

L & M
Revenue (1897) Department.

MISCELLANEOUS SERIES.

G.O., No. 6587.

DATED 4-5-99

[Despatch Abstract.]

Anti-plague inoculation

Recording letter from the Sanitary
Commissioner forwarding with remarks
a report by Major Bannerman with regard
to investigations as to — results pursued
by him at Belgawan

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

Local & Munl. (1899) Department.

CURRENT No. 761 ?



From
The Sanitary Commission
for Madras.

In Orders

Shall these papers be recorded
or communicated to the Comr.
O. King's Criticisms seem perfectly
sound - and the rept does not
seem to give much light on the
question at issue - for this reason
submitted that the paper might
simply be recorded

No. 1181
S

Dated 10 April 1899.

Received 11th } 1899

Registered 12th

Enclosures 7

Spare copies.

SUBJECT.

Forwarding with remarks
a report by Major Panneer
with regard to investigations as
to anti-plague inoculation
results pursued by him at
Belgaum.

No. 658
The papers may be
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Inoculation was begun in the camps on the 24th. December, 1897. General Rolland, commanding the District, was the first man operated on, and this, combined with the example of the officer commanding, and the medical officer, served to remove all prejudice, and 229 sepoye were inoculated during the morning. This was practically the whole of the men, off duty, that day, in the Hindalgi camp. Next day, the men who had been on duty on the previous occasion, were operated on, and all those unmarried, allowed to return to the lines. Those in other camps, and the families, were speedily inoculated, and permitted to return to the lines also. The return was complete by the 30th. December 1897

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1897. The inoculations were practically complete by this time, though some few followers, children, etc., continued to be done up to 6th. January, 1898. The whole number operated on, was

1665, out of a total population of 1746 living in the lines at that date. The 81, not operated on, infants, pregnant women, and the sick in hospital chiefly, though one sepoy has up to the present time refused to submit to operation.

While these inoculations were going on, i.e., from 24th. December, 1897, to 6th. January, 1898, the following cases of plague occurred

- Among Sepoys, 2 cases, with, 1 death.
- Among Families, 4 cases, with, 4 deaths.
- Total, = 6 cases, with 5 deaths.

After this date, no more cases occurred among the families or followers, during the first epidemic. On the 9th. January, Pte. 1659 Mohidin Sheriff, (inoculated 27-12-97) was attacked, but recovered, and on the 19th. of the same month, Lt. Skeen, (inoculated 27-12-97) who was in charge of the disinfection party in the Sudder Bazaar, was attacked and also recovered.

For the next six months the regiment was free from plague. That this long period of freedom was due to the inoculation, will be manifest, when the course of the plague is followed in the neighbouring cantonment and city of Belgaum. It must be remembered that the sepoys had free access to both, from the date of return to the lines, up to 4th. July 1898, after which date only, the cantonment bazaar and city were placed out of bounds. The following statement shows that the epidemic was at its height in January, and then gradually declined, till, in the middle of May it ceased.

Deaths from Plague reported from the Cantonment and City of Belgaum, month by month.			
Months	Cantonment	Belgaum City	Total Deaths Reported.
Octr./97	4	1	5
Novr. "	102	9	111
Deer. "	66	90	156
Jany./98	13	213	226
Feby. "	6	44	50

The cantonment and city are practically continuous, and may therefore be classed together, as the sepoys resort freely to both places without distinction, the cantonment being merely the part of the town nearest to the lines and barracks.

The second epidemic commenced in June, as may be seen from the following:-

Statement of Deaths from Plague in the Cantonment and City of Belgaum, during the second Epidemic.			
Months	Cantonment	Belgaum City	Total deaths from Plague
June /98	9	5	14
July "	190	25	215
Augt. "	203	101	304
Sept. "	96	602	698
Octr. "	15	984	999
Novr. "	8	267	275
Decr. "	7	58	65

Let us see what was happening in the regiment during this time. The first case after a period of six months, occurred on 30th. July 1898, when Pte. 2246 Sheik Sultan, (inoculated 27-12-97) was admitted to hospital for plague and died next day. During August two were attacked, viz., Pension-boy Sarangapani, (inoculated 29-12-97) attacked 15-8-98, who recovered, and Pte. 695 Kumar Reddi, (inoculated 29-12-97) attacked 19-8-98, and died. In September two also were attacked, viz., Pte. 2145 Adakalam, (inoculated 18-8-98) admitted 26th. September, and recovered, and Pte. 1375 Ram Singh, (not inoculated) attacked the same day and died. This man was believed at the time to have had plague during the first epidemic, but the history as recorded in the case book throws grave doubts on this.

