

is one which merits the attention of the Sanitary Engineer's Department as early as feasible. The giving of a protected supply to the population being a matter of urgent sanitary necessity, I trust Government will be pleased to make all possible concessions. The condition of the inhabitants is pitiable in the extreme, in reference to the notorious prevalence of *C* chin leg or elephantiasis; possibly every tenth adult is affected with this disease.

(e) The connection between elephantiasis and an unprotected water-supply has long been fully proved by the researches of Dr. Manson. Believing, as I do, that it is little use advising people to do things, especially in connection with sanitation, unless they comprehend the *why* and *wherefore* of the advice, I extract from Dr. Manson's last treatise on the subject the following for the information of the council. I may state that the views of Dr. Manson have been supported in this Presidency by the exposure during the course of operations of the parent worm *in situ* by Surgeon-Major Maitland:—

"The habitat of the parent *filaria* is proved to be in the majority of instances, if not in every case, the lymphatic system."

"It is possible that several species of mosquito are efficient intermediary hosts; but, certainly, all species are not qualified for this role."

"... Briefly, the principal steps are as follows:—The mosquito, after piercing the skin with its proboscis, pumps the blood containing *filariæ* into its stomach. Arrived there, the parasite, after casting its sheath, penetrates, by means of the formidable cephalic armature I have already described, the walls of the stomach, and works its way in the course of a very few hours into the thoracic tissues of the insect. ... About the end of the sixth day of its stay in the mosquito, the *filaria* has become a formidable-looking object as seen through the microscope."

"... When the *filaria* has arrived at this stage in its development, it is time for the mosquito, in the usual course of events, to die. Dying, she falls into the water. Any *filariæ* she may have fostered have now an opportunity to escape into that element for a temporary life in which the metamorphosis they have just passed through has qualified them."

"... Having arrived in this way in the human stomach, it works its way through the tissues of its definitive host, and, guided by that strange instinct which pilots so many parasites to their final habitat, comes to rest at last in some lymphatic vessel. Here it continues to grow and mature. Finally, being joined by

It has been ascertained by a rough enumeration lately made, that about 3 per cent. of the population of this municipality are affected with the disease. The large numbers noticed are mostly coolies who flocked to the town for work from the Cchin State and other places.

one of the opposite sex, impregnation ensues. Its young after a time are poured into the lymph stream; thence into the blood; so completing the life cycle and starting a new generation of filariae."

" . . . Through the kindness of Surgeon-Major Eleum, I received 88 slides of night blood taken from 88 natives of Cochin. In 21 of these slides I found *F. Nocturna* in great abundance."

"*Prophylaxis*.—The knowledge we already possess of the life history of *F. Nocturna* enables us to indicate with precision the proper steps to take to prevent its entry into the human body; and our knowledge of the pathology of the diseases it gives rise to enables us to indicate means which may contribute to prevent the development of these diseases, and to mitigate their efforts when they do arise."

"The time may come when communities shall endeavour to protect themselves against the ravages of this parasite; the methods they shall then employ will have reference principally to water-supply. A pure water-supply, uncontaminated by mosquitoes, is the first essential; given that, the elephantoid diseases and elephantiasis will disappear from a community. Tank water or stagnant water of any kind ought not to be used for drinking purposes; wells and reservoirs ought to be protected by a fine-meshed netting or effective cover of some sort to keep out mosquitoes; vessels used for storing water must be frequently emptied, cleaned, and always kept covered up; drinking water, unless beyond suspicion, ought to be boiled or filtered. Persons known to harbour the filaria ought to be looked on as sources of danger to the community, and shunned or compelled to sleep under suitable mosquito curtains. By these means *F. Nocturna* could be stamped out, and the diseases it causes made matters of history. Their ultimate disappearance is entirely a matter of personal and municipal education—in other words, of civilisation. It is too early in the day, and somewhat optimistic, to look for special efforts on the part of Governments in this direction, but if any municipal or other body is in want of one more argument of a pure water-supply, here is one ready made to their hands."

Now, a perusal of this statement will show the council that the way to prevent elephantiasis is simply to protect the water from mosquitoes—apparently of a species peculiar to certain localities—falling into the drinking-water. Now, mosquitoes undoubtedly flourish in the midst of soil damp with sewage or in stagnant collections of it. Hence, to drink water that has flowed over sewage-laden ground, as is the case with the tank water of parambas, or to store water in vessels near such collections, or to take water from open wells, are the correct ways to invite the entrance

Super

of the organisms into the system. Neither open tanks nor open wells should therefore be used. Where water is obtained from suspicious sources, it should be boiled before use, and not be left exposed subsequently.

