

1. Number of pages. 62.
2. Date of repair. 13-5-37
3. Initials of Referencer
M.R.O. 1-32,400-23-11-30

MADRAS RECORD OFFICE.

Government of Madras.

Public DEPARTMENT.

G.O. No. 1253 Press
Mis.

Dated 16-8-1871

Not to be folded or roughly handled

2

*Proceedings of the Madras Government, Public Department,
.16th August 1871.*

No. 70. Read the following Extract from the Proceedings of the Government of India in the Department of Agriculture, Revenue, and Commerce, dated Simla, 6th July 1871, No. 28 (Sanitary):—

Read again a Circular Resolution of the Home Department, Nos. 241 to 250, dated the 6th July 1870, on the general review by the Sanitary Commissioner with the Government of India, of the Annual Local Sanitary Reports for 1868.

Read a letter, No. 309, dated 25th May 1871, from the Sanitary Commissioner with the Government of India, submitting a general review of the Annual Reports of the Local Sanitary Commissioners for the year 1869.

—

RESOLUTION.—The Governor-General in Council has read the review of the Sanitary Commissioner with the Government of India with much interest, and directs that it be circulated for information and guidance to all Local Governments and Administrations.

2. His Excellency in Council desires that special attention be paid to the suggestions contained in paragraph 87 of the review, and that, in future, Sanitary Reports should be prepared according to the method therein described.

3. There has been great delay in the submission of the reports of the Local Sanitary Commissioners, and the Governor-General in Council desires that the several Local Governments and Administrations will insist upon their reports being submitted, in future, not later than the 1st of March of every year.

—

ORDER.—Ordered that a copy of the foregoing Resolution, together with a copy of Dr. Cuninghams review for 1869, be forwarded to the Local Governments and Administrations noted in the margin, for information and guidance.

Government of Bengal.
" North-Western Provinces.
" Punjab.
Chief Commr. of Oudh.
" Central Provinces.
" British Burmah.
Resident, Hyderabad.

Ordered, also, that a copy be forwarded to the Governments of Madras and Bombay, with the suggestion that, in order to secure uniformity in the preparation of the Sanitary Reports, the plan described in paragraph 87 of the review may, if there is no objection, be adopted by the Sanitary Commissioners under those Governments.

Ordered, also, that a copy of the above Resolution be forwarded to the Sanitary Commissioner with the Government of India for information, and with the remark that the Government of India will await the receipt of a further communication on the subject of a cholera map.

Ordered, also, that a copy of the above Resolution, and a copy of Dr. Cuninghams review of the reports for 1869, be published in the *Gazette of India*.

(True Extract.)

(Signed) J. GEOGHEGAN,
Under Secy. to the Govt. of India.

*Proceedings of the Madras Government, Public Department,
16th August 1871.*

No. 71.

ORDER THEREON, 16th August 1871, No. 1253.

Communicated to the Sanitary Commissioner, Madras, who will report whether there is any objection to adopting in this Presidency the method suggested by the Sanitary Commissioner with the Government of India, in paragraph 87 of his review, for the preparation of the annual reports.

(True Extract.)

Captain, R. E.,
*Under Secretary, P. W. D.,
for Chief Secretary.*

To the Sanitary Commissioner, with three copies of the review.

„ Acting Inspector-General, Indian Medical Department, with two copies of the review.

No. 309.

FROM

THE SANITARY COMMISSIONER
WITH THE GOVERNMENT OF INDIA.

TO

THE SECRETARY TO THE GOVERNMENT OF INDIA,
HOME DEPARTMENT.

Dated SIMLA, the 25th May 1871.

SIR,

With reference to the correspondence noted in the margin, I have the honor to submit a general review of the Annual Reports of the local Sanitary Commissioners for the year 1869.

General Review of the Annual Reports of the local Sanitary Commissioners for 1869.

2. These reports reached me in the following order, and on the date which is noted opposite to each of them :

From Berar,	13th June	1870.
„ Punjab,	11th October	„
„ Oudh,	22nd „	„
„ British Burmah,	„	„
„ Bengal,	11th November	„
„ N. W. Provinces,	30th „	„
„ Central Provinces,	2nd March	1871.

Several of these Reports were very late in submission.

3. Although somewhat earlier of arrival than they were in the year previous, they all with one exception came too late to be of use in the preparation of my general report for 1869. The year was characterized by unusual sickness ; cholera, small-pox, and fever were extremely prevalent over great portion of the country, and the matters which demanded investigation were therefore much more numerous and important than ordinary. In estimating the time occupied in the preparation and submission of the different reports, regard must be had to the manner in which these investigations have been conducted and recorded. For example, the Report of the Sanitary Commissioner of the Central Provinces did not reach this Office till the 2nd of March 1871 ; but it contains the results of a most pains-taking enquiry into the great epidemic of cholera from which the people in those Provinces suffered so heavily in 1869, and this enquiry was in a great measure conducted during the early part of 1870, in the course of a tour through that part of the country which had been chiefly affected.

The delay was in a great measure caused by the great sickness and the many important matters which consequently demanded attention.

Obdt. of 118713 30/5/71.

PUBLIC.

THE SANITARY COMMISSIONER,
&c.,
&c.,

Dated August, 1869.
Recd.

G. O., 16th August 1871, No. 1253.

AUGUST.
Nos. 70-71.

Communicating review of the local sanitary reports for 1869 by the Sanitary Commissioner with the Government of India.

4. But while making every allowance on account of the work which attends on the proper discharge of the duties of the Sanitary Commissioners, it is indispensable that their Annual Reports should be submitted at a much earlier date than hitherto. The statistics of sickness and mortality among the troops and prisoners cannot be considered with any degree of satisfaction apart from the history of disease among the people generally. All the information which can be procured from every source must be examined at one and the same time, and the Sanitary Commissioners will therefore, I trust, submit their Annual Reports in future in time to enable me to have the advantage of studying them in connection with the statistics of troops and prisoners, and so to prepare a full and complete report for the year regarding all sections of the community.

It is very important that these reports should in future be submitted at a much earlier date.

No general plan has been followed in these reports.

5. The division of their reports into certain sections which I recommended last year has not been followed by all the Sanitary Commissioners, nor, indeed, has it been fully adopted by any of them; but I shall endeavour, as far as possible, to keep to such an arrangement in this general review of their contents. And I would at the same time observe that if some such division as I have proposed, or any other which the Government may think best, were generally followed by all the local Sanitary Commissioners, it would greatly facilitate reference, and thereby materially aid not only in summarizing the facts collected from various sources, but also in drawing deductions from them.

6. I shall now proceed to consider the information which these reports contain as regards—

I.—Vital statistics.

II.—The history of each of the chief diseases as it affected the several Provinces during the year.

III.—The meteorology.

IV.—The general condition of the people as influenced by any deficiency in the crops, or by the unusually high price of food.

V.—The personal investigations and proceedings of the Sanitary Commissioners.

VI.—Sanitary progress during the year.

7. Although the Madras and Bombay Reports do not properly fall within this review, I shall take advantage of the opportunity of collecting from them any prominent facts which illustrate the history of disease or the sanitary condition of the people in those parts of India.

Any prominent facts contained in the Madras and Bombay Reports for 1869 will, at the same time, be noticed.

8. With the exception of a few statements regarding cholera in some Districts, and these are confessedly inaccurate and incomplete, the Sanitary Commissioner for Bengal gives no vital statistics for his Province. In his remarks on this most important question, Dr. Smith observes that it had been intended to commence mortuary registration from the 1st of November 1869, but that, owing to unforeseen difficulties, its introduction was postponed till the 1st July 1870. How far these arrangements have actually been carried into effect I am not aware; but, judging from the very imperfect information which is obtainable regarding cholera in the several Districts of the Lower Provinces during 1870 and during the past months of the current year, it would seem that the system is not yet in good working order.

See I., Vital Statistics.

None are available regarding the Lower Provinces.

9. Bengal Proper is the only Province of India from which no statistical information regarding the deaths among the people in any part of it during the year 1869 can be obtained. In the North-Western Provinces, the Punjab, Oudh, the Central Provinces, and Berar, a general system of mortuary registration has been for some time in operation. In British Burmah, it has as yet been confined to 17 towns, but, with the single exception of Calcutta, no information can be obtained regarding the number of deaths among the people in any part of the Lower Provinces. The want of such data is a serious loss as regards the mortality attendant on all diseases, but the want is chiefly felt in connection with the history and geographical distribution of cholera. If the delta of the Ganges be the home of this disease, then every fact connected with its appearance within the limits of this endemic area, and with its progress beyond these limits, is of the greatest importance. But, in truth, without vital statistics the Sanitary Commissioner wants the foundation on which all his other work must be built. The supervision of the registration of deaths amongst so large a population and over so great an area as that of the Lower Provinces is undoubtedly no small work, but it is one which is of primary importance and which much demands attention.

The want of this information is a great loss, especially as regards the history of cholera.

10. The registration of deaths in the North-Western Provinces shows that 1869 was a year of very unusual sickness and mortality. All the great causes of death—cholera, small-pox, fevers, and bowel complaints were very prevalent. The comparative results in different Districts as shown in the one general table which is given in the body of the Report, appear to convey a tolerably correct estimate of the relative prevalence of these diseases, but the mortality must be greatly understated, and thousands of

For the North-Western Provinces they are imperfect.

deaths must have escaped registration. The death rates vary in different Districts from 5.8 per 1,000 in Bustee, a ratio which must be the result of very imperfect registration, to 56 per 1,000 in Jhansie, where famine and terrible sickness told heavily upon the people. The total death-rate of the Province is given as 17.9. The details which are furnished in Appendix A are manifestly incorrect. The new scheme of registration had not then come into force, and the particulars which have been given regarding the causes of death during the year, such as a "broken heart," "eating mud," and many others which might be instanced, are chiefly valuable as illustrating the necessity of a better system. During the last few months the standard forms have been brought into use, and the results of each month's registration are regularly published in the North-Western Provinces Gazette.

In the Punjab they are more complete and bear evidence of greater accuracy.

11. In the Punjab, where the importance of a good system of registration has from the first attracted the attention which it so justly deserves, the details are much more complete and bear the impress of greater accuracy than those of the North-Western Provinces. Much still remains to be done before the returns can be accepted as embodying more than an approximation to the truth, but, "lamentably imperfect" as they are still admitted to be by the Sanitary Commissioner, they are yet of great value, not only for the information which they contain regarding the general history of disease, but as the basis of more successful results. The death-rate for the Province was 26 per 1,000, varying from a minimum of 16, to a maximum of 38 in different Districts. In the towns, the statistics of which although included in the District tables are also shown separately, the death rate equalled 35 per 1,000, a result which points rather to greater accuracy than any special mortality. In some of them the death-rate was extremely high. At Umritsur, it was 69, at Delhi 46, at Sajanpore in the Goordaspore District 80, and at Dera Nanuk in the same District 84 per 1,000. A very important step has been taken in making the heads of families responsible for reporting all births and deaths. As a commencement this rule has been applied to only the principal station of each District (excepting Umballa and Abbottabad, which have for the present been omitted); but the Sanitary Commissioner recommends that it should be gradually extended as the people come to understand the uses and object of registration until at last the whole Province is included in its operation. The new standard forms for showing the results of registration had not been introduced. Some delay had occurred owing to a reference on the question of establishment required for the purpose, but monthly statements in the prescribed form now appear in the local

Gaz.
ha

ements which the Sanitary Commissioner his report afford much information, but it is that one and the same system should be throughout India. Without this, comparison is impossible, and no satisfactory examination can be the returns from the different Provinces without an ty of labor which may, to a great extent, be obviated uniformity.

12. All the data regarding the deaths and causes of deaths in Oudh during the year 1869 are contained in one table in the body of the report. The deaths registered from all causes equalled 16.8 per 1,000, a result which, especially in a year of such great sickness, must be much under the truth. In different Districts it varied from 9.1 to 35.6 per 1,000. The information is very meagre and imperfect, nor is mention made of any measures which have been taken with a view of obtaining more reliable returns. With the introduction of the new standard forms some improvement may be expected, but it does not appear whether arrangements have yet been made to adopt these forms or not. As yet no monthly statements have appeared in the local Gazette, in conformity with the instructions which have been issued by the Government of India.

The details from Oudh meagre.

13. In the Central Provinces the proportion of the population under systematic registration in 1869 was much the same as in the year previous; but when cholera became prevalent, it was extended to the whole of the people with the exception of those in the feudatoryships and zemindarces which are not under the direct administration of the Government. It thus happens that while the information regarding the other great causes of deaths refer to 4,862,516, the details regarding cholera include 6,879,738. With the commencement of 1870 the new forms have been brought into use, and the whole of the inhabitants, with the exception of those in the zemindarces and some of the more distant villages of the wilder Districts have been embraced in the registration. Dr. Townsend's Mortuary Tables for the year, although still confessedly imperfect, afford very valuable information and evince the care and attention which in the Central Provinces as in the Punjab has been bestowed on the subject of registration. The details of the Province on the deaths registered were 11.6 in the District of Jubbulpore. In many of the Districts the loss of life was terrible. In twenty-three of the Districts, regarding which particulars are given separately, the ratio was over 40 per 1,000. In fifteen of the twenty-three it was over 50, and

In the Central Provinces, as in the Punjab, registration has received much attention.

these fifteen again contain instances of mor-
70, 80, 90, 100, and in the case of Jubbulpore +

Berar was not placed under
a separate Sanitary Com-
missioner until April 1870.

14. Berar was taken from the Central P.
placed under a separate Sanitary Commissioner
the 2nd of April 1870. The population under reg-
in 1869 amounted to 2,074,614 or nearly 93 per cent. of the
whole people of the Province. The registered deaths give
a ratio of 22·8 per 1,000 of the population. In the District
of Woon it was only 14·9, in Oomraotee 30·4, and between
these extremes there were varying rates of mortality. The
standard forms, it is noted, were to have been brought into
use in 1870. It is very desirable that the monthly results
should be published for general information. In the ab-
sence of any local Gazette the statement might conveniently
appear in the Gazette of the Central Provinces.

In British Burmah only 17
towns had been embraced
in the registration.

15. In British Burmah the registration of vital statis-
tics had been introduced into only seventeen towns; but from
the 1st July 1870, a system based on that laid down by the
Supreme Government for the whole of India was to come
into force. The Chief Commissioner trusted that, with care
and attention on the part of District Officers, statistics for
the whole Province would thereafter be obtained.

The Returns from Mysore
being for the official year
are not comparable with
the others.