On the first of October the wife of a sepoy died in the regimental bazaar, she was not inoculated. Not being "on the strength" she did not reside in the lines themselves. On the same day, a child Ramanah, (inoculated 9-7-98) son of Naigue 1672 Chelamiah, died of plague. The next case was 25 days after this, Pte. 2290

Muhammad Hussain, (inoculated 25-8-98) he recovered. On 26th. October, a boy aged 13, Thatchanamurti, (inoculated 3-1-98, and again on 16-7-98) son of Pte 726 Mutuswami was admitted and recovered. On the 8th. November, Lt. Bedford 26th. M.I., (not inoculated) developed plague and died two days after. On the 18th. of the same month, Pte. 2344 Ratomallai 15th. M.I., attached to the regiment, (inoculated 8-11-98) was attacked and recovered. The last case was Pte. 2289 Gurunaden, (inoculated 6-7-98) who was attacked 13- December 1898, and recovered. The detail of the above cases can be seen at a glance at the accompanying table, and one cannot help being convinced that but for the almost complete inoculation and re-inoculation of the regiment, - carried out in December 1897, and August 1898, respectively, - an epidemic as bad as that experienced in November and December 1897, would have occurred. Instead of this we see that during the six months of the second epidemic, when hundreds were being attacked in the cantonment and city, the regiment showed an average of two attacks per mensem only. It is only right to state however, that after the 4th. of July 1898, the cantonment and city were placed out of bounds for the sepoys. As regards infection from floors or walls of houses, not much of importance is to be gathered. From the subjoined statement it will be seen that one hut only, in the lines has been infected more than once, and curiously enough, three cases have occurred in it at separate times. Some months intervened between each event. Sarangapani, the second case in the house, had been living in the place for 57 days before he developed plague, and Ratomallai, the third case, had resided 22 days in the hut, before becoming ill.

Statement of Cases of Plague in the Cantonment			
No. of Cases	Regiment	City	Total
1	1st Bn.	1	2
2	2nd Bn.	2	4
3	3rd Bn.	3	6
4	4th Bn.	4	8
5	5th Bn.	5	10
6	6th Bn.	6	12
7	7th Bn.	7	14
8	8th Bn.	8	16
9	9th Bn.	9	18
10	10th Bn.	10	20
11	11th Bn.	11	22
12	12th Bn.	12	24
13	13th Bn.	13	26
14	14th Bn.	14	28
15	15th Bn.	15	30
16	16th Bn.	16	32
17	17th Bn.	17	34
18	18th Bn.	18	36
19	19th Bn.	19	38
20	20th Bn.	20	40
21	21st Bn.	21	42
22	22nd Bn.	22	44
23	23rd Bn.	23	46
24	24th Bn.	24	48
25	25th Bn.	25	50
26	26th Bn.	26	52
27	27th Bn.	27	54
28	28th Bn.	28	56
29	29th Bn.	29	58
30	30th Bn.	30	60
31	31st Bn.	31	62
32	32nd Bn.	32	64
33	33rd Bn.	33	66
34	34th Bn.	34	68
35	35th Bn.	35	70
36	36th Bn.	36	72
37	37th Bn.	37	74
38	38th Bn.	38	76
39	39th Bn.	39	78
40	40th Bn.	40	80
41	41st Bn.	41	82
42	42nd Bn.	42	84
43	43rd Bn.	43	86
44	44th Bn.	44	88
45	45th Bn.	45	90
46	46th Bn.	46	92
47	47th Bn.	47	94
48	48th Bn.	48	96
49	49th Bn.	49	98
50	50th Bn.	50	100

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with him in the house at the time, and was not attacked. She was inoculated on 23-9-98, and is still alive.

6. ADAKALAM, Private, 2145, D. Company. This man was inoculated on 18-8-98, developed plague 26-9-98, and recovered. In his house was living Pte. 2202, Maduraimuthu, inoculated on 18-8-98, he was not attacked.

