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MADRAS RECORD OFFICE.

Government of Madras.

Financial DEPARTMENT.

G.O. No. 697 Press ~~Mis~~

251-252.

Dated 25—4— 1874.

20/21

Not to be folded or roughly handled

Proceedings of the Madras Government, Financial Department,
25th April 1874.

No. 251. Read the following despatch from the Right Honourable the Secretary of State for India :—

Sanitary.
No. 3.

INDIA OFFICE, LONDON,
26th March 1874.

MY LORD,—With reference to the despatch of your Excellency in Council, dated the 30th June, No. 22 of 1873, forwarding the annual report of the Municipality of Madras for the year 1871-72, I now transmit, for your consideration and for the adoption of such measures as may appear to you desirable, copy of a memorandum by the Army Sanitary Commission.

Dated 29th January 1874.

2. I concur with the Commission as to the high estimate which it has formed of the value of the late Mr. Gover's services, and I trust that the exertions of your Excellency's Government and of the Municipality will never be relaxed until the city of Madras is thoroughly drained.

I have, &c.,
SALISBURY.

His Excellency the Right Honourable
The Governor in Council, Fort St. George.

MEMORANDUM by the Army Sanitary Commission on the Report of the Administration of the Madras Municipality for 1871-72.

This report, with its appendices, contains a detailed statement of the sanitary condition of Madras, and it gives by far the most instructive and practical account of the sanitary elements at work in Indian cities which has come before the Army Sanitary Commission.

This is mainly due to the late Mr. Gover, who in his capacity as Secretary to the Census Committee, and subsequently as Sanitary Officer in the Municipality, has left behind him two reports now published—one on the census, the other on the sanitary condition of Madras—both of them showing how great a loss his death has been to the public service.

1. The census showed that there were 51,800 houses in Madras in 1871, "with a limit of error not exceeding one-fifth per cent." After several trial estimates the numbers in houses were assumed eight per house ; and, while the work of enumeration was in progress, several tests were made use of to discover whether the numerators were discharging their duties properly.

The final result of the various census operations gave the approximate populations of Madras as follows :—

Hindus*	330,052
Europeans	3,613
Eurasians	12,012
Mussulmans	50,964
Other races	910
Total ...	397,552

* Including 69,145 Pariahs.

The statistical data of which these are the totals are used for all sanitary purposes in the report.

2. The causes of death during the official year 1871-72 among this population were as follows :—

	Deaths.
Small-pox ...	343
Measles ...	98
Fevers ...	2,379
Dysentery ...	964
Diarrhœa ...	1,051
Cholera ...	454
Other diseases ...	7,926
Total ...	13,215

Death-rate 33·2 per 1,000.

3. A number of comparisons are introduced into the report to show the relation of Madras mortality in 1871-72 to that of former years, but it appears doubtful if past data are sufficiently correct for the comparison. The data for 1871-72 may be assumed as sufficiently near the truth for practical purposes, and these show that, with the exception of Glasgow, Madras gave a higher death-rate than any of the larger cities and towns in the United Kingdom, and that next to Agra it has a death-rate exceeding by 7 or 8 per 1,000 the rates of such large Indian cities as were available for comparison.

4. Like all other populous cities, Madras shows very different death-rates in different districts. Thus in the eight municipal divisions the rates for 1871-72 stand as follow :—

No. of Division.	Death rate per 1000.
6	21·1
1	26·5
8	32·5
3	32·7
7	33·7
5	37·0
2	37·3
4	48·2

Still more remarkable are the differences between the death-rates of villages and groups of population for the same year. At one end of the scale the Gunpowder Mills, with a population of 641, has a death-rate of 6·2 per 1,000 ; another group of 5,222 persons has a death-rate of 7·6 per 1,000.

Other villages give death-rates of 20, 30, 40, up to 57·8 per 1,000 ; and one group (Monegar Choultry), containing 426 inhabitants, loses no fewer than 243 of them, equal to a death-rate of 570·4 per 1,000.

5. Mr. Gover introduces an instructive comparsion between the death-rates in the four sea-side divisions of Madras and the death-rates of the four inland divisions more or less removed from the influence of the sea-breeze, from which it appears that, while the four former yield death-rates of 19·1, 19·7, 21·6, and 33·2 per 1,000, the four inland districts have death-rates of 29·8 32·8, 36, and 42 per 1,000. A question naturally arises as to why one of the sea-side districts is so far an exception to the comparative healthiness of the region as to yield a death-rate of 33·2, and Mr. Gover gives the answer. It includes St. Thome, which was a city 150 years before Madras was founded ; the district has no outlet whatever for its sewage : it is full of closely-packed houses shutting out the sea-breeze ; and the whole subsoil has become saturated with the filth of centuries.