(f) Following these principles, therefore, the free use of tube wells would probably be the simplest method of temporarily meeting the local peculiarities. In five spots at least within the town, good water is said to be found. Tube wells should be sunk in the neighbourhood of these. The council will find a full description of the uses of these wells in G.O., dated 21st October 1890, No. 2708 L. They are very cheap*, as after paying for the sinking apparatus the sum of, say, Rs. 450, each well sunk (an operation that could be effected in Cochin in twenty minutes) would not cost more than Rs. 80—Rs. 100. Beyond the thickly-inhabited portions in the parambas, it would be well for the municipality to sink these wells at such frequent intervals as will prevent the distance to bring water being regarded as an important factor. The surface tanks in parambas should then be closed, as it would not meet requirements if this exposed water were still used for the inferior purposes of washing eating and drinking vessels. If this mode cannot be afforded, the next best course would be to persuade the inhabitants of parambas to sink pot-wells near their surface tanks, and provide these with lids that can be kept shut except when water is being actually drawn. This ought to prove a very cheap procedure. By these measures the people would be able to tide over the period of waiting for a public scheme. It might be argued that it would be useless to go to the expenditure in view of the advent of a permanent scheme; but this would amount to the council consenting in the meantime to the infection of a large number of persons who have hitherto escaped the life-long misery of elephantiasis.

6. *Conservancy.*—(a) For rubbish removal, wheelbarrows are employed. The carrying capacity of these wheelbarrows might be improved, without causing too great a weight to be borne, by placing an iron wire frame around the top, sloping outwards, after the style of a hay cart.

* These could be lifted and sold on the water-scheme being carried out by the Sanitary Engineer's Department—W.G.K.

As sinking of tube wells cannot at present be afforded, the other course suggested will be considered at an early date.

Steps will be taken to carry out the suggestion as far as possible.

Inspector

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Inspection Notes.

As there is no likelihood of rubbish becoming saleable in this locality, I think the best course the municipality could pursue is to use the cremation system. Mr. Roberts, of Messrs. Burn and Co., has lately devised an incinerator that would, I think, from personal inspection of its working, meet the requirements of the municipality as to cost, safety and rapidity in consumption.

(b) There are nineteen moveable metal dust-bins besides two of wood. I would advise the municipality to use sections 219 and 220, and insist upon the people having ready at a fixed hour a separate receptacle of an uniform pattern to be determined by it.

(c) *Night-soil Conservancy.*—Two latrines are placed along the Kalvetty channel, so that defecation takes place direct into the water. As the ebb leaves the sewage sediment exposed, it is not desirable that this mode should be further pursued. On the same principle, latrines are built by the municipality, so that discharge can occur into the backwater. I can see no objection to this, provided defecation takes place at a spot so distant from the shore that it will not be uncovered by the receding of the tide. Considering the small amount of faecal matter likely to be thus disposed of, and the large volume of water subject to ebb and flow at this point, I think it safe to ignore the possibility of faecal matter being washed on shore. The pattern of latrines now used for this purpose is, however, very poor, irrespective of the fact that they are at present in very bad repair. By the addition of a pump and small storage cistern attached to each latrine, it ought to be possible to secure a good form of flush water-closet washing faecal matter from the latrine automatically into the sea. Possibly, it would be cheap to float the latrines on pontoons. On these points the council should consult the Sanitary Engineer. In Chedlai, the same practice is observed, and is open to objection on the same ground as in the case of the Kalvetty channel.

(d) The present number of latrines is far too small. Action should be early taken to increase the number.

(e) The provision of one night-soil cart and one bucket for the whole population is absurd; but the Chairman informs me that extra carts have been ordered.

Chairman's Remarks.

(Descriptive pamphlet enclosed.)

The sweepings of private houses are removed to the dust-bins by the house owners themselves and they are removed therefrom by municipal sweepers to depôts provided for the purpose.

These latrines will be removed and the suggested improvements to the latrines on the backwater will be considered and the opinion of the Sanitary Engineer invited on the point.

The number of latrines will be increased.

Six additional iron carts have since been provided.