7. RAM SINGH, Private, 1375, F. Company. This man was reported to have previously suffered from plague, and was therefore not inoculated. As the record in the case-book shows only one day of fever, temperature 99.4°, and discharge to duty six days afterwards, the probability is that a wrong diagnosis was made during the stress of the first epidemic. He developed plague on 26-9-98 and died. He was living alone.

7A. The wife of a sepoy, discovered ill with plague, in the regimental bazaar, a few days after her arrival. She was hiding there as she was not "on the strength" of the regiment. She died; her husband, who had been inoculated twice, did not develop the disease.

8. MUHAMMAD HUSSAIN, Private, 2290, E. Company. This man was inoculated 25-8-98, developed plague on 25-10-98, and recovered. He was living alone. Three months previously he had been an inmate of Sheikh Sultan's house. Vide No, 3 supra.

9. RAMANAH, aged one year and four months, inoculated, 9-7-98, died of plague on 1-10-98. In the house were living, his father, Maigue 1672 Chelamiah, and mother, Asarammal, both inoculated twice, neither attacked.

10. THATCHANAMURTHI, aged 13, inoculated 3-1-98 and also 16-7-98, developed plague 25-10-98, and recovered. With him were living his father Pte. 726 Mutuswami, his mother Gnanammal, and two children, all inoculated. Also one boy under one year of age, not inoculated. None of these were attacked.

11. Lieutenant BEDFORD, 26th. M.I., not inoculated, developed plague 8-11-98, and died 10-11-98. He was treated in his own bungalow, no cases have occurred there since.

12. RATAMALLAI, Private, 2344, 15th. M.I., attached to the 26th. regiment

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regiment, inoculated 8-11-98, developed plague 18-11-98, and recovered. He was living alone, in the house previously occupied by Kasimuthu and Sarangapani. Vide No. 4, supra.

13. GURUMADEN, Private, 2289, F. Company. This man was inoculated on 6-7-98, developed plague 13-12-98, and recovered. His house is next to, and continuous with, the house of Ram Singh who was attacked by plague on 26-9-98. Vide No. 7 supra. With him in his house lived Pte. 2377 Annureddi, inoculated 8-11-98, but he was not attacked.

AGE DISTRIBUTION OF THOSE PROTECTED BY INOCULATION DURING THE SECOND EPIDEMIC AT BELGAUM IN 1898.

26th. Regt. Madras Infy.

Under 5 years	{	Primary only	48
		Re-inoculation	<u>176</u>
		Total	224
Between 5 & 60 years	{	Primary only	182
		Re-inoculation	<u>1338</u>
		Total	1520
Sixty & over,	{		<u>57</u>
		Total	57
		Grand total, =	1801

List of Sepoys, 26th. Madras Infantry, attacked by Plague, in 1897,
that is, before inoculation was complete.