6. The enormous death-rate of 42 per 1000 in one of these inland districts is accounted for by the fact that "many parts are filthy in the extreme and cannot be cleansed, for there are no drains, and the streets are too narrow to permit the passage of a conservancy cart."

The streets average six and eight feet in width.

7. The results of improvement in one such district where the servants' parcherries were situated will show how much the local conditions above alluded to influence local death-rates.

The "parcherries" are described as "abominable" and "dens of filth." The death-rate for three years 1859, to 1861 was 72·9 per 1,000 ; for the next three years it was 51½ per 1,000 ; during the next three years it had fallen to 48·7 per 1,000 ; but in the last of these years, viz., 1867, "a determined effort was made to clean and improve these dens of filth." Huts were cleared away, new roads were opened, side ditches were dug, and trees were planted. The results to health have been that during the years 1868 to 1871-72 the death-rate has fallen to 18·4 per 1,000.

8. Another important contrast is drawn between the death-rates of different races and the localities occupied by them.

The Europeans are the most healthy ; next follow the Eurasian population ; then the Mahomedans ; and the most unhealthy are the Hindus. Mr. Gover shows that the figures "point forcibly to some cause lying near the Hindus and remote from the Europeans and corroborate the suspicion that the unduly high level of the subsoil water is connected with the secret. The great mass of the Hindu population live near the Cooum and its connexions."

And the most densely peopled Mahomedan quarter is drained into the Cooum, and the drains are backwatered at high water.

No doubt the foul exhalations from the Cooum have an influence on local health, besides its effects on the subsoil drainage ; but there is reason to believe that the high death-rate of 1871-72 was partly due to what Mr. Gover calls the "abnormal" height of the subsoil water.

The Officiating President of the Municipal Commission also directs attention to this subject. He says ; "The river Cooum, which ought to be an ornament and a blessing to Madras, is now only a source of disease and a receptacle for the sewage of about a-third of the population."

9. Properly speaking, Madras has no drainage. The site is little raised above the sea-level, and the subsoil is sand and clay.

Mr. Gover gives sections of existing surface drains which are partly constructed of rough broken brickwork, and partly have tile bottoms.

The main drain, into which the street drains empty themselves, is oval, not vertically but transversely, 10 feet wide by 5½ feet high. It is nothing but an underground settling tank which retains nearly all the matters suspended in the sewage ; and the result of the work is "that the sewage that flows out at each end is a very innocent liquid, although it brings with it the diabolical stench which is the chief nuisance in Black Town."

During a late cleansing of this main sewer, 15,000 cart-loads of solid matter were removed from it at a cost of £300.

10. It is easy to understand how, with sewers such as these and in the absence of any drainage properly so called, the subsoil of the city has been rendered extremely foul and unwholesome. It is stated as an illustration of the downward percolation of sewage, "both where there are no drains and where there are," that in making excavations connected with the water supply in the more densely-peopled and old localities the ground was so saturated with filth that "the workmen exhibited great disinclination to continue their labour. In some places the soil has been found as black as ink to a depth of eight or ten feet." Trial holes at different points revealed the same condition of subsoil. Mr. Gover very properly raises the question whether a clue to the causes of perennial fevers and other epidemics andthe low state of health which affect the population may not be found in the exhalations from this foul subsoil.

11. The subsoil well-water of course suffers like the earth from infiltrated sewage products and sea-water. "The demands made upon the fresh water have been more than it could meet, and the deficiency has been supplied by a steady influx from the lower brackish waters. In this way a very large proportion of the wells which twenty years ago gave good water are now brackish, and

many that were then brackish are now so salt as to be unfit for any domestic purpose. The water used in many districts is bad in the extreme."

That the results to health of the use of such water have not been worse than they have been is attributed to the fact that the natives boil the water before drinking it, and not unfrequently use it warm.

12. Mr. Gover enunciates the three following great leading sanitary requirements for Madras (they are in fact required everywhere throughout India) "to ensure health" :—

"1. We must have pure water.

"2. We must have pure air.

"3. We must at once carry away or destroy all filth, especially that which results from animal excretion and vegetable decomposition.