16. The statements from Mysore relate to the official
year 1869-70, and cannot, therefore, be compared with those
of the other Provinces which embrace the year 1869. More-
over, the death-rate of about 8 per 1,000 which these
statements show, as the Chief Commissioner remarks, cannot
but be regarded as much too favorable, and many deaths
must have been left unreported. From the 1st July 1870,
the new system of registration was to be introduced, and it
was hoped that more accurate results would then be obtained.
The total population of Mysore, it may be noted, is stated to
be 4,056,766, of which the details are as follows:

Eurians	...	4,151
Eurasians	...	2,855
Native Christians	...	8,186
Mahomedans	...	189,272
Hindoo	...	3,839,679
Budhists and	...	12,623
	...	4,056,766

on in Madras and
Bombay Presidencies.

17. The total population of the Madras Presidency is
estimated at 26,097,021, and of these 24,633,127 had been
included in the registration, the difference representi-

zemindaree tracts and remote villages from which it had
not been found practicable to obtain returns. The returns
shew a total mortality of 18·3 per 1,000, but, as the Sanitary
Commissioner remarks, the deaths are in all probability much
under-stated. The ratios vary in different districts from
9·8 to 24 per 1,000. From the 1st July 1870, the standard
forms were to be employed.

The population under the Government of Bombay
in 1869 is estimated at 13,901,863. A general state-
ment is given for the year, and details regarding the civil
population of each Collectorate. The total death-rate is
estimated at 20·4 per 1,000. It does not appear what
orders have been issued regarding the adoption of the new
forms, but the Sanitary Commissioner observes that the
attempt to obtain information regarding the causes of death,
in even the most simple form, had hitherto failed; and it was
feared that a general classification such as that adopted in the
new statements, which is somewhat more complicated than
that hitherto in use, could not be followed with accuracy.

18. In the annexed statement, the general results of
mortality registration are shown throughout British India.

The general mortality sta-
tistics of India, so far as
obtainable, are shown in
the annexed table.

Statement showing the number of deaths registered in the various Provinces of British India,
during the year 1869.

PROVINCE.	Estimated po- pulation.	Population un- der registra- tion.	NUMBER OF DEATHS FROM						Total deaths.	Ratio of deaths per 1,000.
			Cholera.	Small-pox.	Fever.	Bowel com- plaints.	Injuries.	All other causes.		
Bengal	..	..	No Statistics.	90,770	246,898	81,452	Not stated	91,151	529,733	17·9
North-Western Provinces	..	29,588,653	69,542	53,195	272,946	30,953	4,892	82,637	453,921	26
Punjab	..	17,448,865	9,268	21,554	87,795	6,235	3,200	46,446	188,974	16·8
Oudh	..	11,198,095	23,134	16,849	68,999	12,550	1,725	23,488	174,908	35·9
Central Provinces	..	9,000,000	51,387	6,365	12,917	6,154	818	10,137	47,898	22·8
Berar	..	2,231,665	10,947	1,037	2,415	630	122	4,140	9,369	29
British Burmah	..	2,305,985	1,025	17,448	132,346	Not stated	9,445	271,708	451,981	18·3
Madras	..	26,097,021	21,034	12,673	Not stated	Not stated	4,719	Not stated	233,575	20·4
Bombay	..	13,901,863	52,365							

The statistics are not yet sufficiently accurate for any satisfactory analysis.

19. The returns are still too imperfect to admit of any satisfactory analysis of their contents beyond what is here exhibited. The relative mortality among the rural as compared with the town population, the comparative death-rates at different ages and among the two sexes, as well as the proportion due to particular months and seasons, are all questions of very great interest, but no correct data are yet available for their consideration. It will be observed that the highest mortality 35.9 per 1,000, occurred in the Central Provinces, where the great epidemics of the year sufficiently account for the results. Next follows British Barmah, with a death-rate of 29 per 1,000, but the returns are collected from a very limited portion of the population. In the Punjab, the rate was 22, and in the other Provinces it varied from 22.8 in Bihar to 16.5 in Oudh. Judging from the very unhealthy character of the year, the deaths in the North-Western Provinces, in Oudh, and also in Madras and Bombay, would appear to be much under-stated. As most of the Sanitary Commissioners remark, the errors in the registers are errors of omission, and had all the deaths been entered, the ratio for all the Provinces would doubtless have been more or less in excess of those which are here represented.

The registration of births, though attempted in several of the Provinces is very imperfect.

20. No mention has yet been made of the registration of births. In several of the Provinces, and especially in the Punjab, the Central Provinces, and Oudh, attempts have been made to collect data on this important point; but the difficulties which attend such an attempt are very much greater even than those connected with the registration of deaths, and the results as yet are very imperfect.

Considering the great difficulties which have to be encountered, the results of registration in 1869 are encouraging.

21. On a review of all that has yet been done to introduce a general system of registration among the people of India, it must be admitted that the results of 1869, imperfect as they are, contain most important information, and encourage the hope that they will year by year improve and increase in value. The difficulties which have to be contended with in carrying out any such system in India are but little understood and appreciated by those who have had no experience of the country and whose ideas of registration are derived from what has been done in Great Britain. The vast area embraced in each Province, the millions of people to be included in the registration, the fact that in many Districts, each of which is larger than a county of England, and many of them as large as several counties put together, there is generally but one educated medical officer who could accurately certify to the cause of death in any case, and the want of proper machinery for

registration are all obstacles of no small magnitude; and, regarding what has been effected in relation to these difficulties, I am rather astonished at what has been done than disappointed at the errors and omissions. The system is yet in its infancy; it is new to the people, and, until they in some degree understand its aim and objects, they will not render that willing assistance which is indispensable to its success. The special attention of the Sanitary Commissioner in every Province should be devoted to registration,—it is, as I may say, the backbone of their work,—and, where it is neglected, the sanitary condition of the people can never improve and flourish. When the results of registration for 1870 come to be reviewed, it is, therefore, to be hoped that no Province will be found without its vital statistics collected and compiled with the greatest care, and that all the Sanitary Commissioners will evince the same appreciation of the value of mortuary registration as has been shown by Dr. DeRenzy in the Punjab, and by Dr. Townsend in the Central Provinces.

22. I shall now pass to a consideration of the diseases which chiefly contributed to the mortality of the year, and of these the first on the list, though not the most destructive in all the Provinces, is cholera. In nearly all of them cholera was extremely and unusually prevalent, and it would be impossible within the limits of any general review to enter fully into the history of this vast epidemic. Its main features have already been discussed by Dr. Bryden, in connection with the views which he has expressed in his work on cholera—its geographical distribution, and relation to natural influences. I shall only attempt to state shortly the most important facts which have been recorded by the Sanitary Commissioners in their respective reports, and shall then consider the opinions which they have based upon them. My object is not to urge any particular views with regard to the disease, but merely to examine the evidence which has been adduced, and to ascertain how far any of the theoretical opinions which have been advanced in explanation of the facts of the epidemic are supported by this evidence.

Section II. History of the chief diseases during the year.

A Cholera was very prevalent in 1869.

23. As deaths were not registered in Bengal during 1869, no precise information can be obtained regarding the disease. The Sanitary Commissioner has summarized all the data which he could procure, but from several districts no reports were received, and in none of them have the facts been so fully and carefully recorded as to embody any connected and complete history of the disease throughout the year. Without registration no such data can be obtained. So far as can be judged from the statements of the Civil Surgeons, cholera was severe in the Bhaugulpore, Monghyr, Gya, Patna,

Very little information is to be had regarding its appearance in Bengal.

Sarun, Tirhoot, and Chumparun districts of Behar, and also in Assam. Some few instances are given in which the disease appears to have been spread by human intercourse, but the Sanitary Commissioner does not incline to the opinion that this was the agency by means of which it was disseminated. "It may be asked," he observes (page 43), "could quarantine operations of the most complete and perfect description have put a stop to the spread of cholera during the past year? I believe it would have failed to do so, because there is much evidence to show that the disease appeared simultaneously and independently in many places; because, in a large number of such instances, although special enquiries were instituted on the subject, importation could not by any means be traced; because in certain localities free communication with infected places went on without any manifestation of the disease occurring; and *lastly*, because its often sudden and simultaneous disappearance over broad tracts of country tends to prove its dependence on influences far other than those of mere human agency." Within the endemic limits of cholera, any investigation into the share which human intercourse may have in spreading the disease is beset with peculiar difficulties, but such facts as Dr. Smith here records are of great importance in the enquiry and are well worthy of being recorded in detail. Without specific evidence as to dates and places, and the number of cases or of deaths, it is impossible to form any correct opinion with regard to them. No map has been furnished with this report to illustrate the distribution and comparative incidence of cholera in different parts of Bengal, but, in the absence of any statistics for the Province, it could not well have been prepared in such a way as to be of any real value.

In the North-Western Provinces the mortality from Cholera was very heavy.

24. In the North-Western Provinces the mortality from cholera was very heavy. No less than 69,542 deaths are recorded under this head, or 2·3 per 1,000 of the population. The disease was, however, by no means equally distributed. The districts of Lullutpore, Ghazeepore, Jaloun, Azimgurh, Jhansie, Mirzapore, Benares, Goruckpore, Humeerpore, and Bustee suffered most, the ratio varying from 10·9 in the first of them to 3· in the last. From three districts—Kemaon, Gurhwal, and Turaie,—no deaths from cholera were reported. In fourteen of them the mortality from this cause was under 1 per 1,000, and in the remaining eight it was from 1·3 to 2·8 per 1,000. In eighteen out of the thirty-five districts of the Province, deaths from cholera were recorded in every month of the year. The statistics regarding the Police, the accuracy of which can be relied on, shew that the force suffered most in those districts in which the mortality

among the general population has been recorded at the highest,—evidence which, as the Sanitary Commissioner's remarks shew, that, although the records of the general registration are inaccurate as regards the actual number of deaths, they are not altogether valueless, and contain a fair estimate of the relative incidence of the disease in different parts of the country. No map accompanies Dr. Planck's report.

25. With the exception of Muzuffergurh, every one of the thirty-two districts in the Punjab suffered from cholera, but the severity of the disease was confined to a few places. In twenty-one of the districts the mortality from this cause did not exceed 0·10 per 1,000. In seven of them it was above 0·10 but under 1·0 per 1,000. In the Kohat district it was 3·62, in Umritsur 4·33, and in Peshawur 5·99 per 1,000. On these last three the chief violence of the epidemic fell, but even this does not shew the remarkable localization of the severity of the outbreak, for the mortality, although shown for the districts as a whole, really fell chiefly, and in the case of Umritsur almost entirely, on the capital city: the rural population suffered little. Thus, in the Peshawur district as a whole, there were 2,985 deaths from cholera reported, but of these 1,480 occurred in the city. In the Umritsur district, out of 3,608 deaths, 3,041 were in the city. In the Kohat district, out of 508 deaths, 328 took place in the city and cantonment. Of the total of 9,258 deaths from cholera, it thus appears that no less than 7,101 occurred among the people of these three districts, and of these again 4,849, or nearly five-sevenths, occurred among the people of the three cities. Some particulars are given regarding the outbreaks at these places and also regarding the disease as it appeared at Lahore, Goordaspore, Jullundur, Hissar, Sirsa, Subathoo, Rawul Pindee, and Bunnoo. To attempt to state even the main facts regarding its history in all these districts would be to recapitulate much of what Dr. DeRenzy has already so well described. Some of them must, however, be considered when I come to discuss the opinions which he has expressed with regard to them. Two maps illustrate the report,—one shewing the relative prevalence of cholera for the whole Province, and the other the details regarding the epidemic in the Peshawur Valley.

The severity of the disease in the Punjab was confined to a few places.

26. It appears from the general table already given that in Oudh 23,134 persons died of cholera during the year 1869, or a ratio of 2·0 per 1,000. The disease was epidemic over nearly the whole Province, but no particulars are given beyond the data which appear in the general table. The deaths varied from 0·09 per 1,000 in the Kheree district, to 6·1 in Rae Bareilly. No map accompanies the report, nor is

Particulars regarding the Cholera in Oudh are wanting.

there any record of the number of deaths which occurred in each month, but this last information was subsequently supplied at my request, and a table embodying it appeared in my Annual Report for 1869. There was a marked persistence of the disease throughout the Province, especially in the districts of Fyzabad, Sultanpore, Seetapore, and Pertabgurb.

A very full account of the history of cholera in the Central Provinces has been given by Dr. Townsend.

27. The epidemic in the Central Provinces was made the subject of a most painstaking and careful enquiry; great part of the country which chiefly suffered was visited by Dr. Townsend, and the facts investigated on the spot. Out of a population of 6,879,738 to which the registration of the mortality from cholera was specially extended, 57,079 deaths from this disease were recorded (Table No. 20). As shown in Table No. 18, out of a more limited population of 4,862,516, the deaths were 51,387, or 10.5 per 1,000. The severity of the disease fell chiefly on the people in the Mundla, Saugor, Dumoh, Belaspore, Raepore, and Nursingpore Districts, in which the mortality it occasioned varied from 21.3 in the first to 10.4 in the last. In Seroncha no deaths were reported. In the remaining twelve districts the ratio of loss from cholera was from 9.9 in Wurdah to 0.4 in Chindwara. In the town of Mundla the cholera death-rate was no less than 53.2, in Raepore it was 34.2. Many other towns suffered severely. From these facts it will be seen that the disease was both wide-spread and very fatal, very much more so than in any of the other Provinces. In 1868 it had also been severe in the Central Provinces, but the area over which it then appeared was more confined, and the deaths numbered only 10,400 as compared with 57,079 in 1869. The excessive mortality in these two years may again be contrasted with the singular immunity which the people have enjoyed in 1870, when, throughout the whole Province, only 120 deaths from cholera have been registered. The details of certain outbreaks which are given by Dr. Townsend are of much interest. A map accompanies the report, and is of great assistance in studying the incidence and progress of the epidemic.

In Berar the disease was very generally diffused.

28. In Berar 10,947 deaths were ascribed to cholera during 1869, or 23.1 per cent. of the total mortality. The ratio of loss varied in the districts from 4.7 in Bassim to 8.76 per 1,000 in Oomraotee, in the cities from 2.1 in Bassim to 8.4 in Akolah. The epidemic was very generally diffused throughout the whole Province, but no very excessive mortality appears to have occurred in any one place. The Sanitary Commissioner, as I have already stated, did not assume charge till April 1870, and has been unable fully to detail

the history of the outbreak, or to supply any map in illustration of his report.

29. As the statistics in British Burmah were confined to seventeen towns, the information regarding the general history of the disease throughout the Province is incomplete. In all but four of them deaths were attributed to cholera, and in Akyab there was a severe outbreak to which 700 deaths were supposed to be due. No map accompanies the report.

The information from Burmah relates only to 17 towns.

