

(1) Number of pages 6 sheets
(2) Date of repair 11.8.82
(3) Initials of the Referencer _____

TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

Revenue DEPARTMENT

G.O. No.	75	Press.
B.P. No.		Mis.
Dated	9.1.1878	197 .

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Public Department
Proceedings of the Madras Government
Read the following

INDIA OFFICE;

London, the 19th July 1877.

Statistics and Commerce.
No. 20.

To His Excellency the Honourable the GOVERNOR in Council, Bombay.

SIR,—In forwarding a copy of a memorandum* by the Army Sanitary Commission on the report of your Sanitary Commissioner for 1875, I request that special attention may be given to the following suggestions which are contained in it:

- (1) That in future reports on cholera the number of villages attacked and exempted, with their population, should be distinctly stated.
- (2) That a special inquiry should be instituted in localities where an abnormally high fever death-rate prevails.
- (3) That some measures should be taken to prevent the enormous loss of life which takes place from drowning in wells and tanks.
- (4) That some simple rules should be drawn up and circulated among the people (as has been done in Bengal and the Punjab) for their instruction and guidance in sanitary matters.
- (5) That in measures for the improvement of military stations special attention should in the first instance be directed to the worst cases.

2. I have read with much interest Mr. Hewlett's able reports of his sanitary inspection of certain towns. It would have been well if the report itself had contained an account of sanitary works among the civil population.

3. I observe that the question of the Nusseerabad drainage is again brought forward in this report, and commented on by the Army Sanitary Commission, who, looking at the statistics of sickness and mortality, do not understand the statement quoted in the report that "the health of European troops during the past year has been unexceptionally good". It seems strange that a conflict of opinion should be maintained between the military and medical authorities on a point apparently so simple, and I would suggest that the matter be referred to the personal investigation of your Sanitary Commissioner, so that the question may be finally set at rest, whether the drainage of Nusseerabad is defective or excellent.

4. In accordance with the request made in your general letter No. 18 of 1875 300 copies of this memorandum will be forwarded *via* the Suez Canal.

I have the honour to be,

SIR,

Your most obedient, humble Servant,

SALISBURY.

Memorandum of the Army Sanitary Commission on the report of the Sanitary Commissioner for Bombay for 1875, dated the 18th May 1877.

The present report is one of considerable interest and importance, as showing the transition stage of sanitary administration in Bombay Presidency from its first, almost statistical, aspect into that of real practical struggle with known disease causes.

The statistical part of the report is as full as usual, but it is satisfactory to learn, from the Commissioner's "Personal Proceedings", that there is now a fair prospect of registration work being otherwise provided for, and that the Commissioner will in future, in accordance with repeated recommendations made by the Army Sanitary Commission, be enabled to devote his whole time to his special duties of disease prevention.

Another important step taken by the Bombay Government, in accordance with the recommendation of this Commission, has been, entrusting sanitary work to the Vaccination Department, so admirably organized by Dr. Pinkerton, thereby recognizing that vaccination is really a sanitary proceeding, and that the officers engaged on it may, without interfering with the efficient discharge of their vaccination duties, render efficient help in bringing to notice disease causes coming under their observation, and in giving advice to village authorities and inhabitants on steps that should be taken for improving their own health.

During Mr. Lumsdaine's absence on three months' leave Mr. Hewlett became Acting Commissioner, and was thus enabled to bring to the sanitary inspection of Tanna, Poona, Ahmedabad and Ahmednuggur the knowledge and experience obtained during his laborious and successful work while he was Officer of Health for the City of Bombay, and the resulting reports are a real practical addition to our knowledge of disease causes in Indian cities, and of the general principles on which they ought to be dealt with. These reports cannot fail to be of use to the local authorities, as well as to officers engaged on the reformed sanitary service of the Presidency.

The last section (VI.) of the report is occupied by a detailed account of sanitary progress in the Presidency cantonments, and of works executed in barracks, hospitals, &c., for accommodation, health and comfort of troops.