"Every one of these rules has been persistently neglected and defied, except that during the last three years a great effort has been made to ensure a supply of pure water."

This important work has now to a large extent been accomplished.

The other two principles which Mr. Gover considered "much the most important in Madras" have still to be applied in practice, although much is being done towards realizing them with the existing means, and with satisfactory results so far as these can be attained by labour and carts. The great work of drainage is still to do.

13. The Acting Commissioner in his report calls attention to the subject as follows :—

"The Municipality has ever regretted, in rendering an account of each year's work, that nothing had been done to improve the drainage.

"The necessity for such a measure is now more urgent than before when the people got their supply of water from the wells.

"The water-supply works will soon be in full operation, and will tend in a great measure to raise the subsoil waters and render the houses damp and unwholesome. The only remedy is to carry out a proper system of drainage on the most approved principles."

It is satisfactory to know that, as soon as the Municipal Engineer can spare time from the works of water supply, he will be called on to prepare a drainage scheme.

14. This report for 1871-72 appears to give a faithful account of the present condition of Madras and of the measures required for its improvement.

On the great general principles, apart from mere details, it is exhaustive, and there ought to be no difficulty now in dealing with any questions of public health which may present themselves.

Mr. Gover has clearly shown that the causes of ill-health in Madras arise from—

(1.) Foul subsoil saturated with sewage matter.

(2.) Subsoil water level too near the surface.

(3.) Foul state of the Cooum, a species of shallow tidal estuary traversing the city, containing variable mud and silt banks, having foul exposed shores, and receiving a large part of the sewage of the city.

(4.) Bad water (now being replaced by an abundant supply of water brought from a distance).

(5.) Dense irregularly-built districts with narrow lanes, instead of streets, interfering with outer ventilation even on the sea-shore and preventing efficient cleansing, together with uncleanly habits among the people, arising to some extent from the nature of their dwellings.

15. As regards remedies we might suggest whether the state of the Cooum might not be included in any general drainage scheme ? Tidal rivers and estuaries in hot climates are scarcely safe neighbours to large populous cities, especially if they have little current passing through them and if they receive sewage matter from the population.

The most obvious method of improving them is by intercepting the sewage, so that none shall enter the stream, and to prevent exhalations from exposed mud by embanking the sides permanently and providing in some way for keeping the bed clean by a current or by ensuring a healthy water level in it.

Proceedings of the Madras Government, Financial Department,
25th April 1874.

If dealt with on some such principle, the entire length of the Cooum might become not only a great ornament to the city, but might be the means of supplying the interior of it with healthy sea-breezes, instead of with unwholesome malaria as at present.

Tree planting in open spaces and along streets would also tend to improve the public health.

16. The proposed drainage scheme should provide for the lowering of the subsoil water as well as for the removal of all sewage and foul water of households.

With properly constructed drainage works, the rainfall would become an important agent in gradually cleansing the subsoil from existing filth while filtering through the ground to the drain.

The mass of the rainfall in Madras as in other Indian cities would have to be removed by good surface drainage, including smooth carefully-laid surface channels.

17. The report contains some useful information bearing on the question of sewage outlet, from which it appears that the sewage of Madras could be safely applied for agricultural purposes, and so the whole question of outlet decided in a manner satisfactory to the public health, and with a profit to the Municipality.

18. There are at present two sewage farms in operation. The earliest of these (Shoolay Farm) was laid out, not so much because there was a prospect of success, but because there was a sewage stream existing which it was very desirable to get rid of. Near it was a salt-water marsh in the bed of a backwater communicating with the sea, and this was made use of for getting rid of the sewage.

About 11,000 tons of street sweepings were thrown in, and about 3¾ acres were reclaimed ; about two-thirds of it were platted and treated with sewage. Mr. Gover well says that "the site chosen was about the worst it is possible to conceive. Its condition was so bad that it could not be made worse."

On such land guinea grass was planted, and yielded a crop having an annual value equal to £78 per acre. A bed of Hurrialie grass gave a result equal to £12 per acre per annum. The yield of cow grass was at the rate of £26 per acre per annum. The success was, however, transitory : as might have been anticipated, the salt began to rise under solar influence ; from this and other causes the expected crops were destroyed. The ground had been treated with sewage and there was no drainage. An inquiry was instituted, when "it clearly came out that the main cause of our want of success lay in the subsoil water remaining too near the surface." On this discovery having been made, the ground was broken up to a depth of eighteen inches, and drained every six feet with pipes four feet under the ground level (a greater distance and a greater depth might have been better). On this ground, where nothing would grow, an excellent crop of grass was obtained "with marvellous rapidity," and so the problem was solved. "Adequate drainage makes success certain, and the Shoolay farm is now a commercial as well as a sanitary success."