No.	Rgt.No.	Rank and Name.	Coy.	Age.	Date of	
					Attack	Result.
1.	2224	Private Govindaswami	C.	20	12-11	12-11, Died
2.	1444	" Kasimuthu	F.	29	13-11	14-11, Died
3.	33	Drummer Arland	C.	29	15-11	15-11, Died
4.	2214	Private Appakanu	C.	20	18-11	19-11, Died
5.	2198	Musician R.Deskine	G.	16	24-11	24-11, Died
6.	997	Private Abraham	D.	36	25-11	29-11, Died
7.	2210	Musician Santiago	C.	15	26-11	1-1-98, Red.
8.	637	Havaldar Vijian	F.	41	27-11	28-11, Died
9.	2253	Private Muhammad Yakub	G.	19	27-11	27-11, Died
10.	2257	" Khadir Mohidin	G.	20	28-11	13-12, Recd.
11.	1914	" Narasiah	G.	31	30-11	2-1-98, Red.
12.	1660	" Sheik Ahmad	E.	30	30-11	2-12, Died
13.	2165	" Subrahmaniam	F.	19	30-11	3-12, Died
14.	2146	" Venkatesu	B.	21	30-11	28-12, Recd.
15.	1327	Naigue Ramaswami	B.	34	30-11	27-1-98, Rd.
16.	2084	Private Venkatachellam	F.	27	1-12	2-12, Died
17.	1436	" Verappa	F.	32	1-12	6-12, Died
18.	2149	" Madurai	E.	23	1-12	24-12, Died
19.	1619	" Kupuswami	B.	35	1-12	2-12, Died
20.	2163	" Khadir Sheriff	A.	24	2-12	5-12, Died
21.	1291	" Kistnaswami	B.	29	2-12	13-12, Recd.
22.	2252	" Muhammad Yusuf	G.	22	3-12	7-12, Died
23.	1629	Naigue Ismail Sheriff	E.	32	5-12	9-12, Died
24.	1421	Private Ragavelu Naiker	B.	31	11-12	7-2-98, Rec.
25.	1927	" Appalswami	H.	33	12-12	15-12, Died
26.	1080	" Appalswami	H.	33	12-12	20-12, Died
27.	1375	" Ram Singh	F.	29	13-12	20-12, Recd.
28.	2064	" Chenchenah	H.	26	13-12	27-1-98, Rd.
29.	1528	" Rangaswami	F.	31	14-12	29-12, Recd.
30.	1639	" Munaswami	G.	34	16-12	28-12, Recd.
31.	1198	Naigue Ramaswami	G.	31	16-12	21-12, Died
32.	1641	Private Venketaswami	G.	36	20-12	21-12, Died
33.	1013	" Khadir Khan	A.	33	26-12	27-12, Died
34.	1924	" Sunnassi	H.	27	30-12	9-2-98, Rec.

Deaths = 22, Recoveries = 12.

44. Chirangivi	F.	15-12-97	31-12-97, Recovered
	H.	15-12-97	16-12-97, Died

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List of followers and members of sepoy's families, attacked by Plague in 1897, living in the lines of 26th. Madras Infantry, Belgaum. All these attacks took place before inoculation was complete.

FOLLOWERS

No.	Names	Coy.	Date of	
			Attack	Result
1.	Bhisti, Madarai	C.	17-11-97	17-11-97, Died
2.	Havaladar, Madurai Naik's brother	F.	19-11-97	30-11-97, Died
3.	Pte. Subaroya Pillai's son	F.	19-11-97	21-11-97, Died
4.	Dhobi Khadir'	D.	27-11-97	29-11-97, Died
5.	Recruit-boy Thatcha-namurthi	B.	29-11-97	29-11-97, Died
6.	Hospl. Sweeper, Mangal		1-12-97	3-12-97, Died
7.	Sheik Miran	D.	5-12-97	6-12-97, Died
8.	Saiad Kassim	D.	5-12-97	7-12-97, Died

WOMEN

9.	Naigue Viraswami's wife	C.	20-11-97	20-11-97, Died
10.	Pte. Ramaswami's wife Tholammal	C.	20-11-97	26-12-97, Recovered
11.	Pte. Manikam's mother	C.	21-11-97	28-11-97, Recovered
12.	Pte. Sathia's wife Kolandammal	F.	21-11-97	22-12-97, Recovered
13.	Pte. Perumal's wife	D.	27-11-97	27-11-97, Died
14.	Dhobi Khadir's wife Ghalib	D.	27-11-97	29-11-97, Died
15.	Naigue Jaganatham's mother, Audilatchi	F.	27-11-97	25-12-97, Recovered
16.	Pte. Virapa's wife Amurthammal	F.	27-11-97	3-12-97, Died
17.	Mangathammal	B.	28-11-97	25-12-97, Recovered
18.	Ramalu's wife Seethammal	H.	30-11-97	1-12-97, Died
19.	Venkannah	G.	1-12-97	2-12-97, Died
20.	Bijamb	E.	2-12-97	2-12-97, Died
21.	Muthalammal	D.	3-12-97	20-12-97, Recovered
22.	Aminabi	A.	3-12-97	22-12-97, Recovered
23.	Hannah	G.	5-12-97	20-12-97, Recovered
24.	Ramanjaammal	B.	7-12-97	19-12-97, Recovered
25.	Amravathi	B.	10-12-97	13-12-97, Died
26.	Kampaiammal	F.	15-12-97	11-1-98, Recovered
27.	Rabiabi	A.	26-12-97	27-12-97, Died
28.	Amirbi	A.	29-12-97	3-2-98, Recovered