As there are several points in the report of practical importance it is proposed to call attention to them as briefly as possible.

1. The death-rates are calculated on the census population of 1872, which amounted for the 24 registration districts to 10,228,774.

The districts include 223 rural circles, 55 town circles, and 7 cantonment circles, within which there were registered (in 1875) 375,718 deaths (exclusive of dead-born) and 340,329 births. Both numbers considerably exceed those of previous years.

Mr. Lumsdaine calculates the births registered and unregistered at 664,705 = 40 per 1,000 of the population. The registered deaths give a death-rate for 1875 of 23.2 per 1,000 (including cholera), which is manifestly too low. The tables in the report present considerable discrepancies in the returns which show registration mortality results varying from 6.34 per 1,000 to 32.03 per 1,000, and birth-rates lying between 1.90 and 60.54 per 1,000 of the population. All that can be said is that the total numbers of births and deaths registered are slowly increasing, but the tables of registration circles show where the defects exist and where greater accuracy is urgently needed. The means of effecting the required improvements can only be settled in India, and the following are the steps proposed by the Bombay Government which appear to be founded on the facts of the case.

2. They propose to work the registration under the orders of the Collector until a separate agency can be found. "Seeing that the village is the primary unit the initial registrar must begin there"; but unfortunately many patels can neither read nor write, and have to give information from memory. The people are to be urged to give them information nevertheless, and there will always be

found some one in the village to write it down. "In the smallest villages there is generally one buniyah who can write, and whose entries would be available for the kulkarni when he paid his visit".

Under the new organization of the sanitary and vaccination services the inspecting officers would undertake the duty of inspecting and compiling the registers of births and deaths.

One important element in this change is that the people themselves are called on to assist in providing correct information for entry in the records, and may thus be led to take greater interest in measures for diminishing their village death-rates. So far as concerns the general sanitary work of the Presidency these proposals will have the immense advantage of liberating the Sanitary Commissioner from statistical details, and thus enabling him to devote his whole time to his proper functions. The plan as a whole is worthy of a full trial, and will doubtless lead to greater completeness in registration, and possibly in time, and by the influence of the Inspectors, who are all medical men, to more accurate knowledge of the chief death causes than has hitherto been possible.

3. The following are the death causes as at present classified in the two latest years:

Causes of death.	Deaths.	
	1874.	1875.
Cholera	37	47,555
Small-pox	3,963	3,461
Fevers	183,717	219,156
Bowel complaints	26,990	33,650
Accident or violence	6,165	6,217
All other causes	57,840	65,679
Totals	278,652	375,718

This abstract shows deficiencies in the numbers registered and inaccuracies in the diagnosis which it is hoped may be diminished under the new arrangement, but there is no mistaking the great importance of fevers to the well-being of the people.

The great cholera epidemic of 1875 is a small matter when compared with the deaths from endemic fevers; and if dependence could be placed on the diagnosis the figures would go to show that, when the local causes of fever are most active, cholera is most to be dreaded.

4. *Cholera*.—This cholera pestilence appears to have attacked the registration circles in Bombay with few exceptions, but its exact distribution as regards villages, a matter of great importance in dealing practically with local measures of prevention, cannot be ascertained from the returns. It may be suggested whether it would not be advisable, in future returns of the more important epidemic diseases, such as cholera, fever, small-pox, not only to state the total number of villages and their population as in the tables of the present report, but also to give the number of villages and their population attacked and exempted each year.

So far as can be learned from the data there were 2,466 villages attacked (but the population is not stated) out of upwards of 40,000 villages in the Presidency, and 96,012 persons were attacked, while 13,064,136 escaped cholera.