9

Gopmth

(f) *Private Conservancy.*—Of a total of 2,570 occupied houses, only 277 are attended to by the municipality under this system. Every effort should be made to extend this method. Not only can sanitary requirements be thus best subverted but the method is economical in that the people pay for the establishment and the erection of expensive public latrines and expenditure for the staff required to work them are saved. I would advise the councillors to go systematically to house after house in their respective wards and endeavour their best to make people accept this mode, and, failing their adopting this or other reasonable means for maintaining cleanliness in their dwellings, to take steps under sections 207 and 221.

This will be attended to.

7. *Markets.*—(a) *Fish Market, Kalvetty.*—This is a mere tiled verandah; the floor is of gravel; no drain is provided; the surrounding surface is irregular; there is no water-supply at hand.

It is in contemplation to generally improve all the markets.

(b) *Fish Market, Amaravathy.*—This is a gravel platform provided with a roof; there are no drains; the surroundings are soaked with filth; the sellers squat in the enclosure.

The municipal fish market at Kalvetty is situated on the margin of the river and is well supplied with water. The two other fish markets are supplied with the required water from the neighbouring tanks by the lessees.

(c) *Municipal Fish Market.*—This is a platform with a roof; the floor is of gravel; no drain is provided; there is no water-supply.

(d) *Beef Market.*—This is an ordinary bazaar shop with a verandah. No drains are provided; the floor is earthen.

(e) *Mutton Market.*—This is a building provided with rough planks for a flooring.

8. *Slaughter-houses.*—All are private. It is unnecessary to describe them. They all fail to fulfil sanitary requirements.

9. From the above, it is evident that, both in the matter of markets and slaughter-houses, Cochin is behind the age. It would be advisable to erect a proper slaughter-house on a correct plan, as well as a general market. Both these investments imply, not only better safety, but an increase to the municipal income. I advise that plans for both be secured from the Sanitary Board.

The establishment of a public slaughter-house is under consideration. The Sanitary Engineer will immediately be consulted with regard to the plan and specification.

10. *Vaccination* is conducted by First-class Vaccinator K. Manivakko. The cases are not verified by the Civil Surgeon. In view of the fact that in doing local

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Pope

Inspection Notes.

Chairman's Remarks.

found work lately, the vaccinator was detected in falsifying cases, I would advise that his work be carefully verified. There ought to be no difficulty in effecting this if the rules laid down in G.O., No. 1502 M., dated 19th October 1894, be worked correctly.

The rules laid down in the Government order quoted are now being carried out.

Total births during preceding six months, i.e., from 1st July to 31st December 1893.	Number vaccinated.		Number vaccinated a second time because first operation proved unsuccessful.		Postponed under medical certificate at the end of six months.	Died.	Left the town.	Unaccounted for.	Ratio and successful vaccinations to total births per cent.
	Successfully.	Unsuccessfully for the first time.	Successful.	Unsuccessful.					
271	49	..	..	..	89	26	40	61	15.03

1 1/2

Registration.—The people rarely come to office for declaration of births and deaths, unless directed personally to do so by the overseers who search for cases. Yet, there has been no prosecution under the compulsory clauses during the last fifteen years. Under such a system, many events must escape registration. The requirements of the law should be proclaimed by tom-tom at intervals, and boards notifying the clauses of the Act should be placed on various conspicuous places in the town. After this, prosecution should be resorted to when persons fail to appear at the office without warning. The following are the results secured during the last three years :—

Is being done.

Years.	Ratio of births per mille of estimated population.	Ratio of deaths per mille of estimated population.	Percentage of deaths from						Ratio of deaths of infants under one year of age per mille to registered births in the preceding year.	Ratio per mille of deaths of infants between one and five years of age to population of that age.
			Cholera.	Small-pox.	Fevers.	Dysentery and diarrhoea.	Injuries.	Other causes.		
1892	31.1	47.3	3.2	38.2	5.5	10.4	0.1	42.6	199.3	96.0
1893	31.5	27.9	12.4	5.7	11.7	13.2	0.8	56.2	153.3	28.9
1894	32.5	37.4	35.3	1.7	8.5	8.0	1.0	45.5	164.0	39.9

Sanitary Administration.—The part of Cochin under the rule of the Rajah is a continuation of the British Cochin Municipality. It is obvious that the sanitary precautions taken on one side must be in great part depreciated in value by inaction on the other. I therefore think it is desirable that the highly insanitary state

Inspection Notes.

of the adjoining portion of the independent territory should be represented to the Government of the Rajah, with the object of advising that a municipality or other form of administration that will permit of better hygienic measures being pursued should be appointed.