30. In the annexed statement, the extent of the mortality from cholera in each Province for each month of 1869 has been entered, and, for the purpose of comparison, the returns from Madras and Bombay have also been included. In the report of the Sanitary Commissioner for Bombay I have been unable to find a full detail of the deaths by months, but at page 197 he writes—"The season of greatest prevalence of cholera in 1869 was, during the three months—May, June, and July—during which considerably more than half the total fatal cases of the whole year occurred. The greatest number of reported deaths is in July, but the difference is trifling, the figures for the three months being 9,679, 9,525, and 9,764, respectively. December shews the lowest figure—275." In Madras the first maximum was in July, the disease then declined till October. In November it again rose, and in December it was nearly as fatal as it had been in July. In the North-Western Provinces and also in the Punjab the highest point was reached in August; till then it had gradually ascended, and from then it gradually diminished. In Oudh there was a first decided rise in June, a lull in July, and then a higher rise than ever in August. In the Central Provinces the mortality from cholera gradually rose during the first five months of the year. In June the deaths were nearly twice as numerous as in any other month, and then they steadily declined.

The annexed statement shews the monthly mortality from Cholera in each of the Provinces.

Statement shewing the deaths from Cholera registered in the different Provinces in each month of 1869.

PROVINCE.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTAL.
	No statistics.	No statistics.	No statistics.	No statistics.	No statistics.	No statistics.	No statistics.	No statistics.	No statistics.	No statistics.	No statistics.	No statistics.	No statistics.
Bengal Proper	151	216	1,284	3,148	4,937	11,394	14,339	21,092	6,909	4,318	823	180	68,691
North-Western Provinces	18	32	51	76	144	194	797	3,538	2,391	2,033	204	80	9,258
Punjab	327	177	689	2,614	3,394	4,149	3,543	4,239	1,725	1,521	491	260	23,134
Oudh	70	134	749	1,837	9,799	22,823	12,077	7,050	2,127	391	16	6	57,079
Central Provinces	10	70	139	1,759	1,385	770	3,047	2,618	848	164	18	119	10,947
Benar	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.
British Burmah	175	203	475	446	477	2,575	5,025	3,100	2,424	1,907	2,198	4,067	23,072
Madras	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.
Bombay	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	No statistics for months.	52,365

* These totals do not in all cases agree with those given in the previous statement, but as the object of this Table is to illustrate the comparative monthly incidence of the disease, the discrepancies are of little consequence.

31. I shall now proceed to discuss the opinions which have been expressed by the different Sanitary Commissioners with regard to this great epidemic as it affected their respective Provinces. The data from Bengal are so imperfect that no satisfactory conclusions can be drawn from them. Dr. Smith's views have already been cited in connection with the few facts which have been recorded, and no further reference need, therefore, be made to the disease as it appeared in this portion of the country. Taking the statistics of the North-Western Provinces for 1869, and considering the persistence with which cholera showed itself, appearing in not a few of the districts in every month, and in others in nearly every month of the year, Dr. Planck is inclined to believe "that cholera is always to be found in some part or other of almost every district from one year's end to the other" (page 8). In the Eastern Districts especially the general opinion seems to be that the disease is endemic, and the Sanitary Commissioner thinks it "not unjust to suppose that the permanent home of cholera is extending from East to West, and that, consequently, the people of the North-Western Provinces are more and more likely to have the disease amongst them in an epidemic form in coming years." "That the rapid means of communication now in existence are likely to increase this tendency," he adds, "I think there can be no doubt." With regard to the first of these statements it is difficult to form any correct opinion, because there is no doubt that very many of the deaths which are ascribed to cholera, especially in non-epidemic years, are really due to other diseases, such as bilious fevers. The second remark would seem to imply that Dr. Planck believes in human intercourse as the chief means of spreading cholera; but the facts which he has recorded regarding the epidemic in the North-Western Provinces during 1869 do not tend to this conclusion. Seven instances only are cited in which it was attributed to importation (paragraph 35). "In all other districts, either satisfactory evidence of its importation is said to be wanting, or its importation denied." "As regards the spread of the disease by personal intercourse," he continues, "and the danger to friends or other persons attending on cholera cases, the evidence is re-assuring. With the exception of Meerut and Boolundshuhur, the evidence from all the districts is, that no facts have come to notice showing that the disease has been so spread, or that any unusual danger attends the ministering to cholera patients." His general opinion regarding the epidemic is thus recorded: "Concerning the cause of cholera, or the mode of its distribution, nothing definite, so far as I know, has been recorded in the past year; even the belief that cholera is distributed

The opinions of the Sanitary Commissioner of the North-Western Provinces with regard to the epidemic are chiefly negative.

by means of the water-supply has been, I think, a little disturbed by a record of the fact that wherever cholera prevailed those attacked and those who escaped drank from the same wells." These conclusions are of only a negative character, but it is very much better to confess ignorance than to advance theoretical opinions which cannot be substantiated by facts. It appears to me that in any future epidemic very searching investigation should be made into its history. It would be quite impossible for the Sanitary Commissioner to visit more than a very small portion of the Province during any one season,—for the great mass of information regarding the disease he must be dependent on his mortuary statistics and the reports of the Civil Surgeons;—but if one district or even a part of a district in which cholera had been most prevalent and fatal in 1869 had been selected for careful enquiry in the cold weather of 1869-70, much valuable information might have been obtained. Dr. Planck is of opinion that the great measure required for the prevention of cholera is "the improved sanitation of the Province generally, and especially of the principal centres of population," and of the soundness of this conclusion there can be little doubt.

The opinions of the Sanitary Commissioner of the Punjab are very decided.

32. Dr. DeRenzy's views as to the mode in which cholera is spread over any Province, and the medium through which it generally attacks a community with special violence, are very decided. At page 101 of his report he states, with reference to the first of these questions, "a humid atmosphere is as incapable of transporting the cholera virus from place to place as it was of transporting the potatoe from its original habitat to Ireland, the cinchona to Darjeeling, or the tea-plant to our own Kangra Valley. In these cases human agency was indispensable to the transfer; it is equally so in the case of the cholera virus." On the second point he writes (page 104),—"when it was demonstrated in London that of all the conditions which favor the propagation of cholera,—viz., exposure to infection, bad drains, crowding and defective ventilation, poverty, and the unclean habits which too often attend it, low damp residence, imperfect medical relief, and water tainted with cholera discharges,—the most influential was cholera tainted water, it was practically established that the same relative importance would attach to this condition in all other parts of the world." Dr. DeRenzy, in fact, adopts Dr. Snow's water theory "that the cholera poison is swallowed and acts directly on the mucous membrane of the intestines; is at the same time re-produced in the intestinal canal and passes out much increased in the discharges; and that these discharges afterwards in various ways, but chiefly by becoming mixed with the drinking water

in rivers or wells reach the alimentary canals of other persons and produce the like disease in them."

33. I cannot admit the accuracy of Dr. DeRenzy's statement when he asserts that, in London, the spread of cholera was demonstrated to have been dependent on *cholera tainted* water, but it is not my purpose to enter into any general discussion regarding this or any other point connected with the disease. I shall merely consider how far the two decided opinions which he has advanced are supported by the history of the epidemic as it appeared in the Punjab in 1869. And first as to human intercourse. Neither as regards the city or jail of Umritsur is there any evidence of importation. "The prisoners had been carefully guarded by quarantine, and their employment outside the wall discontinued." The fact that six of the men who were attacked had been employed in making hempen string, suggested to the Sanitary Commissioner the probability of the virus being imported in the hemp, but "there was no clear evidence to show that the hemp came from infected persons." It is stated generally that the villages in the neighbourhood of Umritsur seemed to be liable to attack in the ratio of their proximity to, and facilities of communication with, the city. At Lahore "the first case occurred at the Railway Station in a traveller just arrived from Umritsur, and the disease was for some time confined to the Sultan Serai or rest-house—a place where travellers from all parts put up, and in the Changer Mohulla." In none of the other districts regarding which any particulars are given, Goordaspore, Jullundur, Goorgaon, Hissar, Sirsa, Rawul Pindee, and Peshawur, all of which suffered more or less from cholera, is there the smallest evidence to show that the disease had been imported, nor are even such general statements made as those above quoted which would lead to the suspicion that such had been the case. As regards Peshawur, it is certainly noted that there had been a brisk grain trade, and that, therefore, more than the usual intercourse with Umritsur had taken place, but such vague evidence is of little value.

His opinion that Cholera was imported into the different Districts of the Punjab is supported by few facts.

34. Dr. Ince, who, under Dr. DeRenzy's direction, made special enquiry into the circumstances connected with the spread of the disease throughout the Peshawur Valley, states that, "in 17 towns and villages out of the 329 which he inspected, the first cholera case was said to have been imported from a previously infected locality." "There is strong reason to conclude," he states, "that like the subtle poisons of small-pox and scarlet fever cholera may be conveyed from place to place in the clothes or in the bodies of those who have been

Dr. Ince, who made a special enquiry into the epidemic in the Peshawur Valley, does not conclude that cholera was chiefly spread by human agency.

exposed to it;" but the general conclusions which he formed as the result of his enquiry do not seem to point to the belief that such human agency is the ordinary medium by which it is disseminated; for, immediately preceding the passage which I have just quoted, he writes—

"As to the cause of cholera it is probably a specific poison allied in its nature and origin to that of malarious fever. It is not known how it is generated, but the influence of heat and light and moisture, the presence of organic matter in process of decay, and especially the existence of some peculiar condition of the air, chemical, electrical or otherwise, are probably more or less essential to its production, and the nature of the soil, the proximity of sub-soil water, and the presence or absence of trees, may also have some influence on the process. When developed, it seems to pervade the air as an unseen smoke or vapour; but the usual results of moving troops and prisoners from their barracks would appear to indicate that its diffusion is limited, and it is also probable that it gravitates being most abundant in the lower strata of the atmosphere, or those nearest the surface of the ground. It also seems that it may be absorbed by water which, as is probably the case with marsh miasm, may thus become the medium of its propagation."

And immediately afterwards he adds—

"Some believe that the poison has the power of multiplying itself in the human body like the other recognized zymotic poisons as those of measles and small-pox, and, therefore, that the disease may be communicated to others either by touching the patient, or by inhaling or imbibing the exhalations or excretions of his body. This opinion, however, is rendered doubtful by the rareness with which those attending cholera patients are affected; even in cases where they are attacked, it is equally probable that both patient and attendant were infected from a common source either by breathing the same vitiated air, or drinking the same contaminated water. * * *

During the epidemic at Peshawur there was a more or less universal feeling of *malaise* amongst the residents. Although not exactly ill, most people felt that there was something wrong; this was probably due to the intensity of the cholera poison which was then pervading the air."

35. I have quoted these passages at length because the epidemic was very severe in the Peshawur Valley, and this was the only portion of the Punjab in which, so far as I am aware, any special investigation was instituted into the history of the disease. The facts which Dr. Ince has recorded, and the conclusions which he has drawn from them, do not favor the opinion that the cholera was spread by human agency. The first statement appended to his special report shows that, out of 185 villages attacked, the date on which the first case appeared was in 126 of them between the 9th and 27th of September, the very time when the epidemic was most severe in the city and cantonment. The facts

The evidence throughout the Punjab generally does not favor the opinion that the disease was so spread.

which have been recorded regarding the spread of cholera in the Punjab during 1869, certainly do not favor the idea that it was diffused by persons coming from infected localities. The disease was widely diffused throughout the Province, in all 9,258 deaths were registered as having been due to it. If 50 per cent. of recoveries be accepted as the ordinary result, it follows that nearly 20,000 persons must have been attacked. Many hundreds of villages must have suffered, and yet the evidence of importation may be said to be almost *nil*. The difficulties of obtaining accurate data regarding Native communities are doubtless very great, and, as Dr. DeRenzy remarks, "failure to establish an affirmative does not prove a negative." But any opinion which does not rest on a solid basis of well ascertained facts is no better than a theory, and it cannot certainly be affirmed with reference to the recorded history of cholera throughout the Punjab in 1869, that human agency was indispensable for its diffusion.

36. It will not, I trust, be imagined that, in making these remarks, I am arguing against the views of those who believe that human agency is the only or the chief means of spreading cholera. My object, as I have already stated, is merely to sift the evidence, and see how far it bears out the opinions which have been advanced. I am quite prepared to accept any conclusions which may hereafter be satisfactorily proved, but this is one of those important questions which requires very careful investigation before any answer can yet be given to it. Is human agency the great medium by which cholera is diffused over India? This is the point which has to be determined, and it is to be settled not by any mere theoretical considerations or foregone conclusions, but by a patient and painstaking investigation into the facts of every epidemic as it comes under observation.

The influence of human intercourse in spreading cholera requires much further investigation.

37. The water theory, as originally propounded by Dr. Snow, has attracted much attention and found many supporters in England. In Dr. DeRenzy's opinion it explains all the phenomena of the epidemic of 1869 in the Punjab, and it is, therefore, of great importance to test how far this opinion is really borne out by the evidence. The only places in the Province which suffered with any great violence were, as has been already shown, Umritsur, Peshawur, and Kohat. Is there good reason to suppose that this violence was due to the fact that the water had been tainted with cholera discharges? The water at Umritsur is very impure, but there are no data regarding the great epidemic in that city which substantiate the opinion that impure water was the one of the many

There is no evidence to show that the violence of the epidemic at Umritsur was due to the use of water tainted with cholera discharges.

insanitary conditions under which the people live which governed the violence of the disease. We have the two facts,—an impure water-supply and a high death-rate from cholera;—but there is no reason to suppose that the one was the only, or even the chief, cause of the other. There is no reason to believe that the water of Umritsur is more impure than that of Native cities generally. The wells at Lahore, for example, are by no means pure; on the contrary, the Sanitary Commissioner states that “they are, as a rule, much exposed to pollution,” and yet in Lahore, although the disease appeared, the mortality which it occasioned equalled only 2.48 per 1,000, whereas at Umritsur it was 22.71, or nearly ten times as great. If the inhabitants of one particular quarter of the town of Umritsur or those using any particular water-supply—and it is worthy of notice that there are no less than 1,025 wells within the city—had suffered first or most severely, there would be some ground for believing that the impurity of the one caused the epidemic violence of the other. But this is the very reverse of what occurred. The first authentic case was observed on the 27th May. “After the 27th May,” writes the Sanitary Commissioner, “cases were of almost daily occurrence at Umritsur, but they were not numerous in any one place.”

* * * * *

* * The disease was confined to no particular quarter, but isolated cases occurred in all directions. * * From the 1st August the disease was universally diffused.” But even if it be admitted that the violence of the outbreak at Umritsur was due to the impurity of the wells, it by no means follows that the result was caused by the presence in this water of any special virus derived from cholera evacuations.

