediastinal glands; the symptoms are respiratory troubles, rapid exhaustion, and death in a few days. This form is extremely fatal. The bacilli are limited to the thoracic organs. Special precautions in sorting the wools are required, mainly to prevent the spreading of dust by means of extracting fans, and damping the skins.

Infection occurs rarely through swallowing; it then affects the intestines, causing diarrhoea and collapse.

Having thus stated the general characters of the disease, I will now proceed to the particular instances which concern us.

On March 5th (Saturday afternoon) a constable came to my house and informed me that a person had left the Manchester Royal Infirmary suffering from anthrax, and had come to his home at Levenshulme; he gave me the name and address—Greenbank Farm, Barlow Road. The man, a farmer, sixty-six years of age, had visited the Infirmary. The case was diagnosed as malignant pustule. He was detained, and advised to go into Monsall Hospital; he agreed,

but while arrangements were being made for his removal left the Infirmary. The police authorities at Levenshulme were informed, and were making further inquiries.

The next hour I spent in looking up the subject in Notter and Firth, Hime, and Quain's *Dictionary of Medicine*, with little gain of knowledge as to the steps required to be taken by a Medical Officer of Health. Later in the evening I received a telegram and a note from Dr. Niven, M.O.H., Manchester, informing me of the incident. Evidently I was expected to do something.

About 8.15 I visited the Police Station, found the Sergeant and the Inspector under the Diseases of Animals' Act busily reporting to their headquarters. The Inspector gave me the following information: That on February 24th the farmer had killed a young heifer, two years old and bred on the farm, which had been taken ill the day before suffering from what he called "hind"; the carcass he had sold to a butcher in Levenshulme for £5, less 10s. returned. The butcher had sent his assistant to help to skin it and dress it; this assistant, a young man, had been taken ill with sores on his arm and lip, which was greatly swollen; had seen a doctor, and been sent home that day to Wheelock, near Sandbach, to which place they were sending information.

The farmer had seen a doctor in the district on the Friday, so I proceeded to see him to arrange about visiting the farmer to get a swab for bacteriological examination, without which we could not absolutely verify the diagnosis. I then went on to the farm, where I ordered isolation of the patient, and the sale of milk to be stopped for a time, as it was not known in what condition the remainder of the cattle which occupied the same shippens were. The same night I wrote to Dr. Niven asking for any suggestions he could give me. In his answer he could only refer me to the Anthrax Order, 1899. I could not obtain this locally, but on application to the Local Government Board I received a copy on March 12th, with a letter asking for a copy of any report I might make, and stating that "the concern of a Medical Officer of Health with anthrax is essentially limited to the extension of the infection to man, and to the prevention of nuisance owing to any failure of the local authorities under the Anthrax Order, as, *e.g.*, in connection with the proper disposal of the bodies, etc., of animals dying or slaughtered. The Board assume that the carcass to which you refer has been dealt with in such a way that it will not be used for human food."

The next morning I visited Greenbank Farm with the doctor attending, saw the patient in bed, and took a swab from the arm, using a diphtheria outfit, soaking it in the serous discharge and rubbing

it also on the pustule. The swab was sent off to Prof. Delépine, marked "urgent," with an explanatory note, and next morning I received a report by wire: "Anthrax bacilli present in swab received last night."

The patient was apparently not very ill generally, but somewhat restless while the dressings were being removed, the treatment up to this time having been by cooling lotions externally and stimulating drugs internally; no antiseptics had been applied and no excision done. At this time the hand, forearm, and arm up to the shoulder were much swollen, cedematous, and hard; on the back of the forearm was a raised, dry scab or pustule, the point of inoculation, and a few small vesicles round it; on the back of the wrist, and also below the elbow, were several large blisters containing dark, bloody serum, which exuded freely, and in several places the surface was raw. I made no further examination. He died the next evening from toxæmia.

It will be as well to give at this point an account of the case of the butcher's assistant, and the report which Dr. Gordon, Monsall Hospital, has kindly given me permission to make use of. The case was diagnosed at Wheelock and sent back to Manchester to Monsall Hospital; its nature, I may also say, had been suspected previously at Levens-hulme, though the rarity of the disease had prevented complete certainty.

On admission at Monsall the patient was found to be suffering from lesions of the lower lip and of the skin of the right forearm. There was a history to the exposure of anthrax. The lesion of the skin consisted of a sore the size of a half-crown piece, circular in shape, and raised. In the centre was a blackish area of scab surrounded by a ring of small vesicles; the surrounding skin was reddened and indurated for the distance of half an inch. On the lip there was a swelling of irregular outline consisting of cedematous tissue with a black scab in the centre, but without the vesicles that were observed on the forearm. There was a lesser degree of cedema of the whole face and neck. There was no pyrexia, but there was some cyanosis, and the patient had a toxæmic aspect. The sub-maxillary glands were enlarged and tender, but not hard.

Anthrax bacilli were found without difficulty in fresh cover-glass preparations from the exudate on the lip and arm. Under chloroform the lesion of the skin was freely excised, and the wound left to granulate; no caustic or antiseptic was applied to the wound. The growth on the lip was similarly removed by a V-shaped incision extending to the chin. Both wounds healed well by granulation, and the patient made an uneventful recovery.

Sections from the edges of the portions removed from both skin and lip showed numerous cocci, but no anthrax bacilli, while these latter were found freely in the centre of the lesions.

He was discharged from hospital on March 22nd, and has since resumed work with the same butcher. The scars are marked, but do not disfigure to any great extent now.

Resuming my account of the action taken, on my visit to the farm I found there the Police Inspector and the veterinary surgeon, Mr. Locke, who informed me he had examined all the cattle: they all seemed healthy and presented no appearance of anthrax.

It was reported that another beast and a calf had been removed recently to be killed, but were apparently healthy and could not be traced.

Notice was served declaring the farm an infected place under the Anthrax Order, and prohibiting the movement of cattle.

During the week following the cattle were removed into another shippon; the place where the beast was killed and dressed, and all the stalls, floors, walls, and ceiling were disinfected by scraping, washing with a solution of corrosive sublimate, and afterwards coated with limewash containing carbolic acid. A large quantity of manure was burnt in our destructor, and various articles which could not be disinfected, in accordance with the instructions in the Order. The carcass was not buried in quicklime or cremated according to the Order, for the reason which I shall state later.

After the death of the farmer I gave instructions for him to be placed in a coffin as soon as possible; this was lined with an impermeable material and packed with sawdust and disinfecting powder, care being taken to avoid contact with the corpse. After the funeral I had the clothes and blankets actually soiled burnt, the other bedding was stoved, and the room disinfected by formaldehyde and washing with corrosive sublimate solution.

At the end of the week the place was disinfected, the cattle declared satisfactory, and the sale of milk was resumed. Compensation for the loss from the milk was mentioned by the farmer's wife, but on my advice was not pressed for.

As a result of further inquiry it was stated that cattle had died occasionally, but not for some time back, and there was no history of any previous outbreak at all resembling anthrax on the farm. The farmer himself had not known what "this anthrax" was.

I have now to mention what to us is the most important and interesting part of the whole incident. On Saturday night I was told by the Police Inspector that the carcass had been sold to a butcher, and that the whole of it had been sold to his ordinary customers, and

by this time all been eaten. On Monday morning I sent my Inspector to the butcher to get further information, and to make inquiries as to the character of the meat, etc. He was told it seemed healthy and all right; there had been no complaints, and the butcher's family had eaten some themselves. It was afterwards stated that the butcher's assistant had remarked on the unusual size of the spleen. The hide, hoofs, etc., had been sold, and taken to Manchester along with others. All the meat had gone with the exception of the tongue, which was in pickle in the cellar.

This was reported to me, and I at once went with the Inspector to the butcher's shop, and in the cellar was shown a tub half full of brine, and containing seven tongues, one of which was from the beast with anthrax, and four pieces of pork. I seized all these as being unfit for the food of man, and also took possession of the tub as likely to be contaminated. The butcher willingly gave them up to me and signed a paper to that effect. They were removed to the Council Offices, and kept there for the Inspector of the Board of Agriculture to decide what was to be done with them, and afterwards to be destroyed in the destructor. I was of opinion at this time that the seizure was the duty of the police under the Anthrax Order, but, as they declined, I took the necessary steps.

On Wednesday the Inspector of the Board of Agriculture came, and I saw him. He suggested that the tongues should be examined by Prof. Delépine for anthrax bacilli, with a view to the prosecution of the butcher under the Order. I handed them all over to the police, who sent them to Prof. Delépine for examination and report.

After further consideration the police authorities came to the conclusion that a prosecution under the Anthrax Order would not be successful, but were of opinion that we should take action under the Public Health Act, sections 116 and 117, against the butcher for having in his possession meat unfit for the food of man. They therefore forwarded to the Health Committee the report of Prof. Delépine, which was to the following effect:—

"I examined microscopically various parts of the seven tongues and found that the tongue I had numbered 691 was from an animal which had died of anthrax, or had been killed in the last stage of the disease. By cultivation I was able to satisfy myself that the anthrax bacilli found in the tongue were still living and capable of rapid growth. By inoculation of guinea-pigs I found the bacilli still virulent and capable of infecting animals. This led me to examine the brine, in which I found numerous anthrax bacilli. There can be no doubt that one of the cows from which the seven tongues were obtained was suffering from anthrax, and had either died of the disease or been slaughtered whilst moribund."

The infected tongue was afterwards destroyed under a magistrate's order.

I presented a lengthy report to my Committee on the whole of the occurrences and the action taken, copies of which were later sent to the County Council and the Local Government Board; and after consideration the Committee decided to prosecute.

The case was heard at the County Police Court, Strangeways, before Mr. Yates, K.C., when a complete statement was made by the Clerk to the District Council of the serious nature of the charge. The defendant pleaded guilty and, in extenuation, ignorance of the danger. He was fined £10 and three guineas extra costs.

About a fortnight previously an Irish dealer was fined £50 at Liverpool under the Order.

In connection with this case I departed from the usual strict official reticence and gave an expression of opinion to two reporters. They came to me, told me that they were putting in the next day's papers a statement that this diseased meat had been sold by a butcher and been eaten, and they had already found people in an alarmed state of mind, and asked me if I could say anything that would at the same time relieve this scare. Under the special circumstances I decided it was the wisest course, and stated that the meat when cooked would not be dangerous, and that by this time we should have heard of any ill results if such had occurred. This appeared in the paper as an interview, and gave me for a time an undesired notoriety, and made it necessary for me to give an explanation to my Committee, which they accepted.

In conclusion I may mention some of the points which seem to me most noteworthy:—

The sudden occurrence affecting only one beast, and the freedom of the other cattle, both before and afterwards, is striking.

The persons affected were of course the most likely, as being most exposed to the contagion; but all who handled and cut up the uncooked meat were endangered to a greater or less degree; those who ate it after cooking, only to a slight extent, if at all.

The prolonged incubation of the disease after inoculation; this was seven or eight days instead of one to three, as described usually. The effect of treatment of the local sores even after a prolonged period is very encouraging, and one is inclined to regret the farmer's impatience.

The condition of the meat must not have been greatly affected, or attention would have been drawn to it by some of the customers, who were largely of the better class.

The bacilli were able to persist in the brine for a period of about three weeks.

Was prohibition of the sale of milk from the farm necessary under the circumstances? That is, could the danger of contamination be ignored?

Is it not desirable that the Anthrax Order should contain some instructions to Medical Officers of Health as to the procedure to be adopted in similar cases?

In the interests of public health, is it not necessary that we should have power to examine the carcase of every beast killed on a farm before it is sent to a butcher to be consumed for human food; and that it should be a misdemeanour punishable by law for a farmer to send, or a butcher to receive, such a carcase without acquainting the Sanitary Authority?