(Sd.) W. G. KING, Surgn.-Lt.-Col.,
Ag. Sanitary Commissioner.

FORT ST. GEORGE,
9th February 1895.

CAMP, CANNANORE,
29th April 1895.

Chairman's Remarks.

It is stated that the inauguration of a municipality in the adjoining portion of the Cochin State is in contemplation,

(Sd.) S. LOCKE,
Chairman.

COCHIN,
20th April 1895.

Forwarded.

(Signed) H. MOBERLY,
Ag. Collector.

S.
P.S.

Order 4/10-6-95 No. 960 M.P.S.

Records with the following
Remarks:—

2 (1) The action which the
Municipal Council proposes to
take to remedy the defects
noticed in paragraph 1 (a)
the latter portion of paragraph
5 (b) of the inspection notes
should be reported.

4 (2) The attention of the Sani-
tary Commissioner will be drawn
to paragraph 2 of the Chairman's
letter.

S.H.
2/1/95 C.H.
S.H.

4 (3) Steps should be taken to extend the
private scavenging system and to
improve the system of registration without
delay

To The Chairman, M.C. Cochin
" Collector of Malabar
" Sanitary Commissioner
" Sanitary Engineer
Editors' Table. 2/1/95

2/30/5

(with order)

10TH JUNE 1895, No. 960 M., LOCAL AND MUNICIPAL.

GOVERNMENT OF MADRAS.
LOCAL AND MUNICIPAL DEPARTMENT.

READ—the following paper:—

From S. LOCKE, Esq., Chairman, Municipal Council, Cochin, to the Chief
Secretary to Government, dated 20th April 1895, No. 95.

With reference to G.O., dated 23rd December 1893, No. 1765 M., Local and
Municipal, I have the honour to forward the Sanitary Commissioner's Notes on his late
inspection of the Cochin Municipality, with my comments and replies thereon, which
have been approved of by the municipal council at its meeting held on the 10th
instant.

2. The diagram promised in paragraph 5 (b) of the Notes has not yet been
received.

ENCLOSURE.

INSPECTION Notes of the Sanitary Commissioner, Madras.

MALABAR DISTRICT.

COCHIN MUNICIPALITY.

Inspected 24th to 26th November 1894.

Population as per census of 1891	Males.	Females.	Total.
.. ..	9,379	8,222	17,601

Inspection Notes.

Chairman's Remarks.

Site.—The town is but little above sea
level. The sub-soil water level is at
about from two feet to five feet.

2. Dwellings.—Although in parambas
the perforation is all that can be required,
there are certain places within the town
that are dangerously over-crowded. For
example, in Kalvetti, the buildings erected
by Kadir Haji require revision. They are
built face to face, so as to prevent per-
foration. In this small block, last year
during the cholera epidemic, in 24 families
there were 30 attacks and 22 deaths. Although
arrangements were made to get the people
water from a locality where there was no
cholera, they evidently suffered from the
disability of being allowed to continue the
use, for inferior domestic purposes, of a well
that was at the time of my visit surrounded
with sewage. A tube well should be sunk

S.
P.S.

PR
Order 4/10-6-95 12960/1895

Cochin

Recorded with the following
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P.R.
5/1/95
S.V.

To the Chairman, M.C. Cochin
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" Sanitary Commissioner
" Sanitary Engineer
Editors' Table.
2/1/95

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Inspection Notes.

here, and the old well be closed permanently. Section 156 would probably meet requirements. The enclosed space should be correctly drained, and sewage removal be arranged for. One or two houses should be removed, so as to permit of air entering the enclosure; or, at least, the existing passage, which is built over, should be opened up its entire height, and be increased in breadth (section 187).

3. *Roads*—The roads are repaired with laterite brought from a distance of 16 miles. I understand near the same locality a good stone is found suitable for road-metal. If the municipality have to go to the expense of transporting material so great a distance, it would give them a better return for their investment if they chose that having the longer life. Stone metal solely should be employed. As an instance of the better wearing powers of stone when compared with laterite, I would advise attention to Princes' Street, which was laid with metal 15 years ago and has not been repaired since this date. It is still in good condition.

4. *Drainage*.—(a) *Surface Drainage*.—Much of the surface water is purposely arrested by the inhabitants in small tanks. These are found more or less in each paramba.

(b) *Sewage Removal*.—There are 25 streets having drains which convey sewage towards the sea or the backwater. They are built at very bad levels, and by reason of their imperfect structure doubtless permit of much of the sewage escaping by soakage. Those near the sea permit of the ebb and flow of the tide.