It follows from these facts that during the great epidemic of 1875 cholera selected its victims, not by diffusing itself over the country, but by fastening itself upon a comparatively few defined localities. As another element of the history, it

will be seen from the following abstract that the prevalence of the epidemic was materially influenced by the season:

Months.					Cholera deaths registered in 1875.
January	...	...	...	...	1
February	...	...	...	...	1
March	...	...	...	...	10
April	...	...	...	...	795
May	...	...	...	...	5,359
June	...	...	...	...	10,374
July	...	...	...	...	12,906
August	...	...	...	...	8,609
September	...	...	...	...	3,493
October	...	...	...	...	3,548
November	...	...	...	...	1,640
December	...	...	...	...	819
Total					47,555

The hottest, moistest months were the most fatal.

Mr. Lumsdaine calls attention to another very important fact regarding cholera epidemics in Bombay, viz., their tendency to recur in greatest severity during certain years. As the data have an important bearing, not only on the history of cholera, but also on the introduction of sanitary measures, it may be well to introduce them here.

Years.					Reported deaths in civil population.	Ratio per 1,000.
1866	...	...	...	...	23,037	1.85
1867	...	...	...	...	5,143	.39
1868	...	...	...	...	6,447	.50
1869	...	...	...	...	52,380	3.77
1870	...	...	...	...	2,666	.20
1871	...	...	...	...	5,821	.41
1872	...	...	...	...	15,642	1.03
1873	...	...	...	...	232	.02
1874	...	...	...	...	37	.01
1875	...	...	...	...	47,555	2.93

In 1865 there were 83,148 recorded cholera deaths, and since then there have been remarkable outbreaks of the disease every third year, all the conditions remaining apparently the same. The lesson taught by the table is amongst others that increasing vigilance, not only in effecting sanitary improvement, but in maintaining it in all towns and villages, is a matter of primary necessity. Who could have otherwise predicted that the exemption of 1874 would have been followed by the calamity of 1875? The facts all show the danger of dealing with cholera on any merely hypothetical grounds, or in conformity with any disease theories. It is evident that there are undiscovered reasons, possibly connected with seasonal and personal peculiarities, which tend to augment the activity of recognized local causes at certain periods; and if this be in any sense true, it affords an additional reason for removing all such causes and preventing their recurrence.

5. An illustration of the importance of this view is afforded by an outbreak of cholera among prisoners in Yerrowda Central Jail, near Poona, in the end of May 1875, a report on which is given by Surgeon Major Blanc, the Superintendent. Between 27th May and 1st June the attack comprised 24 cases and eight deaths

out of 1,279 prisoners. Of the total cases 22 took place among men engaged at work on a public road and two cases among men not so employed. Of the total number of prisoners from 725 to 728 were employed out of doors, and of this number from 61 to 134 were employed on the road on the 24th, 25th and 26th May. It was amongst these that 22 out of the 24 cholera attacks occurred, and the question which the Superintendent had to answer was—why the outbreak should have been mostly confined to this batch of prisoners? He considers that there is proof of the following kind to show that the case was one of cholera water-poisoning.

The jail is supplied with water from the river Mula before it reaches Kirkee, where the river makes a bend, and returns, as it were, on itself in its downward course to a point about a mile and a half from where the jail water is drawn, and at this lower point a dam is thrown across the river, over which no water had passed for several days. Consequently the river below the dam was stagnant and contained water in pools. The road gang drew water for watering the road about half a mile below the dam, and, instead of drinking water from the usual source, it appears that they drank of the water intended for the road.

What relation had this fact to the outbreak of cholera? To this question one of two replies may be given. Dr. Blanc considers that the evidence is in favour of the cause having been cholera poison in the water. He shows that on 22nd May, five days before the outbreak, there were two fatal cases of cholera in the village of Yerrowda, close to the dam, and that on the evening of the same day the dead bodies were burnt and the clothes washed within 20 yards of the spot where water had been drunk by some of the prisoners; and this fact of drinking water from the locality was admitted by those who suffered from cholera.