The crop from 2¼ acres sells for £90 per annum, and the establishment charges, which would cover the whole area of the farm (12 acres) if under cultivation, amounted to £66.

But there is not sufficient sewage. "Our difficulty now is in the sewage, not in the soil."

19. The Kistnampet farm is situated partly on sea-blown sand close to the shore, partly on an old rubbish bed covered with sand.

About two acres have been under sewage cultivation.

The soil is very porous, and requires a large amount of sewage. The area has yielded an average of 800 lbs. of grass a day for the whole year.

The annual value of the produce at the lowest selling rate is £120, and after paying charges the profit is £60 per annum for the cultivated area.

20. After this experience with sewage cultivation on soils of the most opposite character, Mr. Gover was fully justified in his conclusion "that the whole sewage of Madras may safely, economically, and profitably be utilized on sewage farms."

21. In 1869, the Madras Government stated that the earth deodorized the sewage as soon as it touched it, and Mr. Gover says that "nothing has since arisen to modify these views, though much to strengthen them."

The Madras drainage question hence admits of an entirely satisfactory solution.

22. Madras has now received by the work of Mr. Standish Lee the great boon of a water supply brought from a distance. It is collected in reservoirs at Cholaveram and Red Hills,

whence it is conveyed to Madras by gravitation with a maximum head of water of 30 feet. The delivery is estimated at 40 gallons per head per diem of the population, at a cost of £130,000.

There are seven miles of open channel through a thinly-peopled country, and thence the water enters a trunk main beginning at 42 inches in diameter and extending about 2½ miles, giving off branches in its course.

23. The following special arrangements in the water-supply works may be noticed :—

Provision has been made for draining off the supply a little below the water surface of the tanks, in order to avoid ground impurities.

The water after issuing from the tank is allowed to fall over a few steps to aërate it, after which it is passed through a vertical filter to strain it. After running along the open channel, on arriving at the Madras terminus the water passes through twelve copper wire gauze strainers, 60 meshes to the inch, before entering the main. Several methods of distribution are under trial :—

(1.) Having masonry cisterns with taps to contain a day's supply for the neighbourhood and an arrangement for filtering the water before it runs from the taps.

(2.) Cast-iron fountains with filtering arrangements.

(3.) Dip wells have been condemned in practice for obvious reasons and will not be used.

(4.) Water saving taps will be used. Kennedy's taps have been under trial, and are highly spoken of.

24. Mr. Lee points out that his system differs from that in use in England, in that only the water drawn for domestic use is filtered, while all the other water for irrigation, bathing places, and watering, flushing, &c., will be unfiltered.

Unfortunately, no analyses of the new water are given in the report, but it is satisfactory to learn that there has been no difficulty about it on the part of the people. Mr. Lee says "that wherever the Red Hill water has been delivered, it has been most acceptable to all classes of the community, and people often go a mile and more to fetch it."

25. Looking at the large increase of moisture which this new water will throw into the sub-soil and the additional malaria likely to arise from it, we entirely concur in the Municipality report that it is "of vital importance to the people that the consideration of a proper drainage scheme for Madras should not be delayed even a single day."

We are glad to see that a committee has been appointed for this object.

26. Mr. Gover's report shows that the sanitary staff have done good service during the year.

Upwards of 107 miles of side drains were constructed and 216,000 tons of garbage were collected and removed out of Madras, besides other work.

27. An instance of successful sanitary administration connected with reconstruction of dwellings may be cited as an example to other Indian communities.

Mr. Gover states that in 1871-72, within municipal limits, there were more than 100 parcherries (villages occupied by outcasts) without either road or drain in them.

The abominations in them were beyond description.

Two of the worst of them were so bad that nothing but entire rebuilding would bring a remedy.

A meeting of the people was called, and, after some trouble, an agreement was arrived at, and properly planned and arranged houses were constructed. One village was completed at the date of the report, and the roads were gravelled and drained.

In this way 1,000 people were provided with decent wholesome dwellings at a cost of £60 to the Municipality.