(c) These imperfect methods, however, can effect little in removing the total sewage of the population. The majority of it is simply thrown upon the ground in close proximity to the surface water tank used for drainage, or flows into large collections of water such as the Kalvetti canal. Taking into consideration the water-logged condition of the sub-soil, it is obvious that purification of sewage in its descent to join the sub-soil must be handicapped more than in ordinary towns.

(d) Messrs. Volkart Brothers discharge the washings of cocoanut-oil barrels and other trade articles into the public drain near their factory. This is unfit for the purpose. This firm should be required to make special arrangements for

Chairman's Remarks.

Will receive attention.

The Sanitary Commissioner must have been mis-informed. This road has often been repaired since it was macadamised. It may also be mentioned that the metal referred to is not only very expensive but great difficulty would be experienced in getting it down, as the quarries are situated far inland, whereas laterite (which is used for road-making throughout the Cochin State) can be obtained at the very sides of the backwater.

The firm will be required to do the needful in the matter.

Inspection Notes.

Chairman's Remarks.

disposal of their sullage water, either by securing discharge by special drains into the sea, or into an impervious, ventilated and trapped cesspool, the contents of which should be emptied into the sea at intervals.

(e) In Chellai, the people are particularly unhealthy. The soil is subject to the tidal influence of a channel which fluctuates from 1 to 1½ feet. This fluctuation affects the sub-soil water except in certain spots where, the soil being firm, permeation and retirement of the water cannot be carried on rapidly. This channel should be filled in with clean material. I understand the filling of the Iruveli swamp is under contemplation. This will be a useful work. In the event of the municipality employing incineration for the disposal of their rubbish, it will have the advantage of having safe material to fill tanks with in the form of the "clinker" produced.

5. *Water-supply*.—(a) The question of water-supply of this town is one that has been very long under discussion. With the exception of five wells, the whole yield brackish water. Hence, it has been necessary to obtain water from 15 miles distance by boats from the river Alwaye. The actual site from which the water is obtained is said to be occupied by a village where the Jews yearly proceed for an outing and where bathing is freely indulged in. I had not time at my disposal to visit this locality; but it is desirable that it should be inspected. I advise that the Civil Surgeon take an early opportunity of visiting the place. The position from which the water is taken for the population should be definitely appointed, with regard to possible sources of contamination of the water from this inhabited area.

(b) Various suggestions have, year after year, been made as to improving the water-supply of Cochin. The recommendation of Surgeon-General Cornish to utilize the rain water by using the roofs of houses as collecting surfaces was one that ought to have gone a long way towards ameliorating the conditions found; but it was put into execution by the council in a half-hearted manner. The municipality simply invested in a few old iron tanks that were disposed of by a local firm as unserviceable. Into these the water from

Will be seen to.

The Civil Surgeon will be requested to visit Alwaye and appoint a place from which the water should be taken. During the monsoon months, however, it would be almost impossible to exercise any supervision as the water boats cannot go very far up the Alwaye river.

These tanks were purchased long before the majority of the present councillors came into office. I understand, however, that although the tanks were not exactly new at the time of purchase, they were serviceable, and this is evident from the fact that very many of them are still in use.

Inspection Notes.

the roofs of individual houses was led by piping of inappropriate dimensions and material and so placed as to neglect to secure the full amount from the catchment area. To work this system properly, suitable houses having good impervious roofs should have been completely surrounded at the eaves with ordinary rain water half-pipes, and either by treating them individually or in groups, arrangements should have been made to lead the water thence, not to iron tanks exposed to the heat of the sun, but to underground, impervious, dark and deep reservoirs. In passing to these reservoirs, the rain water should have been made to run the gauntlet of "rain separators." These are devices for permitting of the first washings from a collecting surface passing and subsequently permitting it to proceed to the storage tank (see diagram). The cost of these is about £1-10-0. Each underground storage tank should have also a small catchpit and a filter. Rain water collected with care in this manner would be most valuable; but, for reasons afterwards stated as to the prevalence of elephantiasis, it would form an unsafe source if the first washings were not discarded and filtration subsequently practised. Pending the completion of a large public scheme by the Sanitary Engineer's Department, the application of these principles to the large Dutch houses in the neighbourhood of the church and the utilization of the open space in its vicinity for the placing of one or more reservoirs would be of utility.