DISCUSSION.

Professor Delépine, and Drs. Coutts, Vacher and Meredith Young took part in the discussion, a vote of thanks being unanimously accorded to Dr. Edlin for the paper, and to Professor Delépine for the practical demonstration.

Professor Delépine then gave a short address on the institution of a Science Degree in Public Health and of a Diploma in Veterinary State Medicine by the Victoria University of Manchester.

STUDIES OF THE MORE IMPORTANT MILK PREPARATIONS IN SWITZERLAND WITH SPECIAL REFERENCE TO THE CHEMICAL COMPOSITION, GERM CONTENT, COAGULABILITY, AND THE DIGESTIBILITY IN VITRO.—From investigations made with a large number of samples of pasteurized, sterilized, and condensed milks prepared in Switzerland on a commercial scale, the following conclusions were drawn by F. Sidler (*Arch. Hyg.*, 47 (1903), No. 4—*Exp. Stat. Rec.*).

All the milk preparations examined conformed to the requirements of the Swiss Food Control. On account of the heat employed in manufacture, the amount of so-called soluble protein in all the samples, with the exception of one brand, was about one-third less than in normal unheated milk. One of the sorts of modified milk did not agree with its purported composition, doubtless because the heat employed in sterilizing had changed the ratio of casein to dissolved proteids. As shown by cultures, 28 of the 109 samples of bottled and canned milk examined contained bacteria, although in most cases no change could be noted in the milk. In Switzerland as in Germany "sterilized" milk is not always free from micro-organisms.

The effect of hydrochloric acid upon the milk was found to vary with the degree of heat which had been employed and the method of manufacture. Coagulation with rennet also varied with the degree of heat employed. Generally speaking, the higher the temperature the slower the rate of coagulation.

As shown by artificial digestion experiments, the different milk preparations varied little in digestibility, condensed milks being somewhat less thoroughly digested than the bottled goods. It was noted that the amount of hydrochloric acid used had a marked effect upon the digestibility of the sample, much more being digested when 1 per cent was added than with either 0.5 or 0.25 per cent.

THE TEACHING OF HYGIENE: SOME SUGGESTIONS.*

By W. W. STAINTHORPE, M.D., D.P.H., J.P.

Medical Officer of Health for the Guisborough Combined Sanitary District.

Is there one here to-day who in the discharge of his duties as Medical Officer of Health has not at times been discouraged and disheartened by the ignorance, indifference, and fatalism which so often render his recommendations and efforts futile? Ignorance of the laws of nature, indifference to everything but the "gathering of gear," fatalism the result of both. Have we not all felt that these are as difficult to break through as the walls of a prison: ignorance and indifference are walls that must be battered down if we are to succeed in our fight against disease and premature death. How is this to be done?

As Health Officers we must make our voices heard beyond the Councils we serve. We must individually and collectively urge upon Education Committees, school managers, school teachers, the Board of Education itself, the absolute necessity of making personal and domestic hygiene a school subject—compulsory, not voluntary. The present system of education requires radical alteration; it is not education, it is cramming. By-the-way, would not the substitution of the word Education for Education impress upon teachers and others the result it is, or ought to be, their object to obtain? But even under the present system there are opportunities for imparting knowledge of the laws governing health which might be utilized. The mid-morning break in the lessons; why not teach the children the why and wherefore of this—the inhaling of fresh air, the exercise of muscles and lungs, the ventilation of the rooms, play as a relief from mental strain?

Some of the schemes I am about to suggest may be considered utopian, nevertheless I am convinced they are desirable.

Schools, except those for infants, should be on the outskirts of towns, in order that the surroundings may be as healthy as possible. The schoolrooms should be, by being models of cleanliness and order, object lessons. To each school or group of schools there should be attached a piece of land where gardening could be taught. Much of hygiene can be so learnt, in fact the lessons are almost innumerable—sewage to the soil; life from life; like produces its like, whether it be good or bad; good crops can only be obtained from the best of

* Read at a meeting of the Northern Branch. 22nd April, 1904.

seed and soil; weeds must be diligently rooted up; whatsoever a man sows that shall he reap. Gardening itself is a healthy exercise.

In too many schools the physical exercise is simply a farce, a matter of routine performed in a dull and listless way. In fact, so far as the effect is concerned, the time in some instances would be better employed in play. To obtain the best results the interest of the children must be awakened. This, I think, can easily be done. Let the scholars, boys and girls, be formed into companies, each with its officers appointed by the children themselves. Each officer to have the command and superintend the work of a section of a company, of course under the teacher. *Esprit de corps* and healthy emulation between company and company would result. Militarism, does someone say? Not necessarily so; but even then, this is a lesser evil than an unhealthy race.

During spring and summer, and occasionally at other times, school children should be taken into the country and taught to observe, to cultivate the beautiful, and to study nature. All this promotes the sound mind in the sound body.

The elements of personal and domestic hygiene should be taught in the higher standards. Continuation classes for the teaching of advanced hygiene should be formed. Attendance for a certain number of hours per year until a fixed standard or age has been reached, should be compulsory.

To every school or group of schools there should be connected a house in which girls could be taught the whole round of domestic work, boys so much of it as pertains or would be useful to them. Provision to be made for both boys and girls to live in the house for a certain number of days.

The duties of citizenship, communal duties, should be impressed on the older children. They should be taught to realize that if they partake of the privileges of communal living they must be prepared to forego something of what is generally termed the liberty of the subject. The conscientious objector reaps the benefit of a vaccinated community; he is willing that nurses and doctors and others coming in contact with small-pox patients should undergo what he considers a great risk, but he must have both the privileges of communal living and full liberty of the subject—a law unto himself. The woman who suspects her child to be suffering from a mild attack of, say, scarlet fever, and prefers to remain in ignorance as to the nature of the ailment so that her child may continue to go to school, is not fulfilling her communal duties, and would probably be the first to cry out if her neighbour acted so.

It need hardly be said that in connection with the continuation

classes on hygiene there should be a system of awards. We have band contests, ambulance competitions, and such like; why not physical drill competitions?

In future the duties of the Medical Officer of Health will have to be more educational or instructive than they are now. In fact, the duties as laid down by the Local Government Board need revision. Much of the Officer's time is taken up by work which can be, and ought to be, carried out by the Inspector of Nuisances. Is there any reason why the Medical Officer of Health should not give lectures in connection with the continuation classes? Should he not also be the examiner?

In conclusion, gentlemen, I trust that the few bald suggestions I have made will lead to a discussion which shall have a practical result.

DISCUSSION.

Dr. JACKSON congratulated Dr. Stainthorpe on the excellence of his paper, and entirely agreed with the sentiments expressed therein.

Dr. BOYD agreed with the tenour of the paper, and considered the teaching of hygiene of the highest importance to future generations, and of the greatest interest to Medical Officers of Health. The question with him was: What is practicable? He was struck with the ignorance displayed by the children taught in Board schools. Other members having spoken.

Dr. STAINTHORPE replied. He admitted the difficulty of conveying children to and from schools situated on the outskirts of towns, but considered that where there were trams—a special service for school children should be provided. He considered that the teachers of elementary schools should be recruited from a higher social grade than at present, at least in many instances. As Medical Officers of Health, they ought to be able to go into schools not only for inspection of school buildings, but for a general inspection of the scholars. He considered that the Medical Officers of Health could further the knowledge aimed at by supervising the teaching of hygiene in school continuation classes and as teachers of hygiene to elementary school teachers.

THE Paris Municipal Council has voted a grant of £120 to Professor Grancher in furtherance of his researches as to the means of preventing tuberculosis in schools.

DECREASE OF CONSUMPTION NOT DUE TO CHANGE OF NOMENCLATURE.—It has been said of late years that the decrease in the mortality from consumption has been to a certain extent due to reporting these deaths under the head of pneumonia. An investigation was made as to this point in New York with the result of finding very few pneumonia deaths that could properly be attributed to consumption. The investigation is still being continued, and whenever there is reason to believe that a death has been improperly credited, a change is made in the reports. Biggs does not believe that the great and rapid fall of the tuberculosis death rate is a result of false diagnosis.

LABORATORY EXPERIMENTS ON THE BIOLOGICAL TREATMENT OF SEWAGE.

By DAVID SOMMERVILLE, B.A., M.D., M.R.C.P. Lond., D.P.H. Camb.
From the State Medicine Laboratories, King's College, London.

MUCH has been written in recent years on the biological treatment of sewage, and various have been the views advanced regarding the mode of action and comparative results of aerobic and anaerobic bacteria. The enthusiasm with which particular modifications of contact beds, septic tanks, etc., have been exploited, arises more from fancy, it is to be feared, than from accurate knowledge of the changes produced, and the results obtained in any individual case.

The exact chemistry of the purification of sewage, as indeed of the so-called "oxidation of organic matter" in any form, is still obscure, and with this particular chapter of science I have at present nothing to do, further than to admit, that evidence exists to show that during the initial, intermediate, and final stages of sewage purification, highly complex organic molecules in the presence of oxygen, bacteria, moisture, and a suitable temperature, are transformed into comparatively simple inorganic equivalents; and that although the net result may still be broadly described as effected by "processes of oxidation" there is no doubt that, as in other forms of fermentation, the end is reached through manifold alternating steps of oxidation and reduction. At a future date I may have something to say concerning the chemistry of certain intermediate products of purifying sewage.

In looking broadly at present day methods of sewage purification, one recognizes two main stages, viz., an *initial*, in which a sufficient quantity of the solids of crude sewage are liquefied, in order to fit it for passing into the *second stage*, viz., that of filtration through fine contact beds, where the treatment is more or less completed.

It seems to be in connection with the first stage that differences of opinion exist as to the comparative merits of various methods, some maintaining that the septic tank method is the best, others that coarse contact beds are preferable, whilst a third class of observers hold to a combination of these two.

Other things being equal, it must be admitted that of the different forms of *initial stage* adopted, that which best disposes of the sludge problem and at the same time minimizes the formation of malodorous gases, must command universal respect.

That the septic tank emits foul odours is only to be expected, when it is remembered that the action of anaerobic micro-organisms on

organic matter is ever attended by the formation of evil-smelling gases. Aerobes perform their functions in a much less objectionable manner.

Mr. W. J. Dibdin has recently suggested a method for first stage operations, in which the disagreeable features of the septic tank are avoided. He employs as material for a coarse contact bed, slabs of waste slate, laid horizontally in rows, which are separated from each other, and supported by slate blocks.

It is found that the bed need only be half the size of a coke bed, much greater space obtaining for the growth and action of aerobic organisms; the bed can be most easily cleansed, and foul smells are completely absent. A film of oxygen is retained on the under surface of the slabs as the sewage gradually fills the bed. Loss of capacity, which largely occurs in coke and clinker beds, is reduced to nothing, as the material does not settle together, break down, nor impair drainage. Bacteria grow on both sides of the slates, and none of the intervening spaces can be choked as in coke beds.

The immediate object of the experiments to be described was to determine the degree of purification, as measured by decrease in albuminoid ammonia, corresponding with definite spaces between the slabs of slate, with the view of establishing if possible an optimum space.

Crude sewage, obtained through the kindness of Dr. Clowes from the London outfall, was used throughout. Operations were carried out in two laboratory tanks of different sizes, containing horizontal rows of slate slabs, arranged at distances apart, varying from one to twelve inches. Care was taken that the conditions of temperature, time given to filling and emptying the tank, time of contact of sewage with slates, etc., were as nearly as may be constant. The temperature was maintained at 16°-18° C. Half an hour was allowed for filling a tank, half an hour for emptying, and two hours for undisturbed contact. Five hours were allowed for rest.