The habits of the poor people underwent an immediate improvement, and, although cholera and small-pox ravaged the unimproved villages close at hand, "there has been not a single case of cholera or small-pox in this parcherry since it was remodelled."

This is surely a hopeful experience for natives. As regards Europeans, if they will only live in accordance with the sanitary requirements of the climate, Mr. Gover shows that "good lives" among Europeans in India are now on a par with "good lives" in England.

28. In conclusion, while expressing regret that the public service has lost so efficient an officer, we cannot but hope that the active sanitary administration which has been called into existence and

has proved its vitality by its works will be supported by the Government and by the Municipality until Madras is completely drained and its sewage applied to agriculture, its population supplied with water, and its worst districts reconstructed, not forgetting the improvement of the Cooum, without which the work will be incomplete.

ARMY SANITARY COMMISSION, WAR OFFICE,
29th January 1874.

(Signed) J. J. FREDERICK,
Secretary.

No. 252. ORDER THEREON, 25th April 1874, No. 697.

Communicated to the President of the Madras Municipal Commission, who will report what is the precise position of the drainage project.

(True Extract.)

D. F. CARMICHAEL,
Acting Chief Secretary.

To the President of the Madras Municipal Commission.
,, Sanitary Commissioner for Madras.
,, Public Works Department.

Exd. J. H. Burns.

Govt. of {1874} Madras.

FINANCIAL.

To

THE PRESIDENT OF THE
MUNICIPAL COMMISSION,
Madras,

&c., &c., &c.

Dated April, 25th.

Recd. *Encl.*

G.O., 25th April 1874, *No.* 697.

APRIL.
Nos. 251-252.

Madras Municipality.—The despatch from the Home Government and the memorandum by the Army Sanitary Commission on the annual report of the Municipality for 1874 communicated to the President, with a request that he will report what is the precise position of the drainage project.

555

No. 3.

Copy Memo: by the Army Sanitary Commission dated 29th Jany 1874.

Ind. Rev. 935

Refered to in Sanitary Letter to Madras, No. 3, dated 26th March 1874

Rec'd at Col'y on the 27th April /74 via Brindisi & Bombay.

555

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Other diseases	7926
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Death

Death rate 33.2 per 1000.

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The other two principles which Mr Gover considered "much the most
"important in Madras" have still to be applied in practice although much is being done towards realizing them with the existing means, and with satisfactory results. so far as these can be attained by labour and carts. The great work of drainage is still to do.

13. The Acting Commissioner in his report calls attention to the subject as follows:-

"The Municipality has ever
"regretted in rendering an accounto
"of each year's work that nothing
"had been done to improve the drainage"

"The necessity for such a measure

"is now more urgent than before when
"the people get their supply of water
"from the wells."

"The water supply works will soon
"be in full operation, and will tend
"in a great measure to raise the subsoil
"waters and render the houses damp and
"unwholesome. The only remedy is to
"carry out a proper system of drainage
"on the most approved principles."

It is satisfactory to know that as soon as the Municipal Engineer can spare time from the works of water supply he will be called on to prepare a drainage scheme.

14. This report for 1871-2 appears to give a faithful account of the present condition of Madras and of the measures required for its improvement.

On the great general principles apart from mere details it is exhaustive and there ought to be no difficulty now in dealing with any questions of public health which may present themselves.

Mr Gover has clearly shewn that the causes of ill-health in Madras arise from.

(1.) Foul subsoil saturated with sewage matter.
(2.) Subsoil water level too near the surface.
(3.) Foul state of the Cooum a species of shallow tidal Estuary traversing the city containing variable mud and silt banks having foul exposed shores and receiving a large part of the sewage of the city.
(4.) Bad water (now being replaced by an abundant supply of water brought from a distance.)
(5.) Dense irregularly built districts with narrow lanes instead of streets interfering with outer ventilation even on the sea shore, and preventing efficient cleansing together with uncleanly habits among the people arising to some extent from the nature of their dwellings.

15. as regards remedies we might suggest whether the state of the Cooum might not be included in any general drainage scheme? Tidal rivers and estuaries in hot climates are scarcely safe neighbours to large populous cities especially if they have

have little current passing through them and if they receive sewage matter from the population.

The most obvious method of improving them is by intercepting the sewage so that none shall enter the stream and to prevent exhalations from exposed mud by embanking the sides permanently and providing in some way for keeping the bed clean by a current or by ensuring a healthy water level in it.