CHILDREN

29.	Muniammal	C.	20-11-97	3-12-97, Recovered
30.	Thatchanamurthi	F.	21-11-97	20-12-97, Recovered
31.	Marimuthu	F.	28-11-97	11-12-97, Recovered
32.	Sepoy's child, no name	D.	28-11-97	28-11-97, Died
33.	Lutchmana	B.	28-11-97	23-12-97, Recovered
34.	Ungannah	F.	30-11-97	30-11-97, Died
35.	Munaswami	B.	30-11-97	2-12-97, Died
36.	Kulamma	B.	30-11-97	30-11-97, Died
37.	Kaveriammal	E.	1-12-97	3-12-97, Died
38.	Jaganath	B.	2-12-97	22-12-97, Recovered
39.	Pension-boy, Sankeriah	F.	2-12-97	2-12-97, Died
40.	Child, no name	B.	4-12-97	4-12-97, Died
41.	Pens.-boy, Abdul Aziz	E.	4-12-97	7-12-97, Died
42.	Muthalammal	C.	6-12-97	19-12-97, Recovered
43.	Alagiriswami	F.	15-12-97	31-12-97, Recovered
44.	Chirangi	H.	15-12-97	16-1-98, Died

Deaths = 27
Recoveries = 17
44

Deaths = 27
Recoveries = 17
44

List of Sepoys, etc., 26th. Madras Infantry, attacked by Plague in 1898,
thst is, after inoculation was complete.

First inoculation begun on 24-12-97; finished 6-1-98.

Second Do. begun on 18- 8-98; finished September, 1898.

No.	Rgt.No.	Rank and Name	Coy.	Date of		
				Inoculn.	Attack	Result
1.	1659	Pte., Mohidin Sheriff	E.	27-12-97	9- 1-98	Recovered
2.		Lt. , Skeen		27-12-97	19- 1-98	Recovered
3.	2246	Pte., Sheik Sultan	E.	27-12-97	30- 7-98	31- 7-98 Died
4.		Pension-boy, Sarangapani		29-12-97	15- 8-98	Recovered
5.	695.	Pte., Kumar Reddi	F.	29-12-97	19- 8-98	20- 8-98 Died
6.	2145	Pte., Adakalam	D.	18- 8-98	26- 9-98	Recovered
7.	1375	Pte., Ram Singh	F.	Not ined.	26- 9-98	27- 9-98 Died
8.		Wife of Sepoy		Not ined.	1-10-98	1-10-98 Died
9.		Son of Naigue, Chelamiah		9- 7-98	1-10-98	1-10-98 Died
10.	2290	Pte., Muhammad Hussain	E.	25- 8-98	25-10-98	Recovered
11.		Son of Pte. 726 Mutuswami	F.	{ 3- 1-98 and 16- 7-98 }	25-10-98	Recovered
12.		Lt. Bedford.		Not ined.	8-11-98	10-11-98 Died
13.	2344	Pte. Ratamallai (15th.M.I.)		8-11-98	18-11-98	Recovered
14.	2289	Pte. Gurnaden	F.	6-7- 98	13-12-98	Recovered

From the above table it will be seen that among:-

(a) The inoculated, there were 11 cases, with 3 deaths

(b) The non-inocd., there were 3 cases, with 3 deaths

(Sd.) C.H. Bennett, M.D., Lt. Colonel, IMS

26th. Regt. Madras Infantry

(Sd.) W.B. Bannerman, M.D., Major, I.M.S.

Dy. Sanitary Comr., Madras

True copy *W.B. Bannerman MD*
Major *W.B.*
Rep. of Vacc. & Dy San'y Comr.

Madras
14.3.98

No. 851
5OFFICE OF SANITARY COMMISSIONER,
Fort St. George, 14th. March, 1899.

From

SURGEON MAJOR W. B. BANNERMAN, M.D., B.Sc.,

INSPECTOR OF VACCINATION

AND DEPUTY SANITARY COMMISSIONER FOR MADRAS,

To

THE Sanitary Commissioner for Madras

Park Town, Madras.