The optimum vertical space between the rows of slabs as indicated by these experiments appears to be about four inches. A few examples selected from a large number of results will serve to make this manifest.

My thanks are due to Prof. Smith for introducing this work.

No. of Experiment.	Distance between rows of slabs	Percentage reduction of Alb. Ammonia.
5	1 inch	25
7	2 inches	81
11	2 "	80
17	3 "	50
19	3 "	52
23	4 "	58
29	6 "	45
35	12 "	18
37	12 "	17

PHYSICAL DETERIORATION.

THE Inter-Departmental Committee on Physical Deterioration, which was appointed by the Duke of Devonshire, as Lord President of the Privy Council, on the 2nd of September, 1903, and was instructed "to make a preliminary inquiry into the allegations concerning the deterioration of certain classes of the population as shown by the large percentage of rejections for physical causes of recruits for the Army and by other evidence, especially the report of the Royal Commission on Physical Training (Scotland), and to consider in what manner the medical profession can best be consulted on the subject with a view to the appointment of a Royal Commission, and the terms of reference to such a Commission, if appointed," has now issued a long and elaborate report [Cd. 2175]. It is divided into three parts, the first consisting of "an examination into the evidence deducible from the War Office figures, and a statement of the steps required to obtain reliable *data* for determining questions of national physique; the second and largest dealing with the causes and indications of degeneracy in certain classes of the community and the means by which it may be arrested; and the third part containing a summary of the principal recommendations which the Committee desire to make."

With regard to the first of these questions, the Committee are unable to discover any trustworthy evidence of the general or extensive physical degeneration which by some has been supposed to exist. They point out that the evidence adduced in the Director-General's memorandum was inadequate to prove that physical deterioration had affected the classes referred to; that no sufficient material (statistical or other) is at present available to warrant any definite conclusions on the question of the physique of the people by comparison with *data* obtained in past times; and that a partial investigation, as for instance into the condition of the classes from which recruits are at present mostly drawn, might be very misleading. After giving some account of the scanty materials for judgment which now exist, the report proceeds to recommend the adoption, in principle if not in every detail, of a comprehensive system of regular weighing and measuring of school and factory children which was brought before the Committee by Professor Cunningham, and also the systematic utilization of the reports of parish medical officers, which set forth all existing illness among the persons who receive medical relief under the Poor Law, and which at present do not pass beyond the individual Boards of Guardians to which they are presented. They propose that these measures should be placed under the supervision of an advisory council as a central authority, and they anticipate that material of very great value and importance might in a few years be expected from its labours.

Under the second head, the Committee declare "that the impressions gathered from the great majority of the witnesses examined do not support the belief that there is any general progressive physical deterioration," and they then enter into some detail with regard to the great improvements in public sanitation by which the probability of such deterioration has been diminished, although they are constrained to admit that in large classes of the community there has not been developed a desire for improvement commensurate with the opportunities offered to them. Laziness,

want of thrift, ignorance of household management, and particularly of the choice and preparation of food, filth, indifference to parental obligations, drunkenness, largely infect adults of both sexes, and press with terrible severity upon their children. The very growth of the family resources, upon which statisticians congratulate themselves, accompanied, as it frequently is, by great unwisdom in their application to raising the standard of comfort, is often productive of the most disastrous consequences. "The people perish for lack of knowledge," or, as it is elsewhere put, "lunacy increases with the rise of wages and the greater spending power of the operative class; while a falling wage-rate is associated with a decrease of drunkenness, crime, and lunacy." Local authorities, moreover, especially in the rural districts, are often reluctant to use their powers, and in these circumstances progress, unless stimulated by a healthy public conscience in matters of hygiene, is slower than might be wished.

The evils above referred to and others kindred to them are discussed at great length, and with frequent reference to the evidence of witnesses; and a variety of suggestions are made for bringing these evils under control by legislative action or by voluntary benevolent effort, as well as by improvements in school organization and teaching. In fact, this part of the report, from beginning to end, is an emphatic recognition of the supreme importance of health, and of the absolute necessity of taking active legislative, educational, and social means for its preservation and improvement, and for the removal of all circumstances by which it is imperilled.

The third part of the report is devoted to a summary of the principal recommendations which the Committee desire to make. These we append:—

1. *Anthropometric Survey*.—With a view to the collection of definite *data* bearing upon the physical condition of the population, the Committee think that a permanent Anthropometric Survey should be organized as speedily as possible upon the lines indicated in Part I. of the Report. In the first instance, this Survey should have for its object the periodic taking of measurements of children and young persons in schools and factories, of measurements of children and young persons in schools and factories, enlisting for this purpose the assistance, among others, of School Teachers and Factory Surgeons, supplemented by a small staff of professional Surveyors. Besides this, a more comprehensive and specialist survey, spread over a longer period, of the population of the country at large, might be undertaken.

2. *Register of Sickness*.—It appears to the Committee in the highest degree desirable that a Register of Sickness, not confined to infectious diseases, should be established and maintained. For this purpose the official returns of Poor Law Medical Officers could, with very little trouble and expense, be modified so as to secure a record of all diseases treated by them. And, further, it ought not to be difficult to procure the co-operation of hospitals and other charitable institutions throughout the country, so as to utilize for the same purpose the records of sickness kept by such institutions.

3. *Advisory Council*.—The Committee are emphatic in recommending the creation of an Advisory Council, representing the Departments of State, within whose province questions touching the physical well-being of the people fall, with the addition of members nominated by the medical corporations and others, whose duty it should be, not only to receive and apply the information derived from the Anthropometric Survey and the Register of Sickness, but also to advise the Government

on all legislative and administrative points concerning public health in respect of which State interference might be expedient; and to them might be remitted for consideration and report all the problems affecting public health which the requirements of a complex social organisation are constantly bringing to the front.

4. *Over-crowding.*—The Committee believe that the time has come for dealing drastically with this problem. They advocate an experimental effort by the Local Authority in certain of the worst districts, in the direction of fixing a standard and notifying that after a given date no crowding in excess of such standard would be permitted. It is believed that, if the thing were carried through without hesitation or sentimentality, means would be found, through the ordinary channels of supply and demand, or within the sphere of municipal activity, for housing all but the irreclaimably bad.

5. *Labour Colonies and Public Nurseries.*—It may be necessary, in order to complete the work of clearing overcrowded slums, for the State, acting in conjunction with the Local Authority, to take charge of the lives of those who, from whatever cause, are incapable of independent existence up to the standard of decency which it imposes.

6. *Building and Open Spaces.*—Local Authorities in contiguous areas which are in process of urbanization should co-operate with a view to securing proper building regulations, in furtherance of which end the making of Building Bye-laws to be approved by the Local Government Board should be made compulsory on both urban and rural authorities; attention should also be given to the preservation of open spaces with abundance of light and air. By the use of judicious foresight and prudence the growth of squalid slums may be arrested, and the districts which hereafter become urbanized may have at least some of the attributes of an ideal garden city.

7. *Smoke Pollution.*—The Committee strongly advocate that cases of pollution of the air by smoke and noxious vapours in manufacturing districts should be heard by a stipendiary magistrate. A stricter enforcement of the law, and a change in legislation, giving higher penalties, would produce a great improvement without imposing any serious burden on manufacturers. It should also be considered whether the responsibilities of the ordinary householder in regard to domestic smoke pollution might not be brought home to him.

8. *Register of Owners of Houses.*—It should be the duty of the Local Authority in all towns above a certain size to establish and maintain an accurate register of owners; this is one of the first *desiderata* towards dealing with slum property.

9. *Medical Officers of Health.*—A Medical Officer of Health in all areas above a certain population should be required to give his whole time to the work, and in no case, unless convicted of misconduct, should a Medical Officer of Health so engaged be removed without the consent of the Local Government Board.

10. *County and District Councils.*—With a view to strengthening the chain of responsibility in matters of local administration, County Councils should be empowered when necessary, after a reference to the Local Government Board, to act in default of urban (other than municipal boroughs) and rural sanitary authorities within the area of their administration, for all the purposes of the Public Health and Housing Acts, to which end the appointment of Medical Officers of Health who would give their whole time should be made obligatory on County Councils.

11. *Reports from Local Authorities.*—The Local Sanitary Authority

in each district should be required to furnish to the Local Government Board, through the County Authority, reports according to certain specified requirements, which will show accurately what was being done or left undone, in matters of sanitation and administration generally, and would thus form a basis of comparison between different districts. Armed with this information it should be the duty of the Central Authority to watch closely local administration, and to endeavour constantly to level up backward districts to the standard attained in the best administered areas.

12. *Law as to Insanitary and Overcrowded House Property.*—Nothing has been brought more prominently to the notice of the Committee than the ignorance that prevails, even in quarters which ought to be well informed, as to what the law and the powers it confers are. A statement on this subject was prepared for the Committee, with the assistance of the Local Government Board; and it appears to them that the Board could not do better than issue it, with such additions as they think proper, to all Local Authorities.

13. *Medical Inspection of Factories.*—The existing powers of Certifying Factory Surgeons should be extended, (1) so as to enable them to examine employees for purposes of qualification at a later age than sixteen; (2) so as to enable them to re-examine, when necessary, at definite intervals. Further, even if it be necessary that Inspectors of Factories and Medical Officers of Health should have, to some extent, co-ordinate powers with regard to insanitary conditions in factories, an arrangement should be made whereby each authority should notify to the other any defects that may be apparent, although coming within the other's province. Similarly it should be the Certifying Surgeon's duty to notify to the Factory Inspector or the Medical Officer of Health, as the case may be, such defects as may come under his notice.

14. *Over-fatigue.*—As a preliminary to any further legislation on the subject of hours of employment, particularly employment of women and children, it is, in the view of the Committee, highly desirable that there should be a strictly scientific enquiry into the physiological causation and effects of over-fatigue, as recommended by the Brussels Congress.

15. *Coal Mines.*—The medical examination of young persons should be extended so as to cover those employed in coal mines.

16. *Workshops.*—The inspection and supervision of these, as distinguished from factories, should be strengthened. The employment of children and young persons in workshops should be dependent, as it is in factories, on a medical certificate.

17. *Alcoholism.*—The Committee believe that more may be done to check the degeneration resulting from "drink," by bringing home to men and women the fatal effects of alcohol on physical efficiency, than by expatiating on the moral wickedness of drinking.

18. *Education in Rural Schools.*—With a view to combating the evils resulting from the constant influx from country to town, the Committee recommend that every effort should be made by those charged with the conduct and control of rural schools to open the minds of the children to the resources and opportunities of rural existence.

19. *Rural Housing and Allotments.*—Local Authorities in Rural Districts should apply themselves to remedying the dearth of cottages which exists in many parts of the country, by the exercise of their powers under Part III. of the Housing Act, 1890, as amended by the Act of 1900. If necessary, these powers might be supplemented by the introduction of some such machinery for putting them in motion as is contained in the

Labourers (Ireland) Act, 1883-1903. It should also be seriously considered whether the experiment, for which there are legislative facilities, of dividing land into small holdings, might not be tried more frequently.

20. *Food and Cookery.*—For the purpose of bringing home to the people the importance of properly selected and carefully prepared food, there is much room for training of a socially educative character among girls and young women. To this end the teaching of cookery in schools should be guided by the principles laid down in Paragraph 232 of the Report. Even more may be done by mothers' meetings and lectures, and the distribution of leaflets on the subject. Continuation classes for girls beyond school age should be organized, attendance at which should be compulsory, subject to the exercise of a judicious discretion on the part of the School Authority.