38. Before considering the water theory in its application to Peshawur, some notice may be taken of the outbreak in the Lunatic Asylum at Lahore. Dr. DeRenzy explains its occurrence on the supposition that the sand which had been used for filtering the water drunk by the lunatics had been taken from a hole a few hundred yards from the Asylum in which he found human and other excrement. “According to the standing rules of the Asylum,” he says, “the filtering sand is changed every Saturday. According to rule the sand would have been changed on Saturday, the 4th September. There is a strong probability that the sand taken from the hole already mentioned was that used on this occasion. The epidemic exploded next day at 4 P. M.” Now, even if this statement be admitted as absolutely correct, it still falls very far short of proving that the outbreak was due to the use of water containing cholera discharges; but as a matter of fact the whole circumstances were carefully investigated by the Civil

Surgeon and the visitors of the institution, and the conclusion at which they arrived was to the effect that the sand used for filtering on the day in question had not been taken from this hole, that, on the contrary, it was part of the very same supply which had been used for some time previous without any ill effects and which continued to be used after the outbreak ceased. In their opinion there was no reason to suspect that the locality from which this sand had been taken had been defiled, nor was there any ground for concluding that the use of this sand has been in the smallest degree connected with the severe outbreak of cholera among the lunatics. I have no intention of judging which is the correct version of the story, but the objections which were made both by the Civil Surgeon and the visitors to Dr. DeRenzy's statement of the facts of the case ought to have been mentioned. It is of the utmost importance that every assertion on a matter of fact should be thoroughly tested before it is accepted as correct, and that any doubts which have been expressed, especially when they come from such competent authority as they did in this instance, should be recorded.

30. The circumstances connected with the outbreak at Peshawur have been already fully discussed in my Annual Report for 1869, and no new facts have been recorded by Dr. DeRenzy which induce me in any degree to alter the opinions which are there expressed. The main water-supply of the city and cantonment, flowing as it does in an open channel, is peculiarly liable to pollution. Here, again, as in the case of Umritsur, we have an impure water associated with a severe outburst of cholera; but there is no evidence to show that they stood in the relation of cause and effect. Indeed, there are certain facts which favor the opposite conclusion. The main water-supply, as I have just stated, is the small stream which runs through the cantonment, and which is very liable to defilement, but the water from Mackeson's well is of good quality, and from this was obtained what was required both for the Royal Artillery and the 104th Regiment. The 36th Regiment drank of the stream water, and yet they did not suffer more than the wing of the 104th which remained in the cantonment, after the other wing left, and drank of the well water. Dr. DeRenzy attempts to meet this difficulty by saying that the troops who were supposed to be supplied from the well may really have obtained their water from the stream, for the water-carriers must naturally prefer to fill their *mussucks* in the easiest manner possible. When at Peshawur I made special enquiries on this point, and was assured on the best authority that the supply both for the Artillery and the 104th was very

The accuracy of the facts connected with the outbreak of cholera among the lunatics in the Lahore Asylum, as recorded by the Sanitary Commissioner, has been called in question.

The facts of the Peshawur epidemic do not countenance the water theory.

carefully taken from Mackeson's well. The water theory altogether fails to account for the facts—the escape of the left wing of the 104th Regiment which marched from the cantonment soon after the disease commenced, the continued suffering of the 36th Regiment long after it had ceased to draw its water from the cantonment cutting, the extreme violence of the disease among the different bodies of troops whether in the cantonment or in camps, among the Native population of the cantonment and the city, and also I believe throughout the Peshawur Valley generally on one and the same day—the 19th September. The immunity of the small garrison of the fort, Dr. DeRenzy attributes to the better quality of the water of the well from which their supply was drawn, and yet the water of this well is certainly no purer and no better defended than the water of the wells at many stations of which the troops drank, and yet suffered severely.

Nor do those at Kohat, but the details are imperfect.

40. The facts regarding the epidemic at Kohat are very much of the same character. Here the water-supply runs in an open stream, and is very liable to pollution, and here also the people, both of the city and cantonment, suffered much. The record of the outbreak is imperfect. In discussing the circumstances connected with it in my Annual Report, I was obliged to content myself with a short general statement which was supplied to me by Dr. Kelly, the Medical Officer of the 1st Cavalry. Without a full account of the several movements of the troops, and of the water-supply with which they were provided at their different encampments, it would be impossible to discuss the facts of this outbreak which bear on the water theory with any degree of satisfaction. But here, again, even if it be admitted that the use of impure water was the main agent in spreading the disease, it still remains to be proved that this water acted in virtue of any cholera discharges which it contained.

At Peshawur different communities drawing their water from different sources all suffered severely.

41. The experience of London in the matter of cholera epidemics which Dr. DeRenzy quotes as demonstrating the truth of the water theory is chiefly valuable, because it showed that, in certain communities living with one exception under the same conditions, the violence of the disease appeared to be regulated by the quality of the water-supply—the one condition in which they differed. But no evidence of this nature has been adduced in India. There are innumerable instances of towns and cantonments suffering severely from cholera, of particular bodies of troops being attacked while all the others escaped, but no evidence has ever been adduced to connect the attack or the escape with the use of any particular water. Those who suffered, and those who

escaped frequently drew their supply from one and the same source. And the facts at Peshawur do not tally with the experience of London. The London experiment has, indeed, been repeated at Peshawur with a very different result. Here, also, we have different sections of the community living under similar conditions in every respect except the source from which they drew their water-supply, but there has been little difference in the extent to which they have suffered from cholera. It may be urged that, although the sources may have varied, they all agreed in being more or less impure; but even if this be admitted, it can hardly be conceived as possible that all of them should have been contaminated with cholera discharges, and that in such a way as to cause the greatest number of attacks in each of the communities who used them on or about one and the same day.

42. Nor can the geographical distribution of cholera in India be explained on the water theory. The water-supply of the people throughout the Punjab and the greater part of the North-Western Provinces is very much of the same character; it is drawn from wells which are all liable to pollution in very much the same way and to the same extent; and yet between Umritsur and Peshawur, a distance of several hundred miles, although cases were recorded from many of the Districts between the month of May, when the first case appeared in Umritsur, and the month of September, when the outbreak commenced at Peshawur, with the exception of the case of the Lunatic Asylum at Lahore, we have no history of any special violence in any particular locality. In the North-Western Provinces, on the other hand, we have large tracts of country where the people suffered most severely. Is it conceivable that in the one case it so happened that all the wells over a large area escaped the cholera pollution, while those in the other area were generally so contaminated? Again, is it reasonable to imagine that in one year the water over one area is polluted with cholera discharges, while in another year the pollution falls on a different portion of the country?

The geographical distribution of cholera cannot be explained on the water theory.

43. On a careful examination of all the facts, I cannot, therefore, admit that there is any evidence to prove that cholera tainted water was the most influential of all the conditions which favoured the propagation of cholera in the Punjab in 1869. Much more precise and positive proof must be adduced before this doctrine can be accepted as a truth. That good pure water is one of the next important requisites for health I fully admit, and, as I have frequently urged, there is no more pressing reform required in cantonments, cities, and villages than the provision of a really good

The general facts of the epidemic in the Punjab do not support the water theory.

water in ample quantity of the best quality, and defended in every way from impurities, but the value of this reform can be insisted on just as forcibly, and, indeed, with even greater justice, without attaching to it a theory which, so far as the facts regarding cholera in India are concerned, as yet rests on no basis whatever. Facts may hereafter be adduced to show that this water theory is more or less true; but, until such evidence is produced, the assertion that cholera is propagated mainly by cholera-tainted water remains unproved. This is one of the great questions to be investigated by the Sanitary Commissioners with the utmost care and attention, but such an investigation can never be conducted with the hope of any satisfactory results, if it be assumed at the outset that certain theories regarding the disease have already been established as facts—that cholera cannot be diffused except by human agency; that cholera evacuations contain the special virus by which disease is spread, and that this virus acts on any community by gaining access to the water-supply. If the truth of these statements is believed by the enquirer to have been already demonstrated, very little remains for him to learn. But if, on the other hand, he enters on the study of an epidemic with his mind altogether unbiassed, he will find difficulties and anomalies innumerable which require the most patient and painstaking investigation.

The reasons which Dr. DeRenzy assigns for devoting a large part of the cholera section of his report to reviewing Dr. Bryden's work are based on a misapprehension.

44. Before leaving this section of DeRenzy's report, I must shortly advert to that large portion of it which is devoted to a review of Dr. Bryden's work on cholera. I have no intention of entering into this discussion; but the reasons which Dr. DeRenzy assigns as rendering it necessary for him to examine Dr. Bryden's views are founded entirely on a misapprehension, and therefore require some notice. "It is necessary for me," he writes "to examine the propositions which express Dr. Bryden's theory in some detail, because (1) this officer's forecasts of the probable distribution of cholera and his views of its mode of dissemination have become the recognized basis of the action of the Government of India against cholera; (2) because the principles he maintains are diametrically opposed to those on which in my report for 1868 I urged the Punjab Government to proceed; and (3) because I consider his theory erroneous, and seriously calculated to retard sanitary progress." The first of these three statements is altogether incorrect and without the smallest foundation of fact. The action of the Government of India in regard to cholera has never, in the slightest degree, been influenced by any theoretical considerations whatever. In June 1869 the special occasion, to which I presume Dr. DeRenzy refers,

when cholera threatened to be general over Upper India, I recommended that, if the disease should appear at certain stations which had suffered severely in former years, the troops should be at once removed to places which had hitherto enjoyed a remarkable immunity from cholera, and arrangements were made to carry this suggestion into effect. Happily it was not required in the case of the stations selected, but the recommendation rested on no theory but simply on the experience of a series of years. The rules to be observed on the appearance of cholera among European troops have been framed so that no precaution may be omitted which there is the smallest reason to believe may be adopted with advantage. They enunciate no theories, and yet the procedure they prescribe might have been recommended by the most enthusiastic believer in human intercourse and the water theory.

45. With Dr. DeRenzy's second reason I have no concern, nor with the first portion of his third reason; but when he states that Dr. Bryden's theory is "calculated seriously to retard sanitary progress," he falls into a grave error. The progress of cholera over a given area, according to Dr. Bryden, is to a certain extent inevitable; but the degree in which the inhabitants of that area are likely to escape will depend greatly in their sanitary condition, on the purity of the water-supply, the excellence of the drainage, and the completeness of all other such arrangements. Dr. Bryden's object was not to write a work on sanitation, but to explain what he believes to be the laws which govern the spread of epidemic cholera over the country. The benefits of sanitary improvements were not insisted on, simply because this was not the point under discussion. But if Dr. Bryden's views should be substantiated, they will enforce the necessity of great sanitary improvements as the main means of escape, perhaps more strongly than any others which could be advocated; and such reforms would embrace not only the one item of a good water-supply, but every other requisite for health.

So is his statement that Dr. Bryden's views are calculated to retard sanitary progress.

46. Dr. DeRenzy does but scant justice to Dr. Bryden's remarkable work, and it appears to me that, if such a proceeding as he has adopted is to be generally followed, it will lead to very inconvenient results. In any department it would be highly undesirable that one officer should dilate on and endeavour to expose what in his opinion are the fallacious doctrines of another, but in the investigation of such a difficult question as the causation of disease, and especially the causation of cholera, where our knowledge is as yet so far from exact, this course is

Such criticisms are calculated to do much harm by converting the Sanitary Commissioners into partisans of some particular theory in place of being, as they should be, earnest and unbiassed observers of facts.

especially to be deprecated. If the Sanitary Commissioners are to be engaged in reviewing each others reports, much of the benefit expected from their appointment will certainly be lost, and there is every reason to fear that what ought to be an altogether impartial investigation into facts will rapidly degenerate into controversy. In order that a Sanitary Commissioner may properly discharge the important duties assigned to him, it is of the first importance that he should keep his mind perfectly unbiassed by all theories. His great aim should be to collect facts, and *from these facts*, by a process of strictly logical induction, to draw what conclusions may be warranted by them, his judgment being altogether unfettered by the opinions which have been expressed even by the highest authorities. India presents a field for the study of cholera and other diseases such as can be found nowhere else, and the evidence which is year by year available in each Province, if carefully collected, affords ample field for study. If a Sanitary Commissioner is to become the advocate of any particular theories, and the opponent of every other Sanitary Commissioner who differs from him, it is quite impossible that he can preserve that thoroughly unbiassed and unprejudiced frame of mind which is so essential for the successful discharge of his duties; he will see only the facts which suit his own peculiar views, and insensibly shut his eyes to those which tell against them. Full and free discussion on sanitary matters is of great value, but this can be perfectly secured without introducing any element of controversy; and I would, therefore, strongly recommend that the Sanitary Commissioners should refrain from criticising the views which may be held by other officers in the same department.

The conclusions of the Sanitary Commissioner of Oudh are chiefly negative.

47. The Sanitary Commissioner of Oudh is of opinion that the history of the epidemic in that Province has shed no light either on the nature, the origin, or the mode of the propagation of cholera. He is still inclined to the opinion that "there are two entirely distinct diseases known under the same name one of which is of a spreading nature, and the other is not," but this is one of those general statements which, in the absence of all proof, is of very little value. Dr. Sutherland states that "there has been no evidence of contaminated water being the means of conveyance of the disease, or of its germinating in the soil."

In the Central Provinces Dr. Townsend believes that cholera was spread solely by human agency.

48. The most important conclusions at which Dr. Townsend has arrived regarding the epidemic in the Central Provinces may be learned from the following passages of

his report: "It is scarcely too much to say that the cholera which spread over the whole of the Central Provinces and the Bombay Presidency, and reached southward as far as Hyderabad in 1868-69, is traceable primarily to the cities of Mirzapore and Benares on the Ganges, and secondarily to the gangs of coolies on the road between Jubbulpore and Nagpore, and that human intercourse was the sole agent by which the spread of the disease was effected. The current in the main artery of communication between Eastern and Western India became polluted, and every region supplied by its ramifications became affected more or less according to its susceptibility. * * *

* * * Every District in which enquiries were instituted furnishes evidence of importation by means of human intercourse, and in this as in my last report instances are everywhere given of the effect of fairs and other gatherings of people, and of the communication of the disease from village to village and from person to person. * * *

"Taking the facts that I have collected in this report and that of last year, I think it must be conceded that cholera spreads by the agency of human intercourse, and that it requires no other medium for its diffusion; that in other words it may fitly be placed in the category of contagious epidemic disease." * * *

"In this report and in that for 1868 frequent instances have been given in which cholera was conveyed from one locality to another by persons not suffering from the disease, and there can be little doubt that during an epidemic this constantly happens." * * *

49. These extracts show that Dr. Townsend is a firm believer in human agency as the great if not the only means concerned in the diffusion of cholera; and it must be admitted that, in his very careful enquiry, a very large number of instances are adduced in which the disease appears to have been communicated by persons either suffering themselves or coming from an infected locality. The general history of the epidemic, as described by Dr. Townsend in the following passage, does not, however, favor the idea that human intercourse was even the main medium by which the disease was spread. "It may be said generally," he writes, "that the epidemic of 1869 had become diffused over the Province by the end of March and beginning of April; that its prevalence increased rapidly in May and reached its maximum early in June before the rains set in and then

Many instances have been given by him which appear to favor this view, but it is not supported by the general history of the epidemic.

declined; from the beginning of July the decline was rapid, and continued with a slight interruption in the first part of August till October, when the epidemic finally died out. This description of the rise and decline of the epidemic over the whole Province applies to the greater number of the different Districts. These were, however, exceptions." That there was some general influence at work which produced these results, and which governed the rise and fall of the epidemic over a large area cannot be doubted; but whether it was a miasm in the air or some other cause, regarding the nature of which we are as yet profoundly ignorant, has still to be determined.