Enclosure *for*

Sir,

I have the honour to forward herewith a report on the effect of Haffkine's inoculation for Plague, in the case of the 26th. Regiment Madras Infantry, at Belgaum. The report is a conjoint one, drawn up by Lt. Colonel Bennett, I.M.S., the medical officer in charge of the regiment, and myself. I would desire here to thank him, as well as the other officers of the regiment, for much ready help given in collecting, and helping to ascertain the accuracy of the figures submitted.

2. The results ascertained, seem to point to the truth of M. Haffkine's opinion, that in his prophylactic we have a means of controlling an epidemic, and converting it into a manifestation of sporadic cases only.

3. A copy of this report was given to the secretary of the Plague Commission at Belgaum.

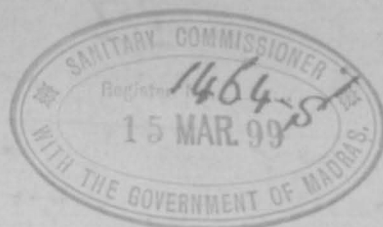
I have the honour to be,

Sir,

Your most obedient servant,

W. B. Bannerman M.D.
Major, I.M.S.

Inspector of Vaccination & Dy. Sanitary Comr.



Plague Research Laboratory, Bombay.

25th. March, 1899.

From,

Major W.B. Bannerman, M.D., B.Sc., I.M.S.

In charge Plague Research Laboratory

B O M B A Y.

To,

Lt-Colonel W.G. King, M.B., D.P.H., I.M.S.

Sanitary Commissioner for Madras

Park Town, M A D R A S.

Sir,

In reply to your No. 950/S, of 20th. instant, I have the honour to supply the following information.

(a) The deaths reported in the months of March, April and May were so small in number that I did not consider them of sufficient importance to enter in the report. If I am not mistaken the deaths were below ten in each of these months.

(b) The only persons who could have been inoculated among those entered in page 9, would be any attacked after the 24th. December, viz.-Nos. 27 and 28. These were both entered as not inoculated in the records. Similarly, of those mentioned on page 8, two only, viz.-Nos. 33 and 34, could have been inoculated and neither of them were so.

(c) Every house in the lines was disinfected.

(d) The following is a statement showing by dates the numbers attacked subsequent to the 28th. November.

Details of names and result will be found in the lists on pages 8 and 9 of the report.

Dates	Sepoys	Families, etc.
29th. November	0	1
30 "	5	4
1st. December	4	3
2 "	2	3
3 "	1	2
4 "	0	2
5 "	1	3
6 "	0	1
7 "	0	1
8 "	0	0
9 "	0	0
10 "	0	1
11 "	1	0
12 "	2	0

Dates	Sepoys	Families, etc.
13th. December.	2	0
14 "	1	0
15 "	0	3
16 "	2	0
17 "	0	0
18 "	0	0
19 "	0	0
20 "	1	0
21 "	0	0
22 "	0	0
23 "	0	0
24 "	0	0
25 "	0	0
26 "	1	1
27 "	0	0
28 "	0	0
29 "	0	1
30 "	1	0
31 "	0	0

(e) The census population of Belgaum city is.... 28,400

The census population of Belgaum cantonment= 12,300

Total = 40,700

(f) The houses were disinfected by spraying with perchloride of mercury solution, by whitewashing afterwards, and by removing the tiles in strips from the roofs.

I have the honour to be,

Sir,

Your most obedient servant,

M. Bannerman M.D.
Major, I.M.S.

In charge Plague Research Laboratory,
Bombay.

[800-5-11-98.]

PLAGUE.

No.

1181
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Office of Sanitary Commissioner,
Madras, *10 April 1899*

From

Lieut.-Colonel W. G. King, M.B., C.M., D.P.H.,
Sanitary Commissioner for Madras,

To

The Secretary to Government,
Local and Municipal Department,
Fort Saint George.

Sir,

I have the honour to forward herewith a report by Major Bannerman with regard to investigations as to anti-plague inoculation results pursued by him at Belgaum. Major Bannerman's contention that in M. Haffkine's prophylactic we have a means of "controlling an epidemic and converting it into a manifestation of sporadic cases only" is in less enthusiastic strain than his letter dated 12th April, 1898, forwarded with my letter No. 1044 dated 10th May, 1898, where it was held by him that it was possible to check the incubation of plague in already infected persons, and to replace absolutely sanitary measures which were held to be useless.