21. *Cooking Grates.*—It should be provided by law that every dwelling let for the occupation of a family should include a grate suitable for cooking.

22. *Adulteration.*—It would be highly expedient that the Local Government Board should be authorized to fix a standard of purity for all foods and drinks, in the same manner as standards for milk and butter have been fixed by the Board of Agriculture.

23. *Infant Mortality and Employment of Women.*—In order to arrive at some conclusion as to the connection between these two: (1) the infant mortality rates should be localized for particular areas in industrial towns; (2) general infant mortality rates for selected industries throughout the country should be taken; (3) the occupations (if any) of all mothers (married or unmarried) should be shown in the Registrar-General's records.

24. *Still-Births.*—Still-births should be registered.

25. *Medical Certificates as to Cause of Death.*—A medical certificate as to the cause of death should invariably be required before the death of any child, or indeed of any other person, is registered. Moreover, the medical certificate should be regarded as confidential, and its contents should never be divulged by the Registrar, as is permissible at present, to the friends of the deceased. It should be sent by the local Registrar direct to the Registrar-General.

26. *Employment of Women in Factories.*—The Committee do not think that the period during which employment after confinement is prohibited, could be extended without counterbalancing disadvantages. But the law should certainly be strengthened, so as to place upon the employer the burden of obtaining proof that the required period has elapsed since the confinement of the women he employs, or, in the alternative, so as to prohibit future employment in the absence of: (1) a medical certificate that it will not be prejudicial to their physical well-being, and (2) proof that reasonable provision is made for the care of their infants. This might take the form of a crèche, or be secured by the recognition for the purpose of a duly licensed body of women.

27. *Provident Societies and Maternity Funds.*—Charitable efforts in manufacturing towns might well be directed towards endowing and maintaining insurance organizations to which employees, assisted by voluntary subscriptions, could contribute while in work, and from which they might receive assistance during the period of confinement and afterwards.

28. *Milk Supply.*—With a view to ensuring the purity of the supply of milk to the community, the Committee think that the measures indicated in Paragraph 273 of the Report should be taken; in default of the Local Sanitary Authority taking proper precautions, the County Council should

in all cases be authorized to act, and it should be the duty of the Local Government Board to intervene in the ultimate resort.

29. *Feeding of Infants.*—The Committee are impressed with the enormous sacrifice of infant life due to insufficient or improper feeding. The ultimate remedy lies in that social education already described, and the Committee advocate the systematic instruction in continuation classes of girls in the processes of infant feeding and management. They also recommend the issue to mothers in every district of leaflets on the rearing of babies similar to those used in Sheffield and Wakefield; this could be done by the municipality, by voluntary associations, or by the Registrar on the registration of every infant.

30. *Milk Depots.*—It is of great importance that the milk supply should pass through as few hands as possible, and that milk vendors should not be general dealers whose sale of milk is confined to a few quarts. In order to effect these objects, milk depots should be formed in every town, obtaining their supply direct from the farms. The Committee believe this could be done without recourse to direct municipal action, but they think that in all improvement Bills promoted by Local Authorities, the insertion of provisions dealing with the milk supply within their area should be insisted on.

31. *Sterilization and Refrigeration.*—Having regard to the acute difference of medical opinion as to the effects of sterilization, the Committee recommend an investigation into the whole subject by a small body of experts. Milk, when drawn from the cow, should at once be refrigerated to a temperature of 40° Fahrenheit.

32. *Midwives.*—The Committee desire to call the attention of Local Authorities to the provisions of the Midwives Act, 1902, which may be made an instrument of the greatest utility for the dissemination among mothers of proper knowledge and practical advice.

33. *Training of Mothers (Health Associations).*—While laying special stress on the need for education of the young in matters of hygiene and domestic economy, the Committee believe even more may be done in the direction of training the mothers of the present generation in these matters. To this end, Health Societies on the lines of the Manchester and Salford Ladies' Health Society should be formed all over the country. Enough has been said of the value of the system by competent judges, to justify the Committee in urging upon every locality the adoption of similar methods. They would further suggest to the Local Government Board the expediency of issuing to Local Authorities a circular explaining the objects to be sought and the means by which they can best be attained.

34. *Elementary Schools in Ireland.*—It appears that the elementary school system prevailing in Ireland urgently requires amendment in regard to warming of schools and hygienic conditions generally.

35. *School Attendance in Rural Districts.*—The Committee think that school attendance in rural districts should not be compulsory till the age of six or possibly seven, and should be discouraged, if not absolutely prohibited, under five.

36. *Games and Exercises for School Children.*—It is desirable that more attention should be given, with the assistance, where possible, of voluntary agencies, to organizing games for school children, and for that purpose much greater use should be made both of school and public playgrounds than at present. But the Committee are of opinion that no scheme of games alone can ever be made general enough to supply the place of methodical physical training, and they hope that the course of physical exercises referred to in Paragraph 308 will find general acceptance

with Local Authorities. While they consider that such exercises should, when possible, be taken in the open air, they must urge upon Local Authorities the expediency of providing play-sheds or rooms other than the ordinary class-rooms, in which the exercises may be conducted regularly without interruption from the weather.

37. *Cookery, Hygiene, and Domestic Economy.*—Instruction in these matters should, as far as possible, be made compulsory on the elder girls at school, and care should be taken that it is placed in the hands of properly qualified teachers, to which end it is expedient that some State aid should be given under proper conditions to schools of cookery at which teachers are trained, and that hygiene in its various branches should be made an essential element in the course of training for all teachers.

38. *Partial Exemption from School.*—It should be considered whether the present law might not be modified so as to make it possible for a child under fourteen years of age to obtain partial exemption from the obligation to attend school, on no other condition than that of continuing to attend school up to a later age, for certain specified periods and for special subjects of instruction.

39. *Special Schools for "Retarded" Children.*—The Committee think that special schools of the Day Industrial School type might with advantage be established for the temporary treatment of children who are not up to normal school standard, and are yet not so defective as to warrant treatment as "mentally deficient."

40. *Special Magistrate for Juvenile Cases.*—In all cases touching the young where the assistance of a magistrate is invoked, he should, where possible, be a specially selected person sitting for the purpose.

41. *Medical Inspection of School Children.*—The Committee are emphatic in recommending that a systematized medical inspection of children at school should be imposed as a public duty on every school authority, and they agree with the Royal Commission on Physical Training (Scotland) that a contribution towards the cost should be made out of the Parliamentary Vote. With the assistance of teachers properly trained in the various branches of hygiene, the system could be so far based on their observations and records that no large and expensive medical staff would be necessary. The lines on which the inspection should be conducted are laid down in paragraphs 323-326 of the Report.

42. *Feeding of Elementary School Children.*—The Committee recommend that definite provision should be made by the various Local Authorities for dealing with the question of underfed children in accordance with the methods indicated in paragraphs 358-365 of the Report. The Committee, it will be seen, do not contemplate any one uniform method of procedure, but think that regard should be had to the varying circumstances of different localities. They also suggest safeguards against economic abuse.

43. *Physical Exercise for Growing Girls.*—If physical exercise of a recreative character were included in the curriculum in the obligatory evening continuation classes for girls, the establishment of which has already been recommended, it would be likely to add greatly to the value and ultimately, it may be, to the popularity of such classes.

44. *Crèches.*—Wherever it was thought desirable, owing to the employment of married women in factories, or for other reasons, to establish municipal crèches, girls over fourteen might be made to attend occasionally, and the teaching of infant management to such girls should be eligible for aid from the grant for public education.

45. *Open Spaces and Gymnastic Apparatus.*—It should be the duty of Local Authorities to provide and maintain open spaces in some proportion

to the density of the population, and such spaces, or some of them, should include shelters fitted with gymnastic apparatus. Every effort should also be made to put such apparatus to the best possible use, by placing it in charge of a competent instructor.

46. *Clubs and Cadet Corps.*—Having regard to the enormous value to the physique of growing lads of these institutions, and to the possible saving of expenditure in other directions resulting therefrom, the Committee are of opinion that some grant should be made from the National Exchequer in aid of all clubs and cadet corps in which physical or quasi-military training, on an approved scheme, is conducted, subject to public inspection.

47. *Physical Exercise for Growing Boys.*—Lads should be made to attend evening continuation classes, in which drill and physical exercises should take a prominent place; and, with a view to the encouragement of clubs and cadet corps, exemption from the obligation might be granted to all enrolled and efficient members of such organizations as submitted to inspection, and conformed to the regulations qualifying them for public aid.

48. *Organization of Existing Institutions for the Welfare of Lads and Girls.*—In order to organize existing efforts on a comprehensive and effective basis, the Committee would like to see a central body, in touch with municipal activity, established in every large town, and charged with the duty of supervising and directing voluntary agencies with a view to bringing them up to a minimum standard of efficiency.

49. *Juvenile Smoking.*—The Committee recommend that a Bill should be brought before Parliament at an early date, having for its object: (1) to prohibit the sale of tobacco and cigarettes to children below a certain age; (2) to prohibit the sale of tobacco and cigarettes in sweet shops and other shops frequented by children.

50. *Syphilis.*—The Committee recommend the appointment of a Commission of Inquiry into the prevalence and effects of syphilis, having special regard to the possibility of making the disease notifiable, and to the adequacy of hospital accommodation for its treatment.

51. *Insanity in Ireland.*—The Committee recommend that investigation should be undertaken at an early date into the extent and character of the increase of lunacy in Ireland.

52. *Teeth, Eyes, and Ears.*—The Committee are of opinion that the care of the teeth should receive special attention in the teaching of the elements of hygiene in schools, that daily cleansing of the teeth should be enforced by both parents and teachers, and that systematic inspection of the teeth, eyes, and ears of school children should be undertaken as part of that general medical inspection which has already been recommended.

53. *Vagrancy; Defective Children.*—The Committee wish to record their belief that the proposed inquiries into these subjects will be of great value.

CONSUMPTIVES IN FACTORIES.—At the factories of Messrs. J. S. Fry and Sons, in Bristol, there are 2,000 girls and women under 54 superintendents all carefully selected from the numerous applicants. All persons found to be tuberculous are suspended from work, put on the sick fund, and sent to a sanatorium as soon as possible. None of them are allowed to return, but are assisted to find work elsewhere, or are pensioned.

BORIC ACID IN MILK.

From reports in Australian newspapers we learn that the fight against the Health Board in the matter of preservatives in milk has reached a further stage.