If dealt with on some such principle the entire length of the Cooum might become not only a great ornament to the City but might be the means of supplying the interior of it with healthy sea-breezes instead of with unwholesome Malaria as at present.

Tree planting in open spaces and along streets would also tend to improve the public health.

16. The proposed drainage scheme should provide for the lowering of the subsoil water as well as for the removal of all sewage and foul water of households.

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With properly constructed drainage works the rainfall would become an important agent in gradually cleansing the subsoil from existing filth while filtering through the ground to the drain.

The mass of the rainfall, in Madras as in other Indian Cities would have to be removed by good surface drainage including smooth carefully laid surface Channels.

17. The report contains some useful information bearing on the question of sewage outlet from which it appears that the sewage of Madras could be safely applied for Agricultural purposes and so the whole question of outlet decided in a manner satisfactory to the public health and with a profit to the Municipality.

18. There are at present two sewage farms in operation. The earliest of these Sholay Farm was laid out not so much because there was a prospect of success but because there was a sewage stream existing which it was very desirable to get rid

of

of. Near it was a salt water marsh in the bed of a back water communicating with the sea, and this was made use of for getting rid of the sewage.

About 11,000 tons of street sweepings were thrown in, and about 3 2/3 acres were reclaimed, about two thirds of it were platted and treated with sewage.

Mr. Gover well says: that "the site "chosen was about the worst it is "possible to conceive". "Its condition "was so bad that it could not be "made worse".

On such land guinea grass was planted and yielded a crop having an annual value equal to £78 per acre. A bed of Bersialie grass gave a result equal to £12. per acre per annum. The yield of Cow Gras was at the rate of £26 per acre per annum. The success was however transitory, as might have been anticipated the salt began to rise under solar influence from this and other causes the expected crops were destroyed The ground had been treated with sewage and there was no drainage.

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an enquiry was instituted when "It clearly came out that the main "cause of our want of success lay in "the sub soil water remaining too "near the surface". On this discovery having been made, the ground was broken up to a depth of 18 inches, and drained every six feet with pipes four feet under the ground level, (a greater distance and a greater depth might have been better) On this ground where nothing would grow an excellent crop of gras was obtained "with marvellous rapidity". and so the problem was solved. "Adequate drainage makes success "certain and the Shoolay Farm is "now a commercial as well as a "Sanitary success".

The crop from 2¼ acres sells for £90 per annum and the establishment charges which would cover the whole area of the farm (12 acres) if under cultivation amounted to £66.

But there is not sufficient sewage "Our difficulty now is in the sewage

" not

"not in the soil."

19. The Kistnampetet farm is situated partly on sea blown sand close to the shore partly on an old rubbish bed covered with sand.

About two acres have been under sewage cultivation.

The soil is very porous, and requires a large amount of sewage. The area has yielded an average of 800 lbs of grass a day for the whole year.

The annual value of the produce at the lowest selling rate is £120 and after paying charges the profit is £60 per annum for the cultivated area.

20. After this experience with sewage cultivation on soils of the most opposite character. Mr. Gover was fully justified in his conclusion "that the whole "sewage of Madras may safely "economically and profitably be utilized "on sewage farms"

21. In 1869, the Madras Govt. stated that the earth deodorized the sewage as soon as it touched it, and Mr Gover says that "nothing has since "arisen to modify these views though "much to strengthen them."

The Madras drainage question hence admits of an entirely satisfactory solution.

22. Madras has now received by the works of Mr. Standish Sec^y. the great boon of a water supply brought from a distance. It is collected in reservoirs at Chiverum and Red Hills whence it is conveyed to Madras. by gravitation with a maximum head of water of 30 feet The delivery is estimated at 40 gallons per head per diem of the population at a cost of £130,000.

There are seven miles of open channel through a thinly peopled Country and thence the water enters a trunk main beginning at 42 inches in diameter and extending about 2½ miles going off branches in its course.

23. The following special arrangements in the water supply works may be noticed.

Provision has been made for draining off the supply a little below the

the water surface of the Tanks, in order to avoid ground impurities.

The water after issuing from the Tank is allowed to fall over a few steps to airate it, after which it is passed through a Vertical filter to strain it. After running along the open channel on arriving at the Madras Terminus the water passes through 12 Copper wire gauze strainers 60 meshes to the inch, before entering the main. Several methods of distribution are under trial.

(1.) Having masonry cisterns with taps to contain a day's supply for the neighbourhood and an arrangement for filtering the water before it runs from the taps.