There are, however, other facts requiring to be valued. Cholera was in the vicinity, and was indeed epidemic in the country. There were washermen at work polluting the water. Two analyses of the water are given, one taken above, the other below, the dam. Both are so unfavourable that the analyst, Mr. Gray, is quite justified in his opinion "that both specimens are so highly charged with decaying organic matter that their use as drinking waters ought to be strictly prohibited". Active measures were taken within the prison by Surgeon Major Blanc for coping with the outbreak.

There is reason to believe from the facts that foul drinking water was an exciting cause of cholera among certain of those who used it. But, as already stated, these were not the only sufferers; whether there was cholera poison in the water or not there are no means of determining, but there can be no doubt that the Acting Chemical Analyst to Government, Mr. Gray, took the only really practical view of the teaching supplied by the case. But it is not meant by this view to support in any way those dangerous Indian customs of disposing of dead bodies and the washing of foul clothes in river courses which may afterwards be used by people for domestic water supplies. The pollution of rivers requires quite as much attention in India as it does in this country, although it is not carried to the same baneful extent there as it is within the United Kingdom.

6. *Small-pox.*—The small-pox mortality of 1875 was the lowest on record, namely, 3,461. Bombay has the most efficient vaccination service in India, and part of this favourable result is, no doubt, due to its operation. The real test of success must, however, be sought at periods when small-pox has a tendency to become epidemic, which appears to be the case in Bombay every third or fourth year.

7. *Fever.*—Every district of Bombay Presidency returned fever deaths, or at least those so registered, during 1875. The registered fever deaths varied in different districts from $6\frac{1}{2}$ to 21 per 1,000. In some circles the mortality was very high. In 11 out of 85 registration circles it exceeded two per cent. of the population. In Ahmedabad it exceeded three per cent. During the last six years 60 per cent. of the total deaths in Bombay Presidency have been ascribed to fevers. The mortality is greatest during the cold and rainy months of the year.

To discover and deal with local conditions in places where fever prevails most is obviously one of the most important functions of the new sanitary administration.

8. *Bowel Complaints.*—As already stated, there were 47,555 registered deaths from "cholera" and 33,650 deaths from "bowel complaints". In face of these facts it seems necessary to inquire what diseases are classed as "bowel complaints". Are many of them choleraic in character, and, if so, are they not part of the cholera epidemic of the year? If "bowel complaint" is a distinct disease, it must be admitted that from its constant existence it is of more importance to the public

health than cholera. During the two years, 1874 and 1875, there were 47,592 deaths from cholera in the Presidency and 60,640 from bowel complaints. The facts speak for themselves.

9. In former years the Commission called attention to the large number of deaths from drowning in water sources, such as wells and tanks.

There were 2,835 deaths from this cause in Bombay Presidency last year. Of these deaths 525 were suicides, 2,084 were accidental, and 230 occurred otherwise. Of these drownings 884 were in wells by accident, and 400 by suicide—in all 1,284 deaths in wells. There were 49 suicides in tanks, and 354 accidental drownings in tanks. So that 1,638 deaths took place during the year in water sources used by the people. Surely some simple and inexpensive means of protecting water and saving human life might be adopted. There appears to have been little improvement in this matter since it was last referred to years ago.

10. The most important subject in this report, in reference to future sanitary progress, is contained in Section 5, the "Record of Personal Proceedings" of the Sanitary Commissioner, which contains a sketch of the future sanitary organization of the Presidency, based on the proposal of this Commission to utilize the vaccination service for sanitary reporting.

Under the re-organization the vaccination service will pass into the hands of the Sanitary Commissioner, as being not a separate but an integral part of the public health department of the Presidency, but it will continue to be administered by its own Inspectors and Superintendents. According to the Government scheme the Superintendents of Vaccination will also be the officers of health of their districts, and in this capacity will be under the Sanitary Commissioner. They will inspect the birth and death registers, and advise about them. They will advise on all local sanitary matters—cleansing, draining, water conservancy, and the like, and also on measures required for epidemics. But neither Superintendents nor their subordinates will do more than advise the people and patels on such simple matters as are within the reach of the people, and their means, such as village cleanliness, conservation of wells, tanks, &c. They will have no power to issue any orders. All action must be taken by Collectors and their assistants.