It will be remembered that about a year ago the Board of Health of New South Wales framed regulations under the Health Act, practically prohibiting the use of preservatives in milk and other foods. The representatives of manufacturers of concentrated milk applied to the Board for an exemption for concentrated milk, as it could not be made under the prohibitive regulations, and it was in demand in the interior, where fresh milk could not be obtained. The Board refused the exemption. Then a select committee of the Legislative Assembly was appointed to inquire into the use of preservatives in milk. This committee, after what appears to have been a very limited inquiry, reported to Parliament: "That the use of 35 grains of boracic acid to the pound of butter, and 35 grains of boracic acid to one pound of concentrated milk, and 18 grains of boracic acid to the pound of table cream, will cause no injury to health and should be permitted." The day following—Nov. 25th—Parliament rose and the report was not considered. Early in January the representative of a milk company was prosecuted for using boric acid in concentrated milk, and was fined. The company applied to the Minister of Justice to remit the fine, but the Minister did not do so. The Minister said, however, that the question was under consideration. He also informed the magistrate that the case was under consideration. On Feb. 24th, the fine not having been paid within the time allowed, application was made to the magistrate for a warrant to commit the representative of the milk company to prison for non-payment of the fine. The magistrate refused, as he had been instructed by the Minister of Justice not to issue a warrant pending inquiry. The Minister then wrote to the Board of Health for its opinion as to the desirability of suspending the regulation, pending the final determination of Parliament. The Board in its reply traversed the report of the select committee, which, it maintained, was based on insufficient evidence, and finally stated that it could not recommend the suspension of the regulation now or at any time. The report of the Board was considered by the Cabinet, and it was decided to follow the advice of its expert advisers, and not to remit the penalty imposed on the milk company. In the meantime, on May 16th, an application was made to the Banco Court for a *mandamus* directing the magistrate to commit the defendant in the above case to prison. The Chief Justice, in delivering the judgment of the court, said he had no doubt that the rule nisi for a *mandamus* must be made absolute, with costs, not only against the respondent but the magistrate also. It was perfectly clear that the magistrate utterly misunderstood his position as justice of the peace. By the Section 19 of the Justices Act (27 of 1902) he was sworn to administer justice without fear, favour, affection, or ill-will, and he had no more right to take instructions from the Minister of Justice in this matter than from any individual in the street; and the only way to make magistrates understand their duty, and that they were not to take instructions from a government or any member of a government, was to make the particular magistrate pay costs. Whether he should be deprived of a commission which he did not understand, was a matter with which the court had no concern. He could not understand the Minister of Justice giving such instructions as were mentioned in the affidavits.

LAW REPORTS.

HIGH COURT OF JUSTICE.

KING'S BENCH DIVISION.

March 3rd, 1904.

BEFORE LORD ALVERSTONE, L. C. J., WILLS AND KENNEDY, JJ.

JACKSON v. WIMBLEDON URBAN DISTRICT COUNCIL.

Public Health Acts—Drain or Sewer, Single Private Drain—Pipe draining into.

A pipe which conveys the drainage of several houses belonging to the same owner into a pipe which is admitted to be a single private drain within the meaning of Section 19 of the Public Health Acts Amendment Act, 1890, is nevertheless a sewer.

This was a case stated by the justices of Surrey, on the hearing of an information by the respondent Council, to recover the cost of relaying a drain. The defence was that the pipe was a sewer, and repairable by the respondents. The pipe in question was laid in private ground, behind a terrace of houses all belonging to the appellant. It took the drainage of each of these houses, and carried it into another pipe which received the drainage of houses belonging to another owner. This latter pipe was connected with the public sewer, and was admitted to be a single private drain within the meaning of Section 19 of the Public Health Acts Amendment Act, 1890.* The justices decided in favour of the Council, but this was reversed on appeal.

S. Mayer appeared for the appellant, Macmoran, K.C. and G. Humphreys for the respondent Council.

The Court held that the fact that the pipe discharged into a private drain did not prevent it from being a sewer, which it undoubtedly would have been had it discharged into a public sewer, and allowed the appeal.

March 29th, 1904.

BEFORE LORD ALVERSTONE, L.C.J., DARLING AND CHANNELL, JJ.

WIELAND v. BUTLER HOGAN.

Public Health Act, 1875, Sections 116 and 117—Unsound Meat—Deposited for sale—Evidence.

Before justices can convict a person for being in possession of unsound meat intended for the food of man, they must be satisfied on the evidence that it was so intended, and if they believe that the person did not mean to expose it for sale, they cannot convict him merely because the meat was in his shop.

This was a case stated by the justices of Middlesex, on the hearing of an information of the respondent as Medical Officer of Health of the Urban District Council of Tottenham, under the Public Health Act, 1875, alleging that the appellant was in possession of certain unsound meat which was deposited for purposes of sale at his shop, and intended for the food of man. The justices convicted, subject to this case.

* According to the subsequent decision in *Thompson v. Eccles Corporation*, *Public Health* xvi. 641, this admission need not have been made.

The facts proved or admitted were as follows: On Monday, October 12th, 1903, shortly after 12 noon, an Inspector of Nuisances for the district visited the shop where the appellant carried on his business of a butcher. One customer was present in the shop, which was being cleansed, under the direction of the appellant's manager. The shop contained a safe which the inspector found closed. It was opened by him, and found to contain a large quantity of meat, for the most part perfectly sound, but part of a neck of mutton, weighing about three pounds, some sausages, and nine pieces of cooked meat on separate dishes, showed signs of decomposition. All these were seized by the inspector, and after being submitted for inspection to the respondent, were taken before and condemned by a justice on the same day as unsound and unfit for the food of man. The meat condemned was unsound and unfit for the food of man at the time of seizure, by reason only of decomposition or putrefaction.

The evidence on behalf of the appellant was as follows: Business was carried on at the appellant's shop up to midnight on the previous Saturday, when all the meat remaining unsold was placed in the safe, and was then sound and fit for the food of man. The ordinary course of business at the appellant's shop is to devote the morning on Mondays, when very little trade takes place, to cleansing and preparatory work, and not to set out for sale or examine the contents of the safe until this process is complete, and on the Monday in question the safe had not been opened after midnight on the previous Saturday, until the Inspector's visit, a period of about thirty-six hours. And further, that in the ordinary course of appellant's business, all the meat contained in the safe would have been examined before setting it out for sale, and any part found to have been unsound would have been removed.

Clarke Hall appeared for the appellant, R. Cunningham Glen for the respondent. The court allowed the appeal.

LORD ALVERSTONE, L.C.J. said in giving judgment that he thought the justices believed the evidence for the defence, and that they found as a fact that the meat had gone bad in the interval between Saturday and Monday, and that up to the time on Monday when the Inspector opened the safe, the meat had not been handled or moved from the safe. Under those circumstances, he did not think there was any evidence that the meat in the possession of the appellant was deposited for the purposes of sale on his premises, and was intended for the food of man. The decision was therefore wrong in law.

DARLING J., in concurring, said the justices had to consider two questions—first, was the meat deposited on the premises for the purposes of sale? and, secondly, was it intended for the food of man? The evidence given and which, I think, the justices believed, shows that it was not intended for the food of man. The meat was not exposed for sale at all, and further, whatever was the condition of the meat at the time when the safe was opened, at that time it was not intended for the food of man, for it would have been examined before it was exposed for sale.

CHANNELL J. also concurred.

April 12th, 1904.

ISLE OF THANET HOSPITAL BOARD v. FARQUHAR.

Public Health Act, 1875, Sections 131 and 132—Hospital belonging to Local Authority—Maintenance of Children—Liability of Guardians.

The charitable guardians of children who send them to the hospital of a local authority while suffering from an infectious disease, are not "patients" within the meaning of Section 132 of the Public Health Act, 1875, and cannot be made liable for the expense of maintaining the children, unless there is a contract either express or implied, binding them to pay these expenses.

This was an appeal from a decision of a County Court judge in an action by the plaintiff Board to recover the cost of maintaining six children in the Board's hospital for infectious diseases. The children were sent to the hospital from the Victoria Hospital for Children, of which the defendant was treasurer. The plaintiffs were a Board for a united district, created by a provisional order under the Public Health Act, 1875, Section 279.

It appeared that in August, 1902, the plaintiffs had established a hospital under Section 131 of the Public Health Act, 1875. In November, 1902, the matron of the plaintiff's hospital received a telephonic message from the doctor in attendance at the convalescent home, requesting the admission as patients to the hospital of six children who had developed scarlet fever. The six children were admitted to the hospital, and remained there for some time. The cost of maintenance was 10s. 6d. per child per week, amounting to the sum claimed, £25 11s. 6d. or more.

The amount was claimed under the provisions of Section 132 of the Public Health Act, 1875, or alternatively on a contract expressed or implied. The County Court judge held that the defendant was liable under Section 132, and did not consider the alternative. That section is as follows: "Any expenses incurred by a local authority in maintaining in a hospital, or in a temporary place for the reception of the sick (whether or not belonging to such authority), a patient who is not a pauper, shall be deemed to be a debt due from such patient to the local authority, and may be recovered from him at any time within six months after his discharge from such hospital or place of reception, or from his estate in the event of his dying in such hospital or place."

W. B. Campbell and Farquhar appeared for the appellant. Low, K.C. and Weigall for the respondent. The Court allowed the appeal, and remitted the case to be tried as to the contract.

LORD ALVERSTONE, L.C.J., said, as I understand it, the substantial part of the argument on behalf of the local authority was based upon Section 132 of the Public Health Act, 1875, and there was a reasoned argument for and against the view that the representative of the Victoria Hospital for Children came within the word "patient" in that section. In my opinion such a contention is not arguable. Section 132, *supra*, says that the expenses of a patient at the hospital shall be a debt recoverable from him within six months of his discharge, or, if he dies, from his estate. There may be good reasons for not going further. We are not entitled to construe the word "patient" as including charitable guardians, such as the authorities of the Victoria Hospital for Children, who are the principals of this convalescent home. The learned County Court judge has distinctly based his judgment on Section 132. It is doubtful to my mind whether the case was seriously based on contract; but the question seems to have been raised, not indeed on an express, but on an implied contract. If we were satisfied there was no case made for the respondents on contract, we certainly should not send the case back for a new trial, but the matter being of importance, we think there ought to be a new trial, if the respondents so desire.

WILLS and KENNEDY, JJ. concurred.

July 8th, 1904.

BEFORE LORD ALVERSTONE, L.C.J., KENNEDY AND PHILLIMORE, JJ.

BROOKS v. BAGSHAW.

Sale of Food and Drugs Acts—Milk—Proceedings out of Time—Second Summons on same information.

Although Section 19 (1) of the Sale of Food and Drugs Acts requires that proceedings shall be instituted within twenty-eight days, it is sufficient if the information is laid within that time, although the summons be issued subsequently and after 28 days, and if the first summons is wrong a second can be issued.

This was a case stated by the justices of Norwich on an information by the appellant Brooks, an Inspector under the Sale of Food and Drugs Acts, against the respondent, Bagshaw, for selling milk alleged to have been adulterated with 43 per cent of added water. At the hearing the respondent took a preliminary objection that the prosecution was out of time, as not having been instituted before the expiration of twenty-eight days from the time of the purchase, as required by the Sale of Food and Drugs Act, 1899, Section 19 (1). The information was laid on January 23rd, 1904. The summons was issued on the same day, and made returnable on February 11th, 1904. This summons was not served until January 29th. Section 19 (2) of the same Act provides that a summons shall not be made returnable in less time than fourteen days from the day on which it was served. As there was not fourteen days between January 29th and February 11th, the case was not proceeded with on February 11th, but a fresh summons was issued on the original information. It was objected that this was too late, and the justices were of that opinion.

E. E. Wild appeared for the appellant, and the respondent did not appear. The Court allowed the appeal.

The LORD CHIEF JUSTICE, in giving judgment, said that the question in this case was not exactly covered by the decision in *BEARDSLEY v. GIDDINGS* (See *Public Health*, p. 511), but was whether there was any valid objection to a summons being issued more than twenty-eight days after the date of the alleged offence, the information having been laid within the twenty-eight days. In *BEARDSLEY v. GIDDINGS* it happened that the summons was issued on the same day as the information was laid, and the Court held that it was not the service, though outside the twenty-eight days, that was the governing condition, but the commencement of the proceedings. In criminal proceedings the commencement of them was the laying of the information. Ever since *Ex parte FIELDING*, it seemed to have been held that on a valid information a series of summonses could be issued, unless there had been a determination on the merits. He thought that as this information was in proper time, the issue of the second summons on February 11th, was not too late, and the appeal must be allowed.

KENNEDY and PHILLIMORE, JJ. concurred.

COUNTY OF LONDON SESSIONS.

July 16th, 1904.

BEFORE MR. LOVELAND LOVELAND, K.C.