Dr. Townsend believes that the one general influence which governed this history was the condition of the water-supply.

50. Dr. Townsend is of opinion that this one general influence is the condition of the water-supply, not the water theory in the same sense in which it was advanced by Dr. Snow and advocated by Dr. DeRenzy, but simply that the rise and fall of the disease are intimately associated with the impurity or purity of the water drunk by the inhabitants. His remarks on this point are very interesting and well worthy of attention:

" 671. In the report on cholera that I submitted last year I adduced a number of facts showing the intimate connection between impure water and the prevalence of cholera among the Native population, and the evidence of this report of which the above diagram may be considered an epitome, particularly if read in connection with Table 14, showing the rise and fall of the water in the wells in different parts of the Province, abundantly confirms the conclusion there drawn that drinking water fouled with organic impurities is the chief, if not the sole, condition under which cholera becomes epidemic in these Provinces.

" 672. The descriptions that have been given in the foregoing pages of the water-supply of the different Districts confirmed as they are by the drainage statistics given in Tables 13* and 14† show that from the time that the rains cease in September till the rains of the next season commence, the water-supply of the country is continually diminishing and deteriorating; as the hot weather approaches, the current in the larger rivers slackens, and in the smaller streams ceases altogether, tanks more or less dry up, the water in the wells runs low in the second or third week of April, the hot and dry North-Westerly winds set in, evaporation becomes exceedingly rapid, the diminution of the water-supply is greatly accelerated, and the insects and animals that swarm in all sources of water-supply die and putrify. The extent to which this death of animal life in water takes place will, of course, depend on the volume of water and the conditions of stagnation and exposure to the action of sun and evaporation; but I believe it may safely be said that annually, in the hot weather between March and June, a very large proportion of the drinking water of the people of

* Flow of water in Kanhan.

† Rise and Fall of Water in wells.

this Province passes through a state of putrefaction. It is at this time that cholera is most rife, and it creates the greatest havoc in those Districts in which water is most scanty and most exposed to the action of the sun and of evaporation, in Chattisgarh and Mundla, where the water supply is derived from tanks or from stagnant nálas.

" 673. Towards the end of May, the South-Westerly winds and gathering clouds, which indicate the approach of the monsoon season, check the deterioration of the water-supply; cholera begins to decline, and, with the first showers of the rainy season, there is a considerable fall in its prevalence; but with the heavier rains, another cause, by which the water-supply is rendered impure with animal matter, comes into play, and the tanks and wells become fouled by surface drainage. The operation of this cause is first evident in the District of Biláspúr, where, as I have shown, the tanks are most liable to pollution by surface drainage from the villages; a little later, when the rains have continued for some weeks, the surface water reaches the wells, and we find the prevalence of cholera increasing in the District of Nágpúr plain, where the water-supply is largely derived from wells sunk in porous strata, and in which the rise of the water is most rapid; but even here the operation of this cause is most marked in the towns which have a wide area of polluted soil, and few villages are affected by it. The general decline of cholera throughout the country, though impeded by this cause, still continues, and eventually, when the sources of water-supply have been everywhere replenished and the rains cease, cholera dies out. * * *

" 680. All these facts tend to show an intimate connection between cholera and water contaminated with animal organic matter. They do not, however, support the view that the water, under the use of which cholera is produced, is contaminated with the excreta of persons suffering from the disease; that it is simply the medium by which a specific poison contained in choleraic excreta is conveyed into the system. That choleraic dejections may contain specific poison, is quite possible; but that the diffusion of the disease over a wide area depends upon this poison being communicated through the medium of the drinking water, is most improbable. The evidence of the epidemic of 1869 in these Provinces is totally opposed to this view; for the diffusion of cholera by this means sufficient rain-fall to wash surface impurities into the water is pre-supposed; but in these Provinces a fall of rain in the hot weather that yields any surface drainage is a comparatively rare occurrence; and a reference to Table 12, which gives the rain-fall of the Province in 1869, will show that during April and May, when the epidemic spread with the greatest violence, the mean rain-fall over the whole Province did not exceed half an inch; and it is rather remarkable, too, that in the Districts of Nimar, Chindwará, Chándá and Sironchá, where the rain-fall in May was rather above the average, cholera was least prevalent.

" 681. While, therefore, I by no means deny the probability that the dejections of cholera patients contain the specific virus of cholera, I believe the instances in which the disease is communicated by water contaminated with this form of pollution to be comparatively rare. The connection between cholera and impure water is most commonly that of a predisposing cause; and there is reason to believe that any form of decomposing animal matter will create this predis-

position; that water polluted by dead bodies thrown into it or buried near it, by the death of the animalculæ, or fish that swarm in nearly all sources of supply, or by the excrement of men or cattle conveyed into it by surface drainage, or percolation through a porous soil, will act as a virulent and fatal poison when the infection of cholera is present.

"68. I have given evidence, both in my last report and in this, that the inhabitants of a town or village may use water impregnated in an excessive degree with animal organic matter with apparent impunity as long as they are not exposed to the infection of cholera; but when this happens, when an infected individual arrives among them, the disease is manifested with violence in proportion to the degree of pollution of the water-supply."

If this view be correct, then cholera should be epidemic every year.

51. Much, no doubt, depends on the water-supply; but if the circumstances described by Dr. Townsend are those which govern the rise and fall of cholera, or if, to use his own words, "drinking water, fouled with organic impurities, is the chief, if not the sole, condition under which cholera becomes epidemic in these Provinces," it is difficult to understand why it is not epidemic in every year.

Dr. Townsend believes that this is prevented by all those who are susceptible having been already carried off.

52. In a succeeding paragraph Dr. Townsend, as if anticipating such an objection, propounds the theory that "the disappearance of cholera is due primarily not to the dying out of the choleraic influence or contagion, but to the absence of individuals susceptible to its effects," and that "a tract of country over which cholera has spread is for a time protected from a recurrence of the disease." But how is such a theory to be reconciled with the persistence of cholera within its endemic area, or how are the oft-recurring epidemics, which break out in districts bordering on this endemic area, to be explained? The question, although of theoretical interest, is of no practical importance, except in so far as it is connected with Dr. Townsend's opinions in relation to the impurity of the water being "the chief, if not the sole, condition under which cholera becomes epidemic." Without much further evidence, the theory could not be accepted. It is difficult to believe that when more than 100,000 persons, double the number who died of cholera in the Central Provinces in 1869, were found susceptible to the disease, in one year, only 240, double the number who died in 1870, should be found susceptible in the year following, out of a population of over 6,000,000. Moreover, there is certainly no evidence to show that one attack of cholera confers any immunity from subsequent attacks; on the contrary, there is some reason to believe that those who once suffer are rather more liable to the disease than they were previously. But,

without insisting on this latter point, there remained 50,000 persons in the Central Provinces in 1870 who had recovered in 1869; there is no reason to doubt that they were susceptible to the disease, and yet in the whole Province only 120 persons died of cholera in 1870.

53. Dr. Townsend also has criticized Dr. Bryden's views in relation to the facts of the epidemic as it affected the Central Provinces. I have no intention of attempting to defend these views. At another time, with further experience, Dr. Bryden will, no doubt, be able to explain them still more fully, and to adduce fresh illustrations of the general truths which they contain, but I would observe that there are some points in Dr. Townsend's remarks which deserve notice. In the first place, it is to be noted that, according to Dr. Bryden, the cholera of the Central Provinces in 1869 was not a new invasion, but a reproduction of the cholera of the previous year, and that, therefore, the meteorology, so far as regards the prevailing winds, does not affect the question. If the meteorology of 1868—the year in which the invasion took place—be considered, it may be argued that here also the prevailing winds did not favor the entrance of any miasm from the endemic Province of the disease, but too much stress appears to have been laid on the question of the comparative prevalence of different winds. If cholera is an air-borne miasm, which is sown broadcast over a large area by means of wind, it is quite conceivable that it should be so sown with great rapidity.

In the history of the epidemic in the Central Provinces, there are several striking facts which support Dr. Bryden's views.

It is to be remarked, moreover, that the wind which Dr. Bryden believes to have been the vehicle by means of which the Central Provinces were invaded by cholera in the spring of 1868 was a North-East wind—a wind, in fact, which would follow very much the same track as the highway from Mirzapore and Benares, along which, according to Dr. Townsend's belief, the disease was imported by human beings. A reference to page 154 of Dr. Bryden's general report, and especially to the foot note on that page, shows that such North-Easterly influences prevailed to an unusual degree at the time in question, and this phenomenon is easily accounted for by the signal failure of the South-West monsoon which characterized the year. I am not arguing in favor of the air-borne theory, but it is certainly not disproved by the fact that the winds in 1869 were not generally such as would bear up a miasm from the delta of the Ganges. Dr. Townsend's remarks on the extreme dryness of the atmosphere, which characterized the season when cholera prevailed in the Central Provinces, is a much more

important point; but I must leave Dr. Bryden to consider the facts adduced by Dr. Townsend in connection with the views which he has advanced on the condition of the atmosphere most favorable to the spread of cholera. I would observe, however, that in Dr. Bryden's report on the cholera of 1869, he shows that the meteorology of the Central Provinces between the 9th and 15th May—the week in which the disease appears to have extended to the Districts which had escaped in 1868—was characterized by the general diffusion of moisture as indicated either by actual rain or the presence of clouds.

It is also very remarkable that, during the severe epidemic at Raipore,—the only place in regard to which the daily register of the weather is given in full—clouds were frequent, and there were also occasional showers. In commenting on the Table which shows the "meteorological conditions at Raipore during the epidemic," Dr. Townsend remarks (paragraph 513)—"It will be observed that the period of the epidemic was characterized by great heat and dryness of atmosphere; that during the week in which it reached its maximum, storms of wind from the South with electric disturbances and a few drops of rain were frequent. With the exception of the slight shower registered on the 21st May, and the few drops of rain that accompanied the electric disturbances in the following week, there had been no fall of rain since the middle of March, and none occurred till the 22nd of June. By that time, the epidemic had ceased in the town, and was on the decline in the District." I observe, however, that, from the 10th of May, the date on which the register commences, up to the end of the month, although the mean humidity denotes great dryness of atmosphere, clouds were very frequent. In 18 out of these 22 days their presence is noted in a greater or lesser degree, and the same remark applies to 14 out of the first 21 days of June.

54. The sanitary report of the Central Provinces for 1869 is of much value, and opens up an almost endless field for discussion and attentive consideration in regard to cholera. The great questions connected with the disease still remain to be solved, but no better means could be adopted for accomplishing this important end than the special personal enquiry which Dr. Townsend instituted, and the record of which is contained in his report. He has also suggested that a still more searching investigation should be undertaken in certain selected portions of the Central Provinces, where, with the aid of a medical officer and of Native Doctors, the whole facts within a limited area may be examined

The mode of enquiry adopted by Dr. Townsend is the best adapted for the purpose.

and accurately recorded. This investigation has been proposed as a contribution towards the special enquiry recommended by the Army Sanitary Commission in the 5th Section of their instructions for conducting a cholera enquiry in India, and it will, I trust, soon be in operation.

55. The epidemic of cholera in Berar is chiefly interesting from the fact that its violence was attributed to the use of old grain which, having been stored in pits for many years, was required under the pressure induced by the scanty crops of 1869. But a more careful investigation showed that this theory, which had been advanced by the Superintendent of the Revenue Survey, was incorrect. Although the pits in use in certain parts of the Province had been drawn on to a large extent, the grain was not required for local consumption, and had been exported to other Provinces where the demand was great. It, moreover, appeared that, in those parts of Berar where such pits exist, cholera had not been so prevalent as in others where they are not used, and, as a matter of fact, the particular part of the country regarding which the theory had been advanced suffered less than any other portion of the Province. The pit-grain certainly could not be regarded as wholesome food, and was apparently well calculated to favor disease, especially of the digestive organs; but Dr. Lewis, to whom specimens were forwarded for examination, reported that, beyond having lost great part of its nutritive value, it did not present any peculiar features, nor did it develop any special organisms such as might be associated with the occurrence of an epidemic.

The epidemic in Berar was supposed to be due to the use of pit-stored grain.

56. The discussion of the cholera of 1869, and of the various opinions which have been advanced by the several Sanitary Commissioners with regard to it, has occupied much space, but the epidemic was a most important feature in the sanitary history of a very unhealthy year, and it is of the greatest importance that all the facts connected with it should be carefully examined. It will be observed that I do not consider any of the opinions adopted by the Sanitary Commissioners as proved; some of them are purely theoretical, others require patient investigation and further proof; but it is satisfactory to know that these theoretical considerations do not materially affect the practical measures which seem best adapted to arrest the violence of any future epidemic. The strongest supporters of the doctrine that cholera is spread by human agency, or by human agency alone, such as Dr. DeRenzy and Dr. Townsend, fully admit the impossibility of adopting quarantine. All are

Notwithstanding different theories, there is a general consent as to the value of sanitary improvements as the best preservative against cholera.

persuaded of the value of a pure water-supply, and the argument in favor of this essential requisite of health is in no degree strengthened, indeed it is rather weakened, by the theoretical assumption that cholera will attack any community with violence only when that water contains cholera discharges. The practical lesson of the epidemic is the same as that which has been taught by all former epidemics, general sanitary improvement, or, as Dr. Planck has well stated it, "the improved sanitation of the Province generally, and especially of the principal centres of population."

SECTION II.

B.—Small-pox.

Its distribution and relative prevalence in the Lower Provinces are not recorded.