It appears to the Commission that much good would be done by issuing a short code of explanatory rules for the guidance of the people and village authorities, setting forth the objects of these improved sanitary arrangements, and the direction in which the people could aid the authorities in protecting their own health.

It is unnecessary to discuss the details proposed for carrying out the improved administration, as all such questions must be decided by the Government. So far as the principle is concerned, it is in every way worthy of being carefully applied, for there can be no doubt as to the uniform testimony of every report on public health questions received from India, which shows conclusively that to the action and co-operation of the people themselves and the village officers we must mainly look for the general sanitary improvement of country districts, and the matters in which Government might give aid beneficially will soon become manifest.

The general result may confidently be expected to lie in the direction of improved registration of births and deaths, in enlisting the people in the preservation of their own health by carrying out simple local improvements, and in diminished liability to epidemic diseases.

11. Thus under the new arrangements the Sanitary Commissioner will cease to be a mere registrar of deaths, and he will very soon find that he has as much real practical sanitary work to do as will fill up his whole time. He is appointed, indeed, with this very object; and it would be as wide a departure from the real purposes of this important office if its occupant were to devote his time to scientific pathological inquiries as if he were to return again to the functions of registrar. It is not intended by these remarks to undervalue either statistics or scientific research, but, as the duties of the Sanitary Commissioner's office are being re-arranged, it is necessary that their real object should be distinctly stated, especially as scientific investigations into Indian diseases are entrusted at present to very competent inquirers there, and the duty of the advising sanitary authority is to take account of every new fact which may throw light on disease causes, and to apply all such facts to practical use.

This is quite enough for one man's superintending work in Bombay Presidency.

12. Mr. Hewlett's reports follow next in order. The first one, on an outbreak of cholera at Tanna, is accompanied by a report on the same outbreak drawn up by

Dr. Hojel, Acting Civil Surgeon. These reports give an instructive insight into the internal economy of Indian rural towns in relation to cholera, and show that there is no mystery connected with the localization of the disease, however difficult it may be to account for its being there at all.

The town is situated on the low banks of a creek; its population is about 14,299, of whom 11,340 are without wholesome provision for natural purposes, and hence every sequestered place, even the streets, are fouled. In numbers of houses there are cesspits; the streets are unpaved and unsewered, street drains are merely surface cesspools. "Everywhere," says Mr. Hewlett, "I saw the same disgraceful surface uncleanness, the same want of all proper municipal supervision, and the same absence of persistent sanitary work. . . . The water-supply is on a par with the drainage. The people are solely dependent on surface wells and a large tank," which latter is in a filthy state. Many of the houses appear to be in a very inferior condition, and overcrowded.

Tanna is one of a group of about a dozen registration circles at no great distance from Bombay within which cholera broke out in May 1875. The first case in Tanna appears to have been an imported one, but Dr. Hojel infers the existence of "a septic state of the atmosphere by the fact that people were attacked in four different quarters of the town". The attack lasted from the 21st of May to the 31st of August 1875, during which period 296 people were affected and 173 died.

Both reports give details of the sanitary condition of the town, and of energetic sanitary and relief measures carried out by Dr. Hojel, one of which was removing the tiles from the roof of an affected house, pulling down and burning partitions, and digging up the floors. Mr. Hewlett's reason for these proceedings involves an important point in sanitary practice. He says: "Such action has always been found effectual in Bombay, where we have learned from experience that cholera poison cannot live in plenty of air and light".

Both of these reports are valuable additions to practical sanitary literature, and may serve as guides to similar work elsewhere.

13. Mr. Hewlett's reports on the sanitary state of Poona, Ahmednuggur and Ahmedabad are marked by the same skill in laying hold of the main sanitary defects in each city as have characterized his reports on Bombay. The reports are devoted to real practical points, and may very well be used as guides for improving the cities to which they refer.