Sale of Food and Drugs Acts—Milk—Warranty.

The Great Western and Metropolitan Dairies (Limited), of Harrow Road, Paddington, appealed against a conviction by the justices for the

Kensington Petty Sessional Division, and against a fine of £2, with £5 5s. costs, for giving a false warranty in writing in respect to certain milk.

Mr. Avory, K.C., and *Mr. R. D. Muir* were for the appellants; *Mr. R. Cunningham Glen* appeared for the Chelsea Borough Council in support of the justices' decision.

It appeared that an inspector under the Sale of Food and Drugs Acts had bought a sample of milk from an assistant of a dealer named Williams, which on analysis was found to contain 6 per cent of added water. A summons was issued against Williams, and he proved that he bought the milk with a warranty from the present appellants, and the summons against him was dismissed and a fresh summons issued against them, on which they were convicted. It was proved on their behalf that they also had bought the milk with a written warranty from a farmer in the country, and that they had taken the precaution of having their milk analysed frequently, and had never found any deficiency in the milk supplied by that farmer. The appeal was allowed and the conviction quashed.

CORRESPONDENCE.

CYLLIN AND B. PESTIS.

To the Editor of Public Health.

SIR,

Referring to Dr. Griffith's experiments on cyllin (medical), reported in your issue of July last, I may point out that this body has a selective action on micro-organisms, as also the other body known as cyllin, or cyllin (disinfectant).

In a paper published by Dr. Smith and myself in the *Journal of State Medicine*, January, 1904, it is shown that working with a certain strain of *B. typhosus*, cyllin (medical) has a carbolic acid co-efficient of 16, whereas with a certain strain of the Klebs-Löffler bacillus, the carbolic acid co-efficient is 20.

In looking through recent papers I find a unanimity of opinion amongst a few observers as to the carbolic acid co-efficient of cyllin, which I take to be cyllin (disinfectant), when put into action on *B. typhosus*.

<i>B. typhosus</i> ..	Dr. Rideal (a)	..	11
do. ..	Col. Firth, R.A.M.C. (b)	..	11
do. ..	Dr. Kistner, Hamburg (c)	..	11
do. ..	Mr. Ainslie Walker (d)	..	11

Dr. Klein's (e) carbolic acid co-efficient of 30 for *B. pestis*, and Mr. Ainslie Walker's (f) 10 for *B. shiga*, support the view of selective action above mentioned.

I am, Sir, Faithfully yours,
DAVID SOMMERVILLE, M.D., M.R.C.P.

53, NEW CAVENDISH STREET, W.

(a) *Public Health*, Dec., 1908. (b) *Journal of the Royal Army Medical Corps*, March, 1904. (c) From *Hygienic Institute*, Hamburg, May, 1904. (d) *Private Laboratory Report*, 1904. (e) *Public Health*, June, 1904. (f) *Private Laboratory Report*, 1904.

REVIEWS.

ANNUAL REPORT ON FACTORIES AND WORKSHOPS FOR THE YEAR 1903.

By Dr. Arthur Whitelegge, C.B., Chief Inspector of Factories and Workshops, [Cd. 2139]

The report states that at the close of the year there were 102,939 factories and 144,148 workshops upon the registers. These totals include laundries, but not men's workshops, domestic workshops or factories, docks, or warehouses. There were received from occupiers during 1903 317,933 statutory reports. A Parliamentary Return [102], dealing with the cases of lead-poisoning reported in connection with the china and earthenware manufacture in 1902, was made in 1903; and a like return [103] of the cases reported in 1903 has since appeared.

A return of persons employed in 1901 in factories, workshops, and laundries was collected in 1902. Progress was made with the tabulation in 1903, under considerable difficulties, owing to the large number of defaulters, which was about 100,000. As regards textile factories and laundries the results have already been published [Cd. 1979]. Owing to the comparatively small number of employers concerned, it was found to be practicable in the above industries to make the return complete by repeated applications, and in some instances personal investigation by the inspectors. The returns for non-textile factories and for workshops are being tabulated. Special inquiry was directed to the ventilation of humid cotton cloth factories and the observance of the standard fixed by section 94 (3). A report [Cd. 2135] by Mr. F. Scudder, F.I.C., is being laid before Parliament separately.* Arrangements were made for determinations of carbonic acid as a measure of the efficiency of ventilation in factories and workshops generally. The new regulations for file-cutting, and for the manufacture of electrical accumulators, include specific requirements as to means of ventilation. The attention of the inspectors has been specially directed to the requirement of section 6 (1) that "in every factory and workshop adequate measures must be taken for securing and maintaining a reasonable temperature in each room in which any person is employed, but the measures so taken must not interfere with the purity of the air of any room in which any person is employed." In the two new codes of regulations for dangerous trades already named, provision is made for cleanliness of floors, and in file-cutting shops it is required that the walls and ceilings shall be lime-washed twice in each year. The Sanitary Accommodation Order came into force on July 1st, and has proved of the greatest service. The pottery arbitrations have been completed by further awards. Samples of glaze taken by the inspectors in the works under exemption, and examined at the Government Laboratory were found to conform to the requirements with a few minor exceptions, where a small excess was attributable to want of care in grinding.

The Employment of Children Act, 1903, which came into force on January 1st, 1904, to some extent strengthens the hands of the Department, more especially in laundries, docks, and other places which are only partially subject to the requirements of the Factory and Workshop Act. In such places it enables the inspector to prevent the employment of a child after 9 p.m., or in work for which he is physically unfit. The same Act confers upon the officers of local authorities the same powers with regard to licences for the employment of children in public entertainments as were given to His Majesty's inspectors of factories by section 3 of the

* See p. 803.

Prevention of Cruelty to Children Act of 1894. The duty of enforcing the conditions attached to such licenses, from January 1st, 1904, rests with the local authorities. The number of children respecting whose employment licenses were received during 1903 was 722, as compared with 623 in 1902 and 238 in 1901. Irregularities were found in 20 instances, and the managers were cautioned.

A revised memorandum to District Councils was issued from the Home Office in April, 1903, and was followed in May by a further circular dealing specially with underground bakehouses.

AIR TESTS IN HUMID COTTON WEAVING SHEDS. By Frank Scudder, F.I.C. Report presented to Parliament [Cd. 2135]. Price 3d.

After detailing the history of legislation governing humid cotton cloth factories, and quoting the conclusions of Dr. Haldane and Mr. Osborn [Cd. 1302], Mr. Scudder points out that the statutory limit of 9 parts of carbonic acid per 10,000 of air makes no provision for variation in the proportion of carbonic acid in fresh air. This is usually assumed to be about 4 per 10,000, leaving a margin of about 5 per 10,000 for respiratory impurity. Under certain atmospheric conditions, however, considerably more than 4 per 10,000 is found in the open air, so that mechanical ventilation adequate to maintain the standard in ordinary weather may from time to time fail to do so unless the installation is so planned as to afford at ordinary times a result far below 9. It has, therefore, been the practice of the Department, with the assent of the employers and operatives, to regard the air of a weaving shed as, substantially conforming to the standard if the proportion of carbonic acid does not exceed that in the open air by more than 5 parts per 10,000. The reasonableness of this practice is confirmed by the present Report. Three out of the five instances of excess over nine are seen to have been due to an abnormal proportion of carbonic acid in the outside air; the added carbonic acid due to respiratory impurity, which ventilation is designed to remove, being well within the intended limit.

Under the 1889 Act, and still more under the stricter requirements of the Order of 1898, now included in the Act of 1901, great improvements have been effected in the ventilation of humid cotton weaving sheds, and some of these are now among the best ventilated factories, with corresponding advantage to the health of the operatives and to the efficiency of their work. It will be seen from the present Report that good results have been attained by more than one system.

In the experience of the Department there has been substantial conformity with the "nine" standard in daylight, where a properly planned installation has been made and has received due attention. It has, however, been contended by manufacturers that while it is practicable to conform generally to the standard, it is not practicable to maintain it at all times in all parts of every shed, as the terms of the statute require; and that, as a matter of experience, with approved appliances and with every reasonable care in their use, there are occasional and unavoidable instances of excess over the statutory limit, even when interpreted as above. In view of this, of the provisions of section 7 of the Act of 1901 (cited above), of the suggestions of the Ventilation Committee, and of the pending question of chemical standards of ventilation for other classes of factories and workshops, the Home Secretary decided that an enquiry should be made by an independent chemist, and an undertaking was given by the manufacturers that if the result of the inquiry was to show that the statutory restriction upon the amount of carbon dioxide could be

observed they would accept the situation without further question, and make every effort to comply with the requirement.

It was desired by the Home Office, with the concurrence of the manufacturers, that the operatives should be associated in the inquiry; but the invitation was declined by the operatives, on the ground that no condition was made as to increasing the stringency of the standard if the results should show a still higher degree of purity of air to be practicable. Thirty sheds were selected by the Home Office, and, in all, 287 tests were made. Of these 282 complied with the standard of 9 volumes of carbon dioxide per 10,000 volumes of air, and only 5 (from 2 sheds) infringed this standard; one of the 5 just exceeded the limit 9.1.

Dr. Whitelegge calls attention to the fact that in the great majority of cases the proportion of carbonic dioxide was far below that allowed by either limit.

Comparative analyses of outside air were made, and the results are recorded in the tables. The CO₂ in the air of the sheds exceeded that in the outside air by more than 5 parts per 10,000 of air in only 9 determinations affecting 7 sheds; the highest figures being 5.4 (shed 5, List C, Table 7) and 5.2 (shed 11, List B, Table 6, and shed 4, List C, Table 7). In no other instance out of the 287 tests was the difference greater than 5.1, and, as explained in Table 3 (shed 6, List A), the conditions associated with two of the 5.1 results were exceptional.

It appears, therefore, that installations planned and carried out by competent engineers to keep the air of a shed within the prescribed limit do in practice fully maintain the standard, notwithstanding inequalities due to local or accidental circumstances, provided that the appliances are kept in proper order and used to the full extent intended, and that their adequacy or efficiency is not impaired by subsequent alterations in structure or arrangement.

This report amply justifies the protest which has been made against any lower standard of ventilation being sanctioned by the Home Office for factories and workshops generally.

INFECTION AND IMMUNITY, WITH SPECIAL REFERENCE TO THE PREVENTION OF INFECTIOUS DISEASES. By George M. Sternberg, M.D., LL.D., Surgeon-General U. S. Army (Retired). Large 8vo, cloth, pp. 293. Price 6s. net. London: John Murray.

In this volume, one of the Progressive Science Series, the author has stated the main facts, so far as they have been established, with reference to infection and immunity, with the practical object of indicating the measures necessary for the prevention of infectious diseases. As the work is intended for non-medical readers, the use of technical terms has been avoided as far as practicable, and when it has been necessary to use them, explanation of them is given. Wisely no attempt has been made to give an account of recent investigation with reference to Ehrlich's side-chain theory, for the subject is not one which lends itself to popular treatment. The author has been successful in dealing with his subject, and the only fault we can find is that his figures and examples are chiefly of American origin, which may not appeal so strongly to British readers, but this is rather the fault of the Editor of the Series. However, it may be that he expects the larger number of readers to be "on the other side." Anyhow we echo the wish of the author that this volume may serve as a text-book in our high schools and colleges. The diffusion of such knowledge cannot fail to promote the health interests of the people. The chapters on Disinfection are clear and practical, and the second part of the book is occupied with a consideration of the more important communicable diseases.

PROCEEDINGS OF THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FOUNDED 1856. RECONSTRUCTED, 1888. INCORPORATED, 1891.