57. Cholera was not the only disease which was more than usually prevalent in 1869. Small-pox and fever, to all appearance the ordinary malarious fever of India, attained a very remarkable ascendancy and caused great mortality. With regard to each of these very wide-spread epidemics, I shall endeavour to summarize all the information that can be collected from the reports of the different Provinces, but must premise that the history of both diseases is much less complete than it ought to be. Of the general distribution of small-pox over the Lower Provinces nothing is known. It does not appear whether the disease was more or less prevalent than usual. At Dacca there was an outbreak which began to prevail in September 1869 and lasted, it is reported, till the month of April 1870. The case is interesting chiefly on account of the special measures which were adopted to check the disease. Extra vaccinators were employed, a special small-pox hospital was established, and every precaution taken to arrest its spread. The great extension of the disease which was to be feared in the spring did not take place.

Outbreak at Dacca checked by special measures.

In the North-Western Provinces small-pox was more prevalent and fatal than cholera.

58. How widely small-pox was spread in the North-Western Provinces during 1869, and what a fertile source of mortality it was, may be judged of by the fact that while 69,542 deaths were registered from the great cholera epidemic of that year, the deaths attributed to small-pox numbered no less than 90,770. These figures are doubtless far from accurate. Deaths arising from measles and any other diseases associated with an eruption on the skin, are apt to be included by the people under the one general head of small-pox; but against this source of error, which is calculated to increase the number, it must be remembered, on the other hand, that very many deaths as yet escape registration altogether, and the probability is that the mortality from small-pox has been rather under-stated than placed at too high a figure.

59. The information regarding this great epidemic is unfortunately very scanty. During the first five months

of the year the disease was epidemic in many of the districts and prevalent in almost all. The fact that Kumaon and Garhwal, with a population of nearly 650,000, escaped with few deaths, while in other districts the victims were by thousands, is a striking testimony to the power of vaccination and to the able exertions of men who laboured so many years and with so much success to protect the people in these hilly tracts of

The escape of Kumaon and Garhwal, where vaccination had been general, bears striking testimony to the protective power of vaccination.

The deaths from small-pox are not shown according to months, except for four districts, but these statistics well illustrate the seasonal prevalence of the disease—the gradual rise from January to April, and then the gradual decline :

1869.		DEATHS FROM SMALL-POX.			
MONTH.		Allypore.	Agra.	Cawnpore.	Banda.
January	...	840	1,242	331	787
February	...	981	1,212	471	1,265
March	...	1,337	1,456	1,088	2,056
April	...	1,285	1,834	1,615	1,793
May	...	1,218	1,183	1,718	827
June	...	478	442	723	239
July	...	175	132	243	57
August	...	59	117	83	8
September	...	21	52	25	5
October	...	18	12	18	3
November	...	14	12	6	0
December	...	23	8	6	1
TOTAL		6,449	7,802	6,327	7,046

61. This rise and fall of small-pox, which is not confined to the North-Western Provinces, to any one section of the community, or to any particular year, is one of the most remarkable and unaccountable features of the disease which is of great interest, and the cause of which requires very careful investigation. Dr. Planck's theory on the subject is altogether unsupported by facts. "I am inclined to think," he writes, "the reason why deaths from small-pox always commence and increase in the cold weather months is that inoculation is practised then, and so the contagion of the disease is spread in every centre of population to end by becoming epidemic in some years in the hot months." It is a known fact that wherever inoculation is practised, there is

The monthly rise and fall of small-pox are illustrated by the statistics in a few districts.

Dr. Planck's idea that the annual increase of small-pox every cold weather is due to the general practice of inoculation at that season, is not consistent with the facts.

a certain amount of risk of spreading the disease; but the opinion that the increase of small-pox over a whole Province at a particular season of the year is really due to inoculation would require some proof before it could be accepted as correct. Different districts must be compared, which inoculation is the practice and those which are not known, and the results examined. As a matter of fact, I find from a summary of very interesting information on the subject of inoculation in different parts of India, issued by the Medical Department in its "general No. 2 on the Lunatic Asylums Vaccination and Dispensary in the Bengal Presidency for 1869, compiled by Surge-Major Ross, Secretary to the Inspector General of Hospitals, Indian Medical Department," in 1870, that, in the North-Western Provinces, inoculation is the exception and not the rule. It would appear to be confined to the Benares Circle and the Jounpore District. Throughout the Provinces generally it is unknown. In the four districts, for example, which Dr. Planck has cited in illustration of the rise and fall of the disease, no inoculation would appear to have been carried on, and, as he remarks, "a like table of all the districts would give the same general result," those few in which inoculation is resorted to obying the same law as those in which it is not adopted.

The details of the small-pox epidemic in the Punjab are to be gathered from the tables appended to the report.

62. Although Section 2 of Dr. DeRenzy's report is devoted to "the history of the epidemics of the year," the only two diseases of which it treats are cholera and fever. Small-pox is not alluded to, and yet 53,195 deaths from small-pox were registered, or nearly six times the mortality from cholera. The districts in which it chiefly prevailed, and the monthly prevalence of the disease are, however, clearly shown in Returns A. and B. of the Appendix attached to the Report. In the District of Montgomery the highest death-rate from small-pox, 11.79 per 1,000, occurred. In Gurgion it was 10.34. In six other districts the rates were over 5 per 1,000. In the Province generally it was 3.05. The comparative prevalence in different months is shown in the annexed statement:

Monthly deaths from small-pox in the Punjab in 1869.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
6,307	6,382	7,169	6,946	10,609	6,768	3,217	1,835	978	582	836	1,566	53,195

The deaths from small-pox in Oudh are not shown by months.

63. In Oude 21,564 deaths were ascribed to small-pox, or very nearly as many as were attributed to cholera.

The death-rate under this head varied from 8.9 in Oonao to 0.1 in Kheree. For the province generally it was 1.9. No details are given showing the distribution by months.

64. The Central Provinces also suffered severely from small-pox, and the statistics for 1869 show a very remarkable increase in the mortality from this disease. In 1867 and again 1868, the deaths registered under this head were about 3,000. In 1869 they were nearly 17,000. The mortality by months was as follows; and it will be observed that, although the decline commenced a month earlier, the disease obeyed the same general law as that which was followed in the other Provinces:

Monthly deaths from Cholera in the Central Provinces in 1869.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
614	1,073	2,601	4,648	3,849	1,991	932	461	239	141	114	156	16,849

These statistics are valuable so far as they go; but, as Dr. Townsend remarks, the amount of mortality from small-pox does not afford a very accurate test of the relative prevalence of the disease in different districts, for the fatality varies greatly. From certain selected returns it appears that the proportion of deaths to cases varied in five districts from 4.8 to 20.8 per cent. Dr. Townsend is inclined to believe that in the Central Provinces the course of an epidemic of small-pox is, to a great extent, parallel with that of an epidemic of cholera; and that a water-supply impregnated with animal matter which, in his opinion, regulates the violence of cholera, aggravates the effects of the contagion of small-pox, and renders it more deadly in its operation. That the diseases may rage together I have no doubt; but the mere fact cannot be taken as proof that the cause of cholera is a specific poison which passes from man to man.

65. Berar also suffered much from small-pox: 6,365 deaths from it were registered, or 3.0 per 1,000 of the population. The number in each month is shown in the annexed statement.

Statement showing the monthly deaths from Small-pox in Berar in 1869.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
	2,769		1,434	1,012	497	269	195	69	28	37	55	6,365

In the great epidemic of the Central Provinces the decline commenced a month earlier than in the Punjab.

The epidemic was also severe in Berar.

In the Madras Presidency small-pox was not so fatal as in either of the previous years.

66. In the Madras Presidency small-pox caused a heavy mortality, but the deaths, nearly 18,000, were not so numerous as in 1868, when they numbered 34,330. The monthly mortality from the disease is shown in the annexed statement.

Statement showing the monthly deaths from Small-pox in the Madras Presidency during 1869.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1,956	1,661	2,123	1,943	1,894	1,609	1,565	1,358	1,009	596	760	977	17,751

The death from small-pox in the Bombay Presidency are not detailed by months.

67. The deaths registered as having been due to small-pox in the Bombay Presidency during 1869 were 12,673. The details are not given by months, but it is noted that by far the greater number occurred during the first half of the year; the proportion during the first six months having been nearly as 5 to 1 compared with those in the other six. The greatest number (2,239) were reported in April, but in March they fell only 200 short of this figure.

SECTION II.—C.
Fever was more wide-spread and fatal than even cholera or small-pox.

68. Fever is the only other disease of which special mention need be made in reviewing the vital statistics of the year, and great as was the mortality from cholera and small-pox, the mortality from this cause was much greater still. The deaths recorded under this head are less accurate even than those under the other heads; for the uneducated are quite unable to distinguish with any accuracy the cases which should be recorded under it, but there can be no doubt that the year 1869 was characterized by one of the most wide-spread and fatal outbreaks of fever which can be remembered. The history of this great epidemic is unfortunately very incomplete; but some interesting details can be gleaned from the reports of the different Sanitary Commissioners.

Fever was very prevalent at Burdwan and Serampore in the Lower Provinces, but details are wanting.

69. In the report for Bengal allusion is made to severe fever epidemics which occurred at Burdwan and at Serampore, but the papers to which reference is made as containing the history of these outbreaks are not printed with the report. The measures of relief which were adopted only are described.

The Sanitary Commissioner of North-Western Provinces is of opinion that, in those districts which suffered most, the fever was due to over-irrigation from the canals.

70. In the North-Western Provinces, during 1869, no less than 246,838 deaths were attributed to fevers, or nearly one-half of the total mortality of the year. The ratios for each district are not given, and it is thus impossible to compare the results in different parts of the country with any accuracy; but two facts are evident, first that in nearly every

district there was a marked increase of deaths from this cause as compared with the statistics of the year previous; and, *secondly*, that many of them suffered from a wide-spread and fatal epidemic. The chief mortality appears to have taken place in the months which immediately succeeded the heavy rain-fall of September and the first days of October—a rain-fall which covered the country and filled every hole to overflowing. Dr. Planck is of opinion that the fever was due, in some part, to this excessive moisture, and that in the case of Saharanpore and Mozuffernugger this result was in no small degree dependent on irrigation from the canals. The condition of these districts was made the subject of special investigation, and as the result of this inquiry and of his visits to the affected localities, he repeats the opinion that great part of the disastrous results of the year may be attributed to over-irrigation. The practical remedies which he recommends are contained in the following paragraph:

“344. I would, therefore, very earnestly counsel the gradual but certain establishment:

“(A.) Of such measures as may conduce to a lessened amount of canal irrigation—

“1st.—By discouraging the cultivation of rice wherever it was not cultivated before canal irrigation was introduced, and, perhaps, the best way of doing this would be to increase the land-tax of such land so long as rice is cultivated on it.

“2nd.—To introduce some method of distribution which shall require an increase to the manual labor now required to place the water so that it may spread itself over the fields.

“3rd.—To encourage a return to the ancient form of irrigation from wells in all places where the water in the wells now stands at less than 10 feet from the surface at any time of the year.

“B.—Of such measures as may improve the town and village sites—

“1st.—By raising them to the utmost possible extent, levelling and consolidating the surface.

“2nd.—By requiring a return to irrigation, from wells, of the land for a certain distance around every town and village.

“3rd.—By draining permanent water-holes to the nearest *nuddee*, the earth removed from the necessary cutting being utilized for the improvement of the town or village site.

“4th.—By planting trees between any noted source of malaria and the town or village site. By removing trees where they stand too thickly and serve no good purpose.”

71. The question of irrigation, as a cause of malarious disease, is one of great importance not only as regards those parts of the country where canals are already in operation, but also in connection with the great works of a similar nature which have lately been projected, and some of which have been already commenced. I do not mean to throw

But districts of the Central Provinces and Punjab where there is no canal suffered more.

any doubt whatever on Dr. Planck's statement that over-irrigation will make tracts of country previously healthy more subject to fever than they used to be; but such questions cannot be regarded from a merely local point of view. The prevalence of fever in 1869 was not confined to the North-Western Provinces. The Central Provinces and the Punjab, as we shall presently see, had a very heavy mortality from the same cause, and not a few of their districts, where no canal runs, and which are in ordinary years remarkable for the health of the inhabitants, suffered as much as either Mozuffernugger or Saharanpore. This will appear more clear from the following comparison. The District of Goordaspore in the Punjab, it is to be noted, has a canal running through, and it has been purposely introduced into the list so that comparison may be made between the mortality from fever in it as contrasted with the proportion of deaths from the same cause in other districts of the province which are not so situated.

NORTH-WESTERN PROVINCES.			CENTRAL PROVINCES.			PUNJAB.		
Districts.	Popula- tion.	Deaths from fever.	Districts.	Popula- tion.	Deaths from fever.	Districts.	Popula- tion.	Deaths from fever.
Saharanpore ..	866,483	11,189	Saugor ..	490,249	8,005	Goordaspore..	996,126	21,824
Mozuffernugger.	682,189	10,541	Belaspore ..	530,541	10,060	Rawul Pindie	699,647	16,532
Banda ..	724,372	12,960	Raepore ..	586,118	9,894	Hoshyarpore..	938,800	21,344
Bareilly ..	1,464,199	17,416	Jubbulpore ..	423,650	6,791	Umballa ..	1,008,952	13,875

The comparison is not altogether fair, because registration is, I believe, much less imperfect in the Central Provinces and Punjab than it is in the North-Western Provinces, and the proportion of deaths which are not recorded at all in the North-Western Provinces must be much greater than it is in these other portions of the country. But, allowing for this source of error, it is evident that the violence of the fever epidemic was not confined to tracts which are traversed by canals. Hoshyarpore and Saugor suffered very much more than Saharanpore; Rawul Pindie and Belaspore very much more than Mozuffernugger; and the comparison in other cases shows little results. The epidemic was remarkable not only because it was so widespread, but also because it attacked some places with greatest violence which are usually the most healthy.

72. In the Punjab, fever contributed 272,946 deaths, or more than half the total mortality of the year. The death-rate from this one cause alone equalled 15.64 per 1,000. The proportion in different districts varied from a minimum of

The epidemic in the Punjab is not to be accounted for by the late and heavy rains.

3.17 to a maximum of 24.08. In the early part of August, in many of the districts, the epidemic commenced, in others it appeared in September, while others again did not suffer till October, or comparatively escaped. The loss of life in certain parts of the country, as in ~~Rawul Pindie~~, Hoshyarpore, and Goordaspore, was terrible, and the extreme prevalence of the disease prostrated the greater number of the inhabitants. The Civil Surgeons, who were consulted on the subject, were unanimously of opinion that it was due to "the late and heavy rains," assisted in some places by the weakly condition of the people caused by the high prices of food; but in my annual Report for 1869, I pointed out that such an explanation does not meet the facts, and a similar opinion is, I find, expressed by Dr. DeRenzy. There can be no question that up to the month of August, when the epidemic was so severe in many places, the rain-fall had actually been less than in previous years when no fever prevailed.