The salient facts which appear on the face of each of them are the following:

- 1st.—That no sufficient means have been adopted in times past for keeping these towns free of excrementitious matters of human beings and of animals, and, as a consequence, the entire subsoil has been fouled in such a manner as to taint not only the whole area on which the cities are built, but all the water sources and the air in the streets and houses.
- 2nd.—That the death-rates appear to show that, without immigration, one or two of the cities would, in the absence of improvements, cease to be inhabited, and this without taking into account the periodical losses from epidemics.
- 3rd.—That the chief death causes are local fevers and bowel complaints, as shown by the following abstract:

Deaths per 1,000 of population.

Poona (4 years' average).		Ahmedabad (4 years' average).		Ahmednuggur (3 years' average).	
Fevers.	Bowel Complaints.	Fevers.	Bowel Complaints.	Fevers.	Bowel Complaints.
12.49	1.73	27.70	2.27	15.9	1.8

To show the importance of these facts it is sufficient to state that during the same term of years the cholera death-rate, so much dreaded, only averaged .98 at Poona; it was scarcely appreciable statistically at Ahmedabad; and it was 0.03 at Ahmednuggur.

4th.—That the remedies for this dangerous condition of these cities must be sought in means for cleansing the subsoils of their pollutions, and at the same time arresting completely their recurrence; that the existing water sources, especially in Ahmedabad and Ahmednuggur, are dangerously impure, and require to be either abandoned or improved, if this be practicable.

5th.—That the cities must be drained and paved, animals and noxious trades removed out of them, nuisances prevented, and a rigorous sanitary administration introduced.

It is satisfactory to learn from the reports that some improvements have already been introduced, and that there is no indisposition to proceed. But the revelations made by Mr. Hewlett show that the work before the municipal authorities is one of no ordinary magnitude, and will tax both their resources and energies to cope with it.

14. *Sanitary Reports on Cantonments.*—These reports are 28 in number, and are mainly devoted to departmental details. The sanitary information contained in them is too fragmentary to enable the Commission to discuss them. Generally, however, the impression which they convey is that useful sanitary work is being done, and that as a whole the condition of the cantonments in Bombay Presidency is undergoing progressive improvement.

There are, however, a few exceptions to this rule, and these have in former years been made subjects of comment on account of the extent of the problems to be dealt with.

Jacobabad is still suffering from its defective local position, and the cantonment report states that "health is unsatisfactory in all regiments; families in the same condition; health of the Native community indifferent". The chief disease cause is malaria from waterlogged subsoil and probably impure water. Some improvements have been carried out, but it is evident that those connected with the drainage have yet to be done.

Mekhidpur still suffers from a similar condition of the subsoil. In 1875, out of 858 admissions to hospital no fewer than 500 were from fever. A large portion of the men are stated to be suffering from malarial cachexy, and at ordinary parades sometimes eight men will fall out in a morning. The drainage is said to have been completed, but too late to be beneficial during the year. Attempts were being made to supply better water. Time must be given to show the results of better surface drainage, but in the meantime it is most unsatisfactory to be informed that, out of an average strength of 861, there were 858 admissions to hospital, of which 500 were from local fevers.

Nussecrabad.—Attention has been more than once directed to the condition of Nussecrabad as regards its surface drainage and water-supply. The latter will now be improved, as a scheme has been sanctioned. Complaints as to the state of the surface drainage resolved themselves into an existing malarial condition of surface from want of a proper system of surface drainage, and the presence at certain seasons of water surfaces to which injury to health had been traced. Since then the station authorities appear to have been replaced by others, and these have concurred with their predecessors in their views as to the manner in which the drainage should be dealt with.

These views are sustained in the present report by a medical opinion that "the health of European troops during the past year has been unexceptionably good". Let us now see how far this view is sustained by the statistics given by the reporters.

From the 10th March to the 31st December 1875, i. e., during ten months and ten days, out of a strength of 152 men of the Royal Artillery there were 300 admissions to hospital and four deaths.