Metropolitan Branch.—The Annual General Meeting of the Branch was held at the offices of the Society, 9, Adelphi Terrace, on July 26th. Present: Drs. Reginald Dudfield (President), H. W. Roberts, R. K. Brown, S. Davies, O. Field, E. F. M'Cleary, P. Caldwell Smith, J. F. J. Sykes, G. B. Millson, F. J. Allan, L. T. F. Bryett, and J. Priestley (Hon. Sec.)

Bye-laws as to Spitting.—The Secretary reported that he had written to the Clerk of the County Council asking who were entitled to enforce the Bye-laws recently made *re* Spitting. In reply, the Clerk, Mr. Gomme, stated that counsel's opinion had been taken on the point, and that it was to the effect that under the provisions of section 23 (5) of the Municipal Corporations Act, 1882, an offence against the "bye-law may be prosecuted summarily," and that it is competent for any person to take proceedings, and that Societies may, if they think fit, instruct their officers to apply as common informers for summonses under the bye-law.

The Secretary of the Branch then wrote to the Commissioner of Police of the Metropolis, asking what the Police are doing in the matter, especially as regards theatres, etc. The Commissioner replied that as the bye-law applies only to public carriages, public halls, waiting rooms, or places of public entertainment, and not to public thoroughfares, the Police have little or no opportunity of detecting persons infringing the provisions thereof.

Draft Bye-laws of Local Government Board *re* Houses let in Lodgings.—The Council recommended the following alterations:—

Clause I.—(Interpretation of terms)—to add the following:—
"Owner," in relation to a lodging house, means the same as defined in Section 141 of the Public Health (London) Act, 1891.

Clause XV.—To read as follows:—
The landlord or owner of a lodging house shall, in the month of—
in every year, cause every part of the premises to be cleansed.

He shall, at the same time, cause the walls of every area, the surface of every ceiling, and the interior surface of every wall of every room, staircase, and passage in lodging house, and of every water-closet belonging to the premises, to be thoroughly lime-washed in every case where lime-washing is necessary for effective cleansing.

Provided that the foregoing requirement with respect to lime-washing shall not apply in any case where the internal surface of any such ceiling or wall is painted, or where the material of or with which that surface is constructed or covered is such as to render the lime-washing thereof unsuitable or inexpedient, and where the said surface is thoroughly cleaned, and the paint or other covering is renewed, if the renewal thereof be necessary for the purpose of keeping the premises in a cleanly and wholesome condition.

Clause XVI.—To read as follows:—
Subject to the provisions of these bye-laws, the landlord or owner of the lodging house shall provide adequate means of ventilation in or in connection with every common passage or staircase in the lodging house,

and shall cause the said means of ventilation to be maintained at all times in good order.

Clause XIX.—to read as follows:—

Where a duty imposed upon or a prohibition applied to the landlord or owner of a lodging house is by any bye-law expressly imposed or applied subject to the provisions of these bye-laws, proceedings shall not be taken against the landlord or owner for an offence against the bye-law unless and until the landlord or owner, after service upon him of a notice in writing by the Council requiring him within such reasonable time as is specified in the notice to comply with the bye-law, has failed to comply with the bye-law within the time so specified.

N.B.—Words underlined: suggested additions. Words in italics: = suggested deletions.

The recommendation of the Council was adopted and instructions given that the Local Government Board be written to on the subject.

The Discharge of Patients from Fever Hospitals.—On recommendation of the Council the following resolution was adopted:—

"That the Metropolitan Asylums Board be thanked for, and asked to continue, the existing arrangement of furnishing the Metropolitan Medical Officers of Health with a duplicate of the notice of the proposed discharge of fever patients from hospital to their homes, such information having proved of great service during the year of experiment allowed by the Board" (June 30th, 1904).

Donation to Library.—A sum of £10 10s. was voted to the Library Committee towards the purchase of a Library for the Society.

Election of Officers.—The following were elected: President, Dr. H. W. Roberts; Vice-Presidents, Dr. R. Dudfield and Dr. L. C. Parkes; Treasurer, Dr. H. W. Roberts; Hon. Secretary, Dr. J. Priestley; Representatives of Branch on Council of Society, Drs. W. A. Bond, R. K. Brown, L. T. F. Bryett, S. Davies, R. Dudfield, O. Field, E. F. McCleary, G. Newman, L. C. Parkes, P. C. Smith; Council of the Branch, the above, and Drs. F. J. Allan, G. B. Millson, and J. F. J. Sykes.

Home Counties Branch.—A meeting was held at the Plaistow Hospital, West Ham, on Friday the 17th June, 1904. Present: Drs. Sanders, Tew, Brincker, Nash, Macfadden, and Richards.

The following officers were elected for the year 1904-5: President, Mark Sharman, M.B., D.P.H.; Treasurer, Alfred Ashby, M.B., F.R.C.S.; Hon. Sec., H. Meredith Richards, M.D.

The adjourned discussion on Building Byelaws was postponed pending receipt of the printed copies of the bye-laws. It was also arranged to adjourn the formation of a Committee *re* Water Supplies, until Drs. Childs and Thresh could be present. The members subsequently inspected the hospital, under the guidance of Dr. Biernacki, and were much impressed with all they saw. Before separating a vote of thanks was passed to Dr. Biernacki and to the Matron for their kind hospitality.

Southern Branch.—A meeting was held at Christchurch on July 1st, 1904. Present: Drs. Fraser (President), Parkinson, Legate, and Griffith, with Col. Clements and Dr. Hartford as visitors.

After dining together the members proceeded to business. It was resolved to send a message to Mrs. Kelly and family, expressing sympathy and regret at the death of Dr. Charles Kelly, who was one of the most

regular supporters of the Branch, and twice its President. The following officers were elected for 1904-5: President, Dr. A. S. Norman; Vice-Presidents, The Ex-Presidents; Representatives on Council, Drs. Stephens and Willoughby; Hon. Treasurer, Dr. H. Stott; Hon. Secretary, Dr. Griffith.

Fixity of Tenure.—A discussion took place on Fixity of Tenure, and it was resolved "That this Branch hopes the Parent Society will make every effort to get a Bill before Parliament, and pledges itself to assist as far as possible."

A question put forward by Dr. Stephens was discussed, "How long should oysters remain in pure beds, after removal from polluted ones, before they are sold for consumption?" It was thought that such oysters ought to be condemned; but if they were so moved, that it must rest with the local Medical Officer of Health to decide when they should be passed for sale.

The questions sent by the Society were then considered, and the resolutions of the Society on Food Adulteration were agreed to. Of the resolutions from the Metropolitan Branch, only 1 and 2 were agreed to; with respect to 3, the Branch did not see its way to support it, and thinks the suggestion in the latter part would be of no use.

Another question by Dr. Hawkins was considered: "What to do with our temporary isolation hospitals, to make them permanently useful?" It was decided to answer as follows: "That they should not be made permanent, but kept for temporary emergencies."

Dr. Griffith then gave the results and methods of some tests of chemical disinfectants, the results of which were set out in tables and handed round.

ENDO'S METHOD FOR TYPHOID DIFFERENTIATION.—G. Ruata has been testing the method of differentiating the typhoid bacillus which has been published by Endo of Kitasato's laboratory. The bacilli are grown on a medium containing fuchsin decolorised by sodium sulphite. The medium is transparent and shows up well the colonies of the typhoid bacilli, which are colorless, while the colonies of colon bacilli restore the red color to the medium. Ruata did not find the test very reliable, certainly not superior to other color differentiating tests.—*Riforma Med.* xx, No. 17.

DRASTIC MEASURES TO SECURE PURE MILK.—The city of New York health department is throwing large quantities of milk into the streets because the temperature when examined by the inspectors is above 50 degrees. As much as 3,000 cans have been spilled in a single night, and recently a whole train load was condemned on its arrival in the city. The milk dealers are complaining greatly because they have been at times unable to supply their customers. Such rigid procedures are being carried on in order to lessen the number of cases of cholera infantum.

THE SIMPLE MEASURES NECESSARY FOR THE PREVENTION OF CONSUMPTION.—There is no doubt that the neglect of the first principles of hygiene, embodied in the words light, ventilation, and cleanliness, and all which they connote, have more influence over the occurrence of this disease than has hitherto been imagined. The application of these to its cure, as in the open-air treatment, is of infinitely less consequence than their application to the prevention of the disease. When all houses are properly lighted and properly ventilated by windows and doors that are opened the chances of the propagation of tuberculosis will indeed be small.—E. H. Snell, *Ann. Rept.*, Coventry.

CURRENT PUBLIC HEALTH LITERATURE.

Zeitschrift für Hygiene und Infektionskrankheiten,
VOL. XLVII. PART I.

- I. Ueber Infection mit "Leishman'schen Körperchen" (Kala-Azar?) und ihr Verhältniss zu Trypanosomen-Krankheit. (On infection with Leishman's bodies (Kala-azar?) and its relation to trypanosoma disease.) By Prof. F. Marchand (Leipzig) and Dr. J. C. G. Ledingham (Aberdeen). (This is a further account of a case published under the title of a "Contribution to the knowledge of the so-called Banti's disease and Anæmia Splenica" (*Münchener Med. Wochenschrift*, No. 11, 1903, and *Centralblatt für Bakteriologie*, Originale Vol. XXXV, 1904, No. 5, and *Lancet*, Jan. 16, 1904.) Their conclusions are:—

1. The parasites described by us are identical with those found by Leishman and Donovan in preparations from the human spleen in tropical splenomegaly, and stand in close relationship to those observed by Wright in the Delhi bubo.
2. The parasites known provisionally as "Leishman's bodies" are the cause of a general infectious disease, which resembles in its course trypanosoma infection, and like this is apparently conveyed by the bites of insects. This disease is probably identical with Kala-azar.
3. The Leishman bodies, like the species trypanosoma, are distinguished by the presence of a micro-nucleus, and resemble greatly the degeneration forms of trypanosoma.
4. Their occurrence in masses in the spleen, liver, bone marrow, and lymph glands, indicates that the parasites at least occasionally circulate in the blood. We did not find them in the red blood corpuscles.
5. In the organs above named a marked phagocytosis takes place, which apparently leads to a gradual destruction of the parasites. An increase of the parasites in the organs is nevertheless not excluded. The phagocytes of the liver are derived principally from the spleen. A small part reach the kidneys.
6. In trypanosoma Brucei there takes place in the spleen of the rat a similar phagocytosis, in the liver analogous large cell-forms are found, and the parasites here are much more actively destroyed.

- II. Actinomycosis Atypica Pseudo-tuberculosis (Streptothrichosis hominis autorum). By Dr. J. A. Schabod (Peter-Paul Hospital, St. Petersburg). The first case of this disease was described by Prof. Eppinger in 1890, since which time several cases have come to light. The author then details very fully his observations on a case which occurred in the Peter-Paul Hospital. As a result of his investigation he arrives at the following conclusions:—

1. That there exists a special kind of micro-organism pathogenic for men, which in its characteristics stands midway between the ray fungus and the tubercle bacillus.
2. This atypical ray fungus causes in men an illness resembling actinomycosis, but distinguished from the latter by causing a thick, stringy

mucus of homogeneous consistence without granules, forms no club-shaped excrescences, and is acid-fast.

3. There are two sub-species of this atypical ray-fungus, a simple one and a pseudo-tubercular. The former liquefies gelatin and produces in animals no pseudo-tuberculosis. The latter does not liquefy gelatin, and causes pseudo-tuberculosis in animals.

4. *Actinomyces pseudo-tuberculosis* is of biological interest as a connecting link between actinomycosis and tuberculosis, and as a proof of the botanical relationship of both diseases.