73. But while I coincide in the conclusion that the fever is not to be accounted for by the late and heavy rain, I cannot share Dr. DeRenzy's suspicion that it was not of a purely miasmatic origin, and that it may have been of the character either of that fever which, during the last ten or twelve years, has been recognized now and again in certain Jails of the Upper Provinces under the name of Relapsing Fever, or Jail Fever, or Contagious Fever; or of the same character as the fever, whatever may have been its nature, and I do not offer any opinion on this point, which proved so fatal to the prisoners of the Rawul Pindie Jail in 1869. Of this there is no evidence. On the contrary, the statistics of European troops, of Native soldiers, and of prisoners within the area attacked, and the description of the disease as it came under observation in regimental and jail hospitals, show that it was of the same type as that ordinarily known as malarious fever. Dr. DeRenzy twice quotes Dr. Aitken's opinion that "agues have always been observed to be diseases of moist and marshy districts," and argues that because Rawul Pindie, which suffered so severely, stands on high ground and has excellent drainage, there is, therefore, good reason to believe that the disease was not malarious. But such an argument implies that our knowledge on the subject of malaria is already perfect, and yet any one who studies the statistics of communities occupying the same locality and living to all appearance under similar conditions from year to year, must be struck with the fact that fevers which are very rare during one season, without any accountable cause become very prevalent in another. And it must, I think, be admitted that we are still very

There is no evidence to lead to the suspicion that the disease was other than malarious.

ignorant of the conditions under which the epidemic prevalence occurs, whether they be of atmosphere or soil, or be dependent on other circumstances. The epidemic prevalence of fever is just as inexplicable as the epidemic prevalence of cholera. It is quite impossible to believe that the fever epidemic of 1869, which was so destructive over so large a portion of the North-Western Provinces, the Central Provinces, and the Punjab, and which was at its height in all of them about the same time, could have been spread by human intercourse, especially when we have the positive evidence that the cases of the disease, which came under intelligent observation, could not be distinguished from the ordinary fevers which occur every season, and are known under the common name of malarious.

The immense number of cases of fever represented by the mortality is no argument against its having been malarious fever.

74. Dr. DeRenzy argues that if the great mortality which was occasioned by fever in certain districts of the Punjab had been due to the prevalence of the ordinary malarious disease, the number of cases must have been greater than can be readily believed. "Supposing the mortality from the disease," he says, "to be at the rate mentioned by Dr. Morehead (1.33 per cent. of attacks), it would have required upwards of 460,000 cases of fever to give the number of deaths that actually occurred in October alone in the Hoshiarpore District, the population being 938,890. In Rawul Pindie it would have required upwards of 330,000 cases, the population of the whole district being 699,647. Good medical treatment, no doubt, largely reduces the mortality from disease; but, on the assumption that the death-rate was even double that given by Dr. Morehead, the proportion of the population prostrated by fever must have been so large as to bring the business of the country to a standstill." But, as a matter of fact, the business of the country was for a time seriously interrupted. The almost universal prevalence of fever among the Native population of the Peshawur Valley was assigned as one of the chief causes which prevented the earlier removal of the European troops from the cantonment when attacked by cholera. When I visited Rawul Pindie in November 1869, I found that I could not carry out my intention of going to Murree, because the Post Office cart had ceased running for the season, and the bearers were prostrated by fever. There had been difficulty in obtaining forage for the horses in cantonments, and agricultural operations, I was informed, had been seriously interfered with. It was said that at one time 80 per cent. of the whole population of the district were suffering from the epidemic. But more precise facts can be gathered from the statistics of European and Native troops at the same time. Dr. DeRenzy argues that if the deaths attributed to fever in the

Hoshiarpore and Rawul Pindie Districts had been due to malarious fever, one-half of the population in round numbers must have suffered from the disease in the month of October alone. At Mean Meer, in the month of October, among the Native soldiers, as a matter of fact, there were 869 admissions into hospital from fever out of a strength of 1,386, much more than one-half. Among the European troops the admissions were 486 out of 922. At Rawul Pindie, in the same month, 700 Native soldiers gave 350 cases of fever, or just one-half. In the European corps the proportion was greater: at Peshawur, in the same month, out of 2,985 sepoy there were 1,611 admissions into hospital from fever. One of the most striking features of the epidemic was its extreme prevalence over certain areas. These figures certainly do not refer to different individuals. The same persons might be attacked with fever more than once even in one month, but it may be taken for granted that Dr. Morehead's statistics were framed on the same principle, and that his ratio of mortality was deduced from cases, not from separate persons.

75. In Oude the deaths from fevers recorded were 87,795, or 7.8 per 1,000 of the population. From the general table in which these statistics are given, it seems that the disease was very prevalent in the districts of Oonao and Roy Bareilly, where the mortality under this head equalled 14 per 1,000; in others, such as Pertabghur and Seetapore, the loss was only 2 or 3 per 1,000. The distribution of the deaths by months is not given, nor is there any history of the disease.

The deaths in certain parts of Oude from fever were very numerous.

76. The Central Provinces show a mortality of 68,999 persons from fevers, or 39 per cent. of the whole mortality of the year. In his remarks on the epidemic, Dr. Townsend refers to the large element of error which is likely to arise under this head to which I have already alluded, and doubts whether it is advisable to attempt to register the deaths from fever separately, but with all its imperfections the information is still of great value. Dr. Townsend is of opinion that the reverse of the hot season may, in great measure, be due to impurity of water, while the extent to which the fever of the autumn months shall prevail depends on the rain.

In the Central Provinces there was a great epidemic of fever.

"If the rain-fall has been abundant, and, more especially, if it has been continued late in September and October, the development of malaria will be great, and vice versa. The seasons of 1868 and 1869 afford marked evidence on this point. In 1868 the average rain-fall of the monsoon over the whole Province was 15 inches below the average, and the deficiency was greatest in the months of September and October. The morning dews that usually prevail in the autumn months were light and soon ceased, the water in the wells was very little increased, and the subsoil water remained at a considerable depth

from the surface. Under these circumstances the development of malaria was unusually slight, and had comparatively little effect on the returns of mortality from fever. On the other hand, in 1869, the rain-fall of the monsoon was abundant, and, more particularly, the fall in September and October was more than double the average, and three times what it was in 1868, and the returns of the autumn months show a marked increase in the mortality from fever over the corresponding period of the previous year. This increased mortality, however, was not altogether due to the greater prevalence of malaria, for the malaria of these Provinces is not, under ordinary circumstances, directly fatal to life; but in 1869, in many districts, a large portion of the population had been suffering from insufficiency of food from the commencement of the year, and many who had been able to drag through the hot weather succumbed under the climatic changes produced by the monsoon, and were carried off by attacks of fever which, under better circumstances, they would have been able to withstand."

The increased rain-fall, especially in the later months of the year as we have already seen does not solve the unusual occurrence of fever in the Punjab, and without a more detailed statement it is difficult to judge how far the two were connected in the Central Provinces. A comparison of the monthly rain-fall in each district in 1869 with that of 1868 is required, as well as a statement of the monthly deaths from fever in similar detail. As Dr. Townsend observes, the conditions which favor the development of malaria form a very difficult subject of study, and the special attention which he proposes to devote to it will, I doubt not, elicit some interesting particulars.

77. In the Madras Presidency 132,346 deaths were attributed to fever, or a ratio of 5.3 per 1,000, a proportion very nearly equal to one-third of the whole mortality. The remarks of Dr. Cornish, the Sanitary Commissioner, on the epidemic are of much interest, especially in connection with the question of the influence of canal irrigation in favouring the prevalence of the disease, to which allusion has been already made.

"The year 1869," he observes, "has been remarkable for a considerable increase in the fever mortality of the population of the Madras Presidency.

"Fever has been specially fatal in the districts of Godavery, Kurnool, Vizagapatam, Cuddapah, Gangam, Malabar, and South Canara. The small population on the Neilgherry Hills, too, has suffered unduly.

"The highest mortality of all has occurred in the Godavery District (12.0 per mile), where a large tract of country is under canal irrigation. If a similar mortality had occurred in the adjoining irrigation district (Kistna), or in the delta of the Cauvery (Trichinopoly and Tanjore), where irrigation has been practised for many years, it would have become a question whether some connection might not have been

In the Madras Presidency fever was severe, and it prevailed most in the non-irrigated districts.

traced between the accession of fever and the influence of canal irrigation; but, as a matter of fact, fever has been more prevalent and fatal in the districts of Bellary, Kurnool, and Cuddapah for the past four years where there are no irrigation works to speak of, than in the Godavery District for the same time; while the irrigated districts of Kistna, Tanjore, and Trichinopoly have had a fever mortality of fifty per cent. below that of the dry districts just mentioned.

"The fluctuations in fever mortality in the several districts deserve to be carefully studied from year to year. So far as the figures of the four years enable one to come to any conclusion, the causes producing fever would appear to be operative over widely-extended tracts of country at the same time, and to be in action for long periods together. It is noticeable that a high fever rate in Ganjam and Godavery has been co-existent with a similar high fever range in Lower Bengal, in Kurnool, and South Canara, places which are very wide apart."

78. The statistics of the Bombay Presidency do not afford any information on the subject of fevers. The deaths due to this disease are not separately entered, nor are any remarks made on this cause of mortality by the Sanitary Commissioner.

No statistics are given to show the deaths from fevers in the Bombay Presidency.

79. Bowel complaints and the various kinds of injuries as causes of mortality do not require special notice; for, although they are separately entered in some of the annual statements furnished by the Sanitary Commissioners, they do not find place in all of them, and, as a rule, no comments are made with regard to them. With the general introduction of the new forms, this want of information will be supplied, and the interesting facts, which may be elicited under these several heads, will, no doubt, invite attention.

SECTION II.—D.
Bowel complaints and injuries are not generally commented on by the Sanitary Commissioners.

80. This sketch of the history of the diseases, which chiefly contributed to the mortality of the different Provinces, rapid and imperfect as it has been, has occupied so much space that I must content myself with a very brief notice of the matters which remain to be discussed. The main facts regarding the meteorology of the year have been already recorded in my Annual Report for 1869, but they may be very briefly recapitulated here for the purpose of ready reference in connection with the general history of disease. In the Lower Provinces, Mr. Blanford shows that—"the most striking feature of the temperature of 1869, as compared with that of 1868, is the high range in the first five months of the year" "the fall of rain was less than the average in Orissa, the Gangetic Delta, and Arracan, also in Eastern Bengal except Sylhet, and probably Cherra Poonjee in Lower Assam, Sikkim, and parts of Behar. It was above the average at Sooree and Berhampore and over a tract of country stretching between the Rajmchal Hills

SECTION III.
The meteorology of the year was remarkable.

and the Bhutan Doocars, including Dinagepore, Rungpore, and probably Julpigoree and Buxa. The rain-fall in Upper Assam seems also to have been in excess of the average, and it certainly was so in Sylhet." The meteorology of the North-Western Provinces is not discussed separately, nor are any statements of temperature, rain-fall, &c., given for the Province; but allusion is made here and there to the peculiar characters of the year. "The remarkable features as regards climate were a lengthened hot season, a dry ardent season, commencing early and extending far into what is usually counted as the rainy season,—a delayed rainy season characterized by a rain-fall of more than average quantity, and ending in quite a flood of rain as late as the first ten days of October." No separate section of the Punjab Report is devoted to meteorology; but a summary of observations in the Punjab by Dr. Neil, the Meteorological Reporter of the Province, is given as an appendix. There was the same general history here as in the North-Western Provinces,—a high and protracted temperature during the first five months of the year and a heavy rain-fall distributed over a comparatively short period. In the report for Oudh, no mention is made of meteorology; but the subject has received much attention in the Central Provinces where observations are recorded in a certain number of stations under the superintendence of the Sanitary Commissioner. The general results for 1869, as compared with those for 1868, are thus stated by Dr. Townsend:

"The mean barometric pressure was greater in January, February, April, August, and November, less in the other months.

"The mean temperature was considerably higher in the first half of the year, i. e., in the spring and hot weather; lower in the rainy season and autumn.

"The mean humidity was less in the first half of the year; considerably in excess during and after the rains. There was less cloud in May, the hottest month of the year. In the autumn the amount of cloud was greatly in excess over the season of 1868. This is a rather important point with reference to the relative prevalence of blight in the corresponding seasons of the two years.

"The rain-fall was less in the spring and hot weather; greater during the monsoon, and this was more especially the case in the months of September and October.

"In the general direction of the wind, there was no great difference in the two years. South and South-Westerly winds were to a slight extent more prevalent in 1869 in March and in September. The velocity of the wind was much the same during the hot weather in both years, it was considerably less in the rainy season, greater in October.

"The amount of ozone, as estimated by Schonbein's test, was generally less than in the preceding year; but greater in June, October, and November."

SECTION IV.

81. Dr. Townsend is the only one of the Sanitary Commissioners who has devoted a special section to the consideration of the food supply of the people, and the information which it contains is not only full of interest, but has a very important bearing on the sanitary history of the year. In the other Annual Reports, the subject does not receive the attention which it deserves; in some it is passed by altogether, in others only incidental mention is made of it, and yet there can be very little doubt that the famine in 1869, the effects of which were felt far beyond the area in which the crops had failed, had no small influence in favouring the spread of the great sickness of the year, and in determining the excessive mortality which it occasioned.

The food supply of the people.
—This important subject has been discussed in a separate section only by the Sanitary Commissioner of the Central Provinces.

SECTION V.

82. On hundred and one different places in the Lower Provinces were visited by the Sanitary Commissioner during the year. Dr. Smith mentions that he travelled 2,500 miles in the course of these inspections, and was absent from the Presidency on tour for nearly nine months out of the year. Great part of Dr. Planck's report is occupied with a description of 35 towns and cities which he inspected. The Sanitary Commissioners for the Punjab and Oudh append to their reports remarks made on the sanitary condition of certain towns which they visited, but there is no general record of any inspection tour. In the Central Provinces, although the movements of the Sanitary Commissioner are not detailed, Dr. Townsend visited a large portion of the country and minutely examined the circumstances attendant on the unusual prevalence of disease.

The record of personal proceedings of the Sanitary Commissioners is generally defective.

SECTION VI.

83. Excepting in the Punjab Report in which Dr. DeRenzy has devoted a special section to "the Progress of Sanitary Improvement," the important question of what sanitary measures were either suggested or effected during the year has not received from the Sanitary Commissioners generally that prominent notice which it merits. The orders of the Government directing special attention to this subject had not reached them when their reports for 1869 were prepared. In future years full details will doubtless be given.