(2.) Cast Iron fountains with filtering arrangements.

(3.) Dip wells have been condemned in practice for obvious reasons and will not be used.

(4.) Water saving taps will be used Kennedy's taps have been under trial and are highly spoken of.

24. Mr. Lee points out that his system

system differs from that in use in England, in that only the water drawn for domestic use is filtered while all the other water for irrigation, bathing places, and watering, flushing &c will be unfiltered.

Unfortunately no analyses of the new water are given in the report but it is satisfactory to learn that there has been no difficulty about it on the part of the people. Mr. Lee says "that "wherever the Red Hill water has been "delivered it has been most acceptable "to all class of the community, and people "often go a mile and more to fetch it."

25 Looking at the large increase of moisture which this new water will throw into the subsoil and the additional Malaria likely to arise from it we entirely concur in the municipality report that it is "of "vital importance to the people that "the consideration of a proper drainage "scheme for Madras should not be "delayed even a single day."

We are glad to see that a Committee has been appointed for

for this object.

26. Mr. Gover's report shows that the Sanitary staff have done good service during the year.

Upwards of 107 miles of side drains were constructed and 216,000 tons of garbage were collected and removed out of Madras, besides other work.

27. An instance of successful Sanitary administration connected with reconstruction of dwellings may be cited as an example to other Indian communities.

Mr. Gover states that in 1871-2 within municipal limits there were more than 100 parcheries (villages occupied by outcasts) without either road or drain in them.

The Abominations in them were beyond description.

Two of the worst of them were so bad that nothing but entire rebuilding would bring a remedy.

A meeting of the people was called and after some trouble an agreement was arrived at, and properly planned and arranged houses were constructed. One Village was completed at the date of the Report and the roads were gravelled and drained.

In this way 1,000 people were provided with decent wholesome dwellings at a Cost of £60 to the Municipality.

The habits of the poor people underwent an immediate improvement, and although Cholera and Small Pox ravaged the unimproved Villages close at hand "there has been not "a single case of cholera or Small "Pox in this parcherry since it was "remodelled".

This is surely a hopeful experience for natives. As regards Europeans, if they will only live in accordance with the Sanitary requirements of the climate Mr. Gover shews that "good lives" among Europeans in India are now on a par with "good lives" in England.

28. In conclusion while expressing regret that the public service has lost so efficient an Officer, we cannot but hope that the active Sanitary Administration which has been called into existence and has proved

proved its vitality by its works will be supported by the Government and by the municipality until Madras is completely drained and its sewage applied to agriculture, its population supplied with water and its worst districts reconstructed not forgetting the improvement of the Coom without which the work will be incomplete.

(Signed) J. S. Frederick
Secretary

Army Sanitary Commission
War Office
29th January 1874

B/E 555

INDIA OFFICE

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India Office
26th March 1874

Sanitary
No 3.

London

My Lord,

With reference to the Despatch of Your Excellency in Council dated the 30th June No 22 of 1873 forwarding the Annual Report of the Municipality of Madras for the year 1871-72 I was directed by your Excellency's Government to transmit for your consideration

† To be sent herewith 27/3/74

† dated 29 January 1874

His Excellency
The Right Honorable
The Governor in Council
Fort St George

consideration and for the adoption of such measures as may appear to you desirable, copy of a Memorandum by the Army Sanitary Commission.

2 I concur with the Commission as to the high Estimate which it has formed of the value of the late Mr. Gore's services, and I trust that the exertions of your Excellency's Government and of the Municipality will never be relaxed while the City of Madras is thoroughly drained.

I have the honour to be
My Lord
Your Lordship's most
obedient humble Servant

Financial 1874 Dept.

No. 2.

Sanitary

26th March 1874

Letter to Fort St George

No 3.

Rd 20/4/74.

R 935

Rotaid 25 April 1874 No 697.

Communicated to the President of the Madras Municipal Commission, who will report what is the precise position of this drainage project.

To the President of the Madras Municipal Commr.

— " - Sanitary Commissioner

— " - Public Works Department

25/4/74

With ad[illegible]

Transmits copy of Genl. by the Army Sanitary Commr. on the annual report of the Madras Municipality for 1874. Concurs with the remarks as to the high estimate formed of the late Mr Francis Services to Madras and the sanitary of the Madras Corpn. & of the Municipalities will never be relaxed until the city of Madras is quite drained