2. I think Major Bannerman's careful and interesting report shows that the sanitary measure of evacuation of the infected lines and their complete disinfection were the chief factors which converted the epidemic of 1897 into "a manifestation of sporadic cases", if the period of ten days incubation be allowed for, and not the inoculation.

3. The regiment may be regarded as free of the disease and protected by inoculation by the 6th January 1898. But, in January only 13 cases occurred in the Cantonment, in a population of 12,500 where, at least, the sepoys must chiefly have resorted, against two in the regiment (both in cases of inoculated) yielding a ratio upon the respective populations of practically 1 per mille. It is true in the more distant City the attack rate was as high as 7 per mille; but that plague

is peculiarly a disease attaching itself to a locality is an important factor that cannot be ignored, and it is but fair to hold that the measure of danger of infection would be more correctly applied during the period, by reference to the immediate neighbourhood of the lines—that is, the Cantonment—than the City. From January to July, the chances of infection of the regiment were in any case manifestly small, as, after special reference to Major Bannerman—Vide his reply dated 25th March, attached—I find that the attacks were so few in the free population that he did not think it necessary to report them; they probably did not exceed 10 per month, in a population of 40,700 people.

4. In July, the disease again appeared in an epidemic form in the free population. But, so early as the 4th of that month, the chances of infection of the regiment were greatly diminished, by the taking of the sanitary precaution of forbidding the sepoys to visit either the Cantonment or the City. Nevertheless, from this time forward, cases occurred in the inoculated regiment at an average of 2 per month, which, if the months of July and August be excepted, is not a materially different average proportion to that of attacks in the Cantonment. It is presumed (but not stated in the report) that as each case occurred in the lines, the sick properly were isolated and houses disinfected—matters that, with gained experience in the former epidemic, would probably be more efficiently attended to than in the first epidemic. There is no reason therefore to assume from the evidence placed on record, that inoculation solely saved the regiment from a second epidemic.

5. It seems to me that the most important point in this report would have been a comparison between the sanitary measures taken in the lines on the first appearance of the disease in 1897, and during the dropping cases of the last six months of 1898. Had it been shown the measures were identically the same, and were other conditions equal in July and August 1898—which was not the case—a strong argument would have been secured in favor of special resistance to invasion by an inoculated population. Although I hold that it is by no means proved

by the facts reported, I have no doubt from what is known of the protective influence of inoculation that this really did afford the sanitary measures taken material aid; especially as the precaution had been taken of re-inoculating the men, on the appearance of the second epidemic in the City. But, resistance to invasion by an already inoculated population is a very different matter from what is implied by Major Bannerman's past and ^{even} present interpretations of M. Haffkine's views, namely, the ignoring of sanitary measures in a population not yet inoculated and in the midst of an epidemic, with the object of converting it into a manifestation of sporadic case by resort to inoculation. As already contended in my letter No. 1044/S dated 10th May 1898, I still hold that the correct place for inoculation is as an aid to sanitary measures—not as a substitute for them, and I consider no evidence has yet been collected to show that, in practice, this view is otherwise than correct.

6. As in the case of all reports presented in support of inoculation, I think a remarkable feature exhibited—although the cases illustrating it are few—is the better chance of recovery in the inoculated who have been attacked than in the uninoculated, and I cannot help thinking that were more insistence placed upon this fact by those who have an enthusiastic belief in inoculation, it would go far more towards causing the population to readily accept it than if they devoted their energies to proving that inoculation can cope with the disease without aid from sanitation. Indeed, as time advances, I think it will be found that whilst this life-saving characteristic remains incontrovertible, and will contribute greatly to a just appreciation of the valuable labours of M. Haffkine, it will be established that protection from attack, though undoubtedly, present is of a more fleeting nature than ^{now} ~~at present~~ supposed.

I have the honour to be, Sir
Your most obedient servant,

W. G. N.
Lieut. Col., I. M. S.,
Sanitary Commissioner for Madras.

* This method of reasoning is not well applicable, but as it has been adopted by Major Bannerman, it is adhered to.
W. G. N.

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