Sanitary Progress.—This subject has not been generally discussed in the reports.

84. Before concluding my review, I must refer to certain remarks on the subject of venereal disease and the measures which have been undertaken with a view to its prevention which have been made by the Sanitary Commissioner of the Punjab in a letter, copy of which forms one of the appendices of his report. Referring to the opinion of the Sanitary Commission of Bengal, as expressed in their Annual Report for 1864, an opinion on which all the

Dr. DeRenzy's remarks on venereal disease among European troops greatly under-estimate its importance as a cause of inefficiency among them.

rules and regulations for the prevention of venereal disease have been based, Dr. DeRenzy states that, in his belief, the evils attributed to this cause have been greatly exaggerated, that the means adopted to check them have failed, and that all measures intended to accomplish this object will meet with a like result. The point referred to the Sanitary Commissioner by the Government of the Punjab appears to have been not the advisability of attempting to protect European soldiers from this disease, for that question has already been fully discussed, and the necessity for such preventive measures had forced itself on the attention of the Government, but simply how the measures which had been already in operation within the cantonments could best be extended to such of the neighbouring civil population, from among whom the soldiers were believed to contract the disease; how, in fact, the Sanitary Commissioner could best discharge one of the important duties which were originally assigned to him. Dr. DeRenzy has, however, discussed the question of the advisability of attempting any such protection at all, and his statements, which very imperfectly represent the facts, have, I understand, been claimed by the opponents of the Contagious Diseases Act in England as arguments why this Act should be abolished. In their Report for 1864, which has been already referred to the Sanitary Commission for Bengal quoted the opinion of Dr. Duncan Macpherson, to the effect that "fully two-thirds of those who imbibe the disease are invalided within five years, and are sent out of the service with a loathsome poison circulating in their veins which passes down to their posterity." Taking the figures from Dr. Bryden's table, Dr. DeRenzy states that in the five years, 1864-1868, there were 36,879 admissions from venereal disease, and that the total number of men invalided on account of syphilis in the same period was 509. "According to Dr. Macpherson's estimate," adds Dr. DeRenzy, "the number would have been 24,586, supposing that each admission represented a distinct individual point on which I shall remark on hereafter." But, in using this argument, Dr. DeRenzy must have been aware, and, indeed, the sequel shows that he was perfectly aware, of the fact that the admissions do not and were never intended to represent distinct individuals. The proportion of admissions into hospital from any disease among every 1,000 men is a recognized and well understood standard of health statistics. It means simply that so many cases of illness occurred, it never professed to mean separate individuals, nor could such a meaning ever be properly attached to it. In one place Dr. DeRenzy quotes these admissions as if they represented separate individuals; in another place he insists on the well-

known fact that the same man may be the subject of several attacks during the year, and so swell the number of cases. So far as I know venereal disease was never pointed to as one of the great causes of mortality in the European army in India, so Dr. DeRenzy's arguments in controversion of an assertion which appears never to have been made do not require notice. It is impossible to adduce any statistics to shew how much of the annual invaliding is due to venereal affections, or how far the constitution of soldiers' offspring is impaired by the syphilitic taint of the parent. No statistics could supply this information, but any one acquainted with the British soldiers knows how frequently that deterioration of health which leads to death, or discharge from the service, is traceable to the syphilitic poison. There is, however, one point in regard to which we have statistics, and that is the degree of inefficiency among Europeans troops, which is directly due to venereal disease. In my Annual Report for 1868 I gave a table prepared by Dr. Bryden to shew the amount of inefficiency caused by the chief diseases in each month of that year, and any one who doubts the prominent place which venereal affections hold in the returns of British Military Hospitals can refer to that table and judge of the results. It is shewn there that the average number daily inefficient from this class of diseases was greater than that from any other cause whatever. The general totals for the year are as follows:

DISEASES.	Average daily number inefficient from each disease.	Average daily inefficiency per cent. of strength.
Fevers	311	·99
Dysentery and Diarrhoea ...	98	·31
Hepatitis	89	·28
Respiratory Diseases ...	92	·29
Veneral Affections ...	365	1·16
All other causes	635	2·01
Total	1,590	5·04

And this return takes no account of the many cases of illness which were due indirectly to venereal disease. In 1869, out of a total average daily sick list of 1,985 during the year, 436 of the cases were due directly to venereal. In 1870, out of a daily average total of 2,017 men in hospital, the inefficiency was due in 430 of them to venereal. I do not

under-estimate the value and importance of sanitary measures for checking cholera, fever, and other diseases; but such measures will have no effect in diminishing the prevalence of that special class of diseases to which reference is now made. There may be differences of opinion on moral grounds as to the desirability of having any measures for checking venereal disease; there may reasonably be differences of opinion as to the best measures to be adopted for its prevention. It is hardly credible that any one acquainted with the facts should argue that this class of diseases is comparatively of so small importance that no means need be taken for its prevention at all. The returns for 1870 are not yet complete, nor have all the reports of the Lock Hospitals for that year been received. Judging from the statistics of previous years during which the regulations for the prevention of venereal disease in military cantonments have been in force, I fully admit that the results have been most unsatisfactory, and that the amount of good which has been done was by no means so great as was to be expected; but these unsatisfactory results are due not to any defects in the system, but to the very imperfect manner in which the system has been worked. Wherever the civil and military authorities have energetically combined to give it a fair trial, the results have been very different.

The work which has been already done by the Sanitary Commissioners is of the greatest value.

85. The work of the Sanitary Commissioners, as a whole, so far as it is evidenced in their reports, gives much ground for satisfaction. Their duties may be stated broadly to consist of two great divisions,—1st, to obtain information regarding the sanitary condition of the people, the geographical distribution of disease, the nature and history of epidemics, the circumstances favorable to their spread, and the many other matters connected with the health of the population; and 2nd, to point out and urge the importance of the various sanitary measures which are needed. Under the first of these heads much has been done; the history of epidemic disease throughout India in 1869, imperfect as it is, presents a striking contrast to the absence of all information which attaches to former years. The data, the collection of which has been so well begun, will gradually improve and soon form the basis for most valuable generalizations. Knowledge of disease and of the circumstances under which it breaks out in violence must form the foundation of all progress, and in this view of the case what has been effected represents progress itself. Under the second head not much has been shown; but that arises in some measure from the fact that the Sanitary Commissioners have not specially discussed the question. No great sanitary

engineering works, so far as I am aware, have been inaugurated during the year; but it would be wrong to estimate progress merely by such great improvements which can be executed only at the cost of much money and by special engineering skill. It will be some time before such works can really be done on any large scale, but mean time there is ample field for sanitary improvements in the towns and villages where much that is required can be done at little expense. The first step in sanitary reform is to teach the people its value. Without their assistance it is useless to expect any satisfactory results. If the suggestions which I have lately made for placing the health department on a wider and more efficient basis be approved, I believe that an important step will be taken towards this important end.

86. In concluding this review, the great length of which has in great measure been due to the very unhealthy character of the year to which it refers, I shall, for the sake of convenience, briefly recapitulate the various recommendations and suggestions which have been made in the course of it; and, as these may be conveniently considered in relation to one or other of the sections which I have adopted, I shall take the opportunity of showing clearly what these sections are, in the hope that the Sanitary Commissioners will follow the same arrangement. In preparing this review I have been more than ever struck with the importance of having these reports prepared on one uniform plan, not only because it will prove a great convenience to myself, but also because it will be a great convenience to the various Sanitary Commissioners in studying each other's work, and to the public generally who may be interested in sanitary matters, and who may be anxious to compare the data contained in one with those which are to be found on the same subject in the others.

The several recommendations which have been made in this review are here recapitulated.

87. Each Sanitary Report should, therefore, consist of six distinct sections, and under each of them the various points now to be detailed should receive prominent notice.

Suggestions for the preparation of Sanitary Reports on a uniform plan are here detailed.

I.—The vital statistics of the Province.

The annual statements should be according to the standard, from which no deviation whatever should be made. If the population to whom registration has been extended does not embrace the whole population of the Province, the fact should be mentioned in a foot-note, and any discrepancy in the numbers of the whole Province, or of any District, as compared with those of the year previous, should be explained.

The figures should be punctuated by millions and not by lakhs.

Any statistics regarding births and marriages should be shown in separate statements from the mortuary tables.

Any measures for improving the registration which have been adopted during the year should be noted, and how far any improvement has been effected.

—History of the chief diseases during the year.

(a.)—Cholera.

(b.)—Small-pox.

(c.)—Fever.

(d.)—Bowel complaints.

(e.)—Injuries.

With regard to each of them the facts should first be recorded, and then the opinions, if any, which have been based on them.

III.—The meteorology of the year.

The main features of the year should be shortly noted, and any connection which they appear to have had with its sanitary history discussed. The monthly rain-fall and temperature in particular should be compared with the monthly statistics of disease in each District, from which such data can be procured. The daily rain-fall and daily register of other meteorological phenomena in connection with the prevalence of epidemics are of much importance.

IV.—The food supply of the people, as effected by the outturn of the crops, the rate of wages, and the prices of grain, and such information should, as far as possible, be given for separate districts, in relation to the comparative mortality in each.

V.—A record of personal proceedings.

This should include a note of the various places visited during the year, although the special reports on each need not always be printed. The dates of such inspections should always be given for future reference. In connection with this point, I would observe that those tracts of country should generally be selected for inspection which have suffered from any unusual sickness in the preceding season, and an attempt should be made to investigate its causes on the spot.

It may be urged that the Sanitary Commissioners are too much occupied with the supervision of registration

to be able to leave their head quarters for any length of time, but they can do much more to secure efficient registration by moving about the country than by any other means. They can interest District Officers and others concerned in the work, and can satisfy themselves as to the manner in which the registers are kept. The mere prospect of their visit will stir up the Registrars to greater attention. And with all this advantage gained they can also do much to become acquainted with the country and with the people, and to enlighten them in the benefits of sanitary reforms. The details of compilation must be done by the Office, and the results checked here and there.

Under this head also mention may be made of any special reports which have been submitted during the year.

VI.—Sanitary Progress.

This should be a record of any progress that has been made in the year not only as regards the projection or execution of any great engineering works, but also, as it concerns reforms of a minor nature, any means taken to instruct the people in their value and any sign that advance has been made in this direction.

And, in offering their remarks and opinions on these different heads, and on any other matters which deserve notice, the Sanitary Commissioners should abstain from criticizing the views of other officers in the same department. The fullest and freest discussion may be carried on with regard to any theoretical opinions, and the facts of the year may be considered in the light of these opinions without imparting to the discussion anything of a controversial nature, and without endeavouring to show that the views advanced by any other Sanitary Commissioner, are erroneous or calculated to do mischief.

The reports should be submitted at a much earlier date than heretofore.

Each report should be provided with a complete table of contents, and with a clear map of the Province, in which the geographical distribution of cholera and its relative fatality in different places should be distinctly shewn.

88. I believe, however, that the idea of furnishing such a map after the manner suggested by Dr. Goodeve and ordered by the Secretary of State, must be abandoned as impracticable. The Provinces are too large to be dealt with in this way, and every map which has been attempted on this system has been more or less a failure. The main object is to

Dr. Goodeve's plan of a map for showing the distribution and prevalence of cholera requires modification.

show at a glance the chief facts of the epidemic, but the innumerable circles and figures which are required to illustrate the history of an epidemic among the general population would lead to the greatest confusion. It is very desirable that the same method of indicating the results should be adopted in all parts of India, and that this method should be as complete as can be desired. I propose, therefore, to consult all the Sanitary Commissioners on the subject, and then to submit an improved design of map for the consideration and orders of the Government.

Yours faithfully,

SIR,

most obedient servant,

J. M. CUNNINGHAM, M. D.,

Sanitary Commr. with the Govt. of India.

Ph. 7/16/1871
In Bet. 70.

28
Extract from the Proceedings of the Government of India in the Department of Agriculture, Revenue, and Commerce, dated 1st June 1871.

Read a Report from the Sanitary Commissioner with the Government of India, submitted in May 1871, from the Sanitary Commissioner with the Government of India, submitting a general review of the Annual Reports of the Local Sanitary Commissioners for the year 1869.

RESOLUTION.

THE Governor General in Council has read the review of the Sanitary Commissioner with the Government of India with much interest, and directs that it be circulated for information and guidance to all Local Governments and Administrations.

2. His Excellency in Council desires that special attention be paid to the suggestions contained in paragraph 87 of the review, and that, in future, Sanitary Reports should be prepared according to the method therein described.

3. There has been great delay in the submission of the reports of the Local Sanitary Commissioners, and the Governor General in Council desires that the several Local Governments and Administrations will insist upon their reports being submitted in future not later than the 1st of March of every year.

ORDER.—Ordered, that a copy of the foregoing Resolution, together with a copy of Dr. Cunningham's review for 1869, be forwarded to the Local Governments and Administrations noted in the margin, for information and guidance.

Government of Bengal.	North-Western Provinces.
" "	Punjab.
Chief Commissioner of Oudh.	Central Provinces.
" "	British Burmah.
Resident, Hyderabad.	

Ordered also, that a copy be forwarded to the Governments of Madras and Bombay, with the suggestion that, in order to secure uniformity in the preparation of the Sanitary Reports, the plan described in paragraph 87 of the review may, if there is no objection, be adopted by the Sanitary Commissioners under those Governments.

Ordered also, that a copy of the above Resolution be forwarded to the Sanitary Commissioner with the Government of India for information, and with the remark that the Government of India will await the receipt of a further communication on the subject of a cholera map.

Ordered also, that a copy of the above Resolution, and a copy of Dr. Cunningham's review of the reports for 1869, be published in the Gazette of India.

(True Extract.)

Forbes

Under Secretary to the Govt. of India.

Colacarrund. 16 August 1871. No 125 A

Communicated to the Sanitary Commission
Mr. W. who will report whether the method
suggested by the Committee, Comr. with the full of
India, in paragraph 87 of his review, for the
preparation of the annual Reports on
the Sanitary Condition of the
various Provinces is

there is any objection
to adopting in this
Presidency

Mr. 1871 Report
The Under Secretary
Govt of India

Dated 6th Sept 1871 No 28
Let. 125 A

S. C. O. No 1495
1871

Forwarding
Copy of Review by the Sanitary
Commissioner with
the Govt of India of the
Annual Local Sanitary
Reports for 1869 and any
particulars, described in
Review for securing uniformity
in the publications of Sanitary
Reports be adopted by the
Sanitary Commission, Madras

7
H. C. in a 29

70-71

7-8