5. All the exciters of diseases with formation of tubercles known up to the present, from the groups of tuberculosis, pseudo-tuberculosis, and actinomycosis, are distinguished by being acid-fast.

- III. Bericht über eine Malaria Expedition nach, Deutsch New Guinea. By Dr. Dempwolf. (This is a report on a malaria expedition to German New Guinea, 1901-03, under the direction of Prof. Koch, and performed on similar line to those to German East Africa, Istria, and South-West Africa.)

- IV. Anatomisch nachgewiesene Tuberculin-Heilung einer Miliartuberculose der Lungen. (Anatomically-demonstrated healing of miliary tuberculosis of the lungs by tuberculin.) By Dr. Carl Spengler (Davos). This is an account of a case of sub-acute phthisis which in the spring of 1890 became acute through the spreading of the process into the free parts of the lungs, especially the left, accompanied by fever, anæmia, 17 lbs loss of weight, and general aggravation of the symptoms. He was treated at intervals, by Cornet and L. Spengler, with the original tuberculin (T.O.A.), until the year 1894, when his lungs were reported fully active, that he was free from fever and the sputum from tubercle bacilli, and his general condition the same as in his healthy days. In December of this same year he died suddenly of brain trouble. After death a minute microscopical examination was made of the lungs, but unfortunately permission was not granted to examine the other organs. In the lungs neither tubercle bacilli, giant cells, or other evidences of active tubercle could be discovered. There were numerous adhesions and other evidences of healed tubercle, such as small granules or tubercles which were represented by connective tissue, in which no trace of caseation, etc., could be found. The author remarks on this case that from it the healing virtue of tuberculin cannot be doubted, and that in man the curing of a miliary tuberculosis of the lungs has never before been observed or anatomically proved.

- V. Ueber einige praktische Anwendungen der Präcipitine in der Nahrungsmittel Chemie. (On some Practical Applications of Precipitine in Food Chemistry.) By Dr. Albert Schütze (Berlin). This is a description of the methods of distinguishing the various albuminous and nitrogenous ingredients in food by the formation of precipitines. It is one of the methods of applying a biological method to chemical analysis.

VOL. XLVII. PART II.

- I. Ein Beitrag zur Frage nach der ätiologischen Bedeutung gewisser Pflanzenpollenkörner für das Heufieber. (A Contribution to the question of the Ætiological Significance of the Pollen Grains of certain plants in Hay Fever.) By Dr. H. Liefmann (Hamburg). This is an account of an experimental enquiry into the ætiology of hay fever, held in the Govern-

ment Institute of Hygiene in Hamburg, under the Directorship of Prof. Dunbar. He considers that the following propositions were established by him in the course of his investigations:—

1. That the appearance of hay fever and pollen in the air are contemporaneous in point of time, in so far as the beginning and ending of both occur together.
 2. That the factors which influence the amount of pollen in the air, govern in a like sense the clinical aspect of the disease, so that the curve of the amount of pollen in the air is covered by that of the general course of illness.
 3. That the formerly open question, whether the amount of pollen which was demonstrable in the air sufficed to account for the causation of the symptoms of hay fever, can be answered positively.
- II. Ueber die Behandlung von 800 von wüthenden Wölfen gebissenen Personen in Bukarester pathologisch-bakteriologischen Institut. (On the treatment of 800 persons who were bitten by rabid wolves, in the pathological-bacteriological Institute of Bucharest.) By Prof. Dr. V. Babes. This is an account of a number of cases treated by the Pasteur method, with the addition of an immune serum prepared from the blood of dogs and asses. The author claims by his method to have considerably reduced the mortality from this disease in the severely bitten cases.
- III. Vergleichende Studien über die Tuberculine von Menschen und Rinder tuberkelbacillen bei der diagnose der Rindertuberculose. (Comparative studies on the tuberculin made from the bacilli of human and bovine origin, in the diagnosis of bovine tuberculosis.) By M. Kanola (Imperial Serum Institute of Tokio). From his enquiries he thinks that: (1) For the diagnosis of bovine tuberculosis, tuberculin of bovine origin (R. tuberculin) is more suitable and trustworthy than that prepared from human T.B. (M. Tuberculin); (2) The reaction of R. Tuberculin was both quick and strong (this is of great value when in practice the injections are carried out on a large number); (3) The intravenous injection of R. Tuberculin is specially to be recommended, since the reaction reaches its maximum in 6 to 8 hours.
- IV. Die Typhus-epidemie im Landkreis Beuthen O/S in Jahre 1900. (Typhoid epidemic in the district of Beuthen in the year 1900.) This epidemic is specially interesting since it is a complement to the account of the prevalence of typhoid in the district of Trier, which was suppressed by Koch. In this case the numbers were very considerable, amounting to 927 cases with 84 deaths; and from this great number it would naturally be expected that there was some common source of infection, such as contamination of the water supplies, milk, etc. This, however, was not so, and the author shows by a critical examination of the usual sources of typhoid and the character of the epidemic as regards its distribution in time and space, that none of these factors were in operation. He therefore comes to the conclusion that it is a purely contact-epidemic (*Contacte epidemie*), i.e., that it was spread from case to case, principally in connection with the dwelling-houses, owing to the careless and primitive habits of the inhabitants. The district was originally agricultural, and owing to the development of mines the population increased tremendously during the last ten years, so that at the time of the epidemic it consisted of a number of small mining towns. From its rapid development the

sanitary arrangements were very primitive, and numerous opportunities occurred in and about the dwellings of the people for spreading the specific contagium. The methods of combating the disease were similar to those employed by Koch in Trier, viz., establishment of a bacteriological laboratory in the district, and the searching out and isolation of ambulant cases.

The lessons to be taught by this epidemic, to use the author's own words, are, "The first lesson to be drawn from the epidemic here described, is that in country places, which by a sudden increase of the population become quickly converted into districts having an urban character as regards their architecture, and with primitive methods of removal of excrement, etc., 'Contact-epidemics' can occur of such extent as to awake the suspicion that some common vehicle, such as water or milk, is taking a share in its causation.

The second lesson which this epidemic at Beuthen teaches is that as early and thoroughly as possible it must be decided whether one has to deal with a water, or contacts, as the chief source of infection; and if the latter to seek out energetically all invalids, even those suffering lightly, by means of bacteriological methods of diagnosis, isolate them in hospital, and keep them a long time there, and to follow this by energetic and well controlled disinfection.

This epidemic furnishes at the same time a supplement to the conception of Koch and Frosch as regards the 'contact origin' of so many typhoid epidemics, and as a consequence, of the methods of dealing with them."

V. Beiträge zur Lehre von natürlichen Immunität (Contribution II). By Dr. Karl Kisskalt (Giessen).

VI. Ueber den Befund von Influenza-bacillen in Tonsillen und Larynx—gleichzeitig ein Beitrag zur Frage der influenzaähnlichen Bacillen. (On the result of the Examination of Influenza Bacilli in Tonsils and Larynx—at the same time a contribution on the question of Bacilli resembling those of Influenza.) By Dr. Max Auerbach (Cöln).

Deutsche Vierteljahrschrift für öffentliche Gesundheitspflege, XXXVI, Bd. 3tes Heft (Braunschweig), 1904.
German Public Health Quarterly, Vol. XXXVI, Part III.
(BRUNSWICK), 1904.

How are Contagious Sexual Disorders as Epidemic Diseases in the German Empire practically to be stamped out? Dr. Kühn (of Hoya a. W.)

The Teaching at School of General "Nature Knowledge" as a basis for the Teaching of Practical Hygiene and Nursing. Dr. Oscar Schwartz (of Cologne).

On the latest experiences on the origin of Typhoid Fever in the army and in civil life, from the pollution of drinking water as well as by infection from other insanitary conditions, Dr. Albert Deutsch (of Halle a. S.)

The Dwelling in relation to Tuberculosis. Dr. Julian Marcuse (of Mannheim).
The Milk Supply of our Large Towns, Lessons from the Hamburg Dairy Exhibition of 1903. Dr. Pröls (of Scheessel).

Illness from Noise, and its treatment from the point of view of Sanitary Police. Dr. W. Hanauer (Frankfort a. M.)

Caisson Diseases and the various arrangements in Caissons. Dr. R. v. Mouillard (Cologne).

La Clinique Infantile. 2nd ANNÉE, No. 9 (PARIS), 1904.

L'atrophie Infantile et le lait Sterilisé. Par M. le Dr. Logrier¹ (Directeur de la Goutte de lait d'Elbeuf).

Sur les Stagnations depoids dans l'élevage des enfants atrophiques. Par M. G. Variot.

(No. 10.) Chronique des Gouttes de Lait en France et à l'étranger. Par M. le Dr. G. Variot.

(No. 14.) Sterilisation Absolue du Lait par Surchauffage. Par le Dr. Lecornu. Un cas d'atrophie infantile guéri par l'emploi méthodique du lait stérilisé. Par le Dr. Loisel de Rouen.

NEW PUBLICATIONS RECEIVED.

Obiter Scripta: The Excursions of an Improvident Philosopher. (Surface Impressions for Casual Readers.) Y. H. C. P. Wanhope, M.A. Price 1/-. Agas H. Goose, Rampant Horse Street, Norwich.

Municipal Shortcomings. By T. Myddelton Shallcross. Price 1/-. Elliot Stock, 62, Paternoster Row, London, E.C.

Atmospheric Carbonic Acid: Its Estimation and Variation. Lecture by John Robertson, M.D., B.Sc., delivered in the Public Health Laboratory, University of Manchester. Price 1/6. Sharratt and Hughes, 65, Long Acre, London, W.C.

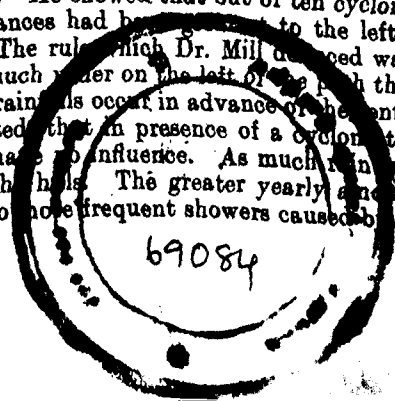
Annual Report of the Chief Inspector of Factories and Workshops, for the year 1908. Part I—Reports. Price 2/10. Eyre and Spottiswoode.

Report on Air Tests in Humid Cotton Weaving Sheds. By Frank Scudder, F.I.C. Price 8d. Eyre and Spottiswoode.

POLLUTION OF OYSTER BEDS.—Two cases are likely to come before the courts shortly, in which damages are claimed from local authorities for financial loss through pollution of oyster and other shell-fish beds, which is alleged to have been caused in each instance by the local authority.

DANGER OF COMMON WOOL FLOCK.—Attention was called to this at the Sanitary Institute Congress in Glasgow. Examination physical, bacteriological, and chemical, demonstrated that much of the wool flock used for mattresses and chairs, cushions, etc., was filthy to an extreme degree, being manufactured from the cast-off clothing of all classes.

CYCLONES AND RAINFALL.—Anomalies have often been observed in the way rain is distributed over an area affected by a cyclonic disturbance. On this subject Dr. H. R. Mill gave an address at the meeting of the British Association, and illustrated graphically this asymmetrical distribution. He showed that out of ten cyclonic movements the rainfall in nine instances had been greater to the left of the path of the cyclonic centre. The rule which Dr. Mill advanced was that "the belt of cyclonic rains is much wider on the left of the path than on the right, and that the heaviest rains occur in advance of the centre." A remarkable fact was also elicited, that in presence of a cyclone the superficial features of the country have no influence. As much rain is precipitated over the plains as over the hills. The greater yearly amounts in mountainous districts are due to more frequent showers caused by condensation.



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