During the year 1875 there were at the station 459 men of the 108th Regiment, among whom there were 611 admissions to hospital and 13 deaths.

Putting both arms together, and making the necessary addition to the Royal Artillery for completing the year, the admission-rate was 1,600 per 1,000, and the death-rate about 30 per 1,000. The year entire would have furnished nearly 800 fever admissions to hospital, besides "a number of mild cases of this disease, coming

under the denomination of heat fevers, requiring little medical treatment". With these facts before them the Commission cannot depart in any degree from opinions already expressed by them regarding the defective drainage plans for this station.

How.—The water-supply of this important station appears still to be unsatisfactory, both as regards quantity and quality.

The only other remark called for by these cantonment reports is that in all probability more rapid and certain progress will be made in the work under the supervision of the Sanitary Commissioner from the time the new service is in operation.

15. *Appendix No. III.* contains a list of works of construction, additions and alterations completed or in progress during 1875 in barracks, hospitals and cantonments generally in connection with the accommodation, health and comfort of troops. It gives returns from 25 stations, and includes new barracks and other buildings, improvements in existing buildings, in ventilation, surface drainage, latrines, lavatories, &c., and includes several hundreds of items, all of more or less importance, as regards the health of the troops. The work of improvement appears to be steadily progressing as funds are available, and the only suggestion which arises out of these returns is whether it would not be more advantageous to direct special attention to the worst stations, such for instance as those already mentioned, and perhaps Calaba also, with a view of putting an end as speedily as possible to the great losses of efficiency accruing at these stations.

16. These remarks may be concluded by a brief notice of an important investigation undertaken by Mr. Hewlett with the view of ascertaining whether the notorious night-soil nuisance in Bombay harbour was likely to injure the purity of water for the supply of ships, which is drawn from the Vehar mains, at the rate of about 100 tons a day, and carried in tanks to the ships. When the tanks were being filled they were surrounded by floating night-soil.

Distilled water was exposed for 24 hours over tanks filled with Vehar water lying at low tide about 100 yards off the North end of the Bunder. The result was that this ammonia-free distilled water had acquired from the foul atmosphere—

Parts.	
.04 of free ammonia	} per million.
.06 of albumenoid ammonia	

Samples taken from the Vehar water-pipe supplying the barge tanks gave—of free ammonia .005 and of albumenoid ammonia .15 parts per million. But in the barges the amount of free ammonia had risen to .01 and of albumenoid ammonia to .23 per million. There was a very slight increase in the chlorine and solids in the barge waters, but the increased impurity had come from atmospheric sources.

The practical result of the inquiry is that the Vehar water should be filtered as was long ago shown to be necessary by this Commission; that the harbour of Bombay should be kept free of night-soil; and that a strict supervision should be kept up over the barges supplying shipping. Greater care is required also in cleansing the ship tanks, for the analyses of water taken from these receptacles show that chlorine and ammonia in the water greatly exceed the amounts due to the Vehar water by which the tanks are supplied.

In conclusion the Commission desire to express their opinion that the report under review is the best and most practical yet supplied from Bombay.

No. 10/267

COPY forwarded to Local Governments* and Administrations and to the Military and Public Works Departments for information.

* Except Bombay.

By Order of the Governor General of India in Council,

HOME DEPARTMENT,
SANITARY;
FORT WILLIAM;
The 8th December 1877.

Under Secretary to the Govt. of India.

3—

Exd.—N. C. D.

Home Dept. Press—No. 367—5-12-77—129.

Order thereon 3rd January 1878 held

Communicated to the Board of Revenue
and to the Sanitary Commissioner

(Enc Extract)

J. Harcourt
Under Secretary

To the Revenue Department.

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Despatch from Sec^y. of State
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of the Army Sanitary
Commission on the report of
the Sanitary Commissioner
for Bombay for 1875
N^o. 75

Recorded.

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9. Jan^y 78.