(c) In 1887, the sinking of a deep or artesian well was advised by Surgeon-Major Dymott. A boring has been sunk by the Sanitary Engineer's Department 325 feet. The result has been the striking of water which, speaking without analysis, is said to be fairly potable. For some months after the south-west monsoon the water overflowed at the surface. Unfortunately, further progress has been stopped on account of accident to the boring tools. The result so far was most encouraging.

(d) The Assistant Sanitary Engineer to Government has also proposed a scheme for bringing water from the Ernacolum side of the backwater where good water is said to be found. The scheme is a bold one and deserves success, but has not yet been discussed fully. The whole question

Chairman's Remarks.

The water has since been analysed and pronounced to be bad.

Inspection Notes.

Chairman's Remarks.

is one which merits the attention of the Sanitary Engineer's Department as early as feasible. The giving of a protected supply to the population being a matter of urgent sanitary necessity, I trust Government will be pleased to make all possible concessions. The condition of the inhabitants is pitiable in the extreme, in reference to the notorious prevalence of Cochin leg or elephantiasis; possibly every tenth adult is affected with this disease.

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"The habitat of the parent filaria is proved to be in the majority of instances, if not in every case, the lymphatic system."

"It is possible that several species of mosquito are efficient intermediary hosts; but, certainly, all species are not qualified for this role."

"... Briefly, the principal steps are as follows:—The mosquito, after piercing the skin with its proboscis, pumps the blood containing filariae into its stomach. Arrived there, the parasite, after casting its sheath, penetrates, by means of the formidable cephalic armature I have already described, the walls of the stomach, and works its way in the course of a very few hours into the thoracic tissues of the insect. ... About the end of the sixth day of its stay in the mosquito, the filaria has become a formidable-looking object as seen through the microscope."

"... When the filaria has arrived at this stage in its development, it is time for the mosquito, in the usual course of events, to die. Dying, she falls into the water. Any filariae she may have fostered have now an opportunity to escape into that element for a temporary life in which the metamorphosis they have just passed through has qualified them."

"... Having arrived in this way in the human stomach, it works its way through the tissues of its definitive host, and, guided by that strange instinct which pilots so many parasites to their final habitat, comes to rest at last in some lymphatic vessel. Here it continues to grow and mature. Finally, being joined by

It has been ascertained by a rough enumeration lately made, that about 3 per cent. of the population of this municipality are affected with the disease. The large numbers noticed are mostly coolies who flocked to the town for work from the Cochin State and other places.

Inspection Notes.

one of the opposite sex, impregnation ensues. Its young after a time are poured into the lymph stream; thence into the blood; so completing the life cycle and starting a new generation of filariae."

"... Through the kindness of Surgeon-Major Elcum, I received 88 slides of night blood taken from 88 natives of Cochin. In 21 of these slides I found *F. Nocturna* in great abundance"

"*Prophylaxis*.—The knowledge we already possess of the life history of *F. Nocturna* enables us to indicate with precision the proper steps to take to prevent its entry into the human body; and our knowledge of the pathology of the diseases it gives rise to enables us to indicate means which may contribute to prevent the development of these diseases, and to mitigate their efforts when they do arise."

"The time may come when communities shall endeavour to protect themselves against the ravages of this parasite; the methods they shall then employ will have reference principally to water-supply. A pure water-supply, uncontaminated by mosquitoes, is the first essential; given that, the elephantoid diseases and elephantiasis will disappear from a community. Tank water or stagnant water of any kind ought not to be used for drinking purposes; wells and reservoirs ought to be protected by a fine-meshed netting or effective cover of some sort to keep out mosquitoes; vessels used for storing water must be frequently emptied, cleaned, and always kept covered up; drinking water, unless beyond suspicion, ought to be boiled or filtered. Persons known to harbour the filaria ought to be looked on as sources of danger to the community, and shunned or compelled to sleep under suitable mosquito curtains. By these means *F. Nocturna* could be stamped out, and the diseases it causes made matters of history. Their ultimate disappearance is entirely a matter of personal and municipal education—in other words, of civilisation. It is too early in the day, and somewhat optimistic, to look for special efforts on the part of Governments in this direction, but if any municipal or other body is in want of one more argument of a pure water-supply, here is one ready made to their hands."

Now, a perusal of this statement will show the council that the way to prevent elephantiasis is simply to protect the water from mosquitoes—apparently of a species peculiar to certain localities—falling into the drinking-water. Now, mosquitoes undoubtedly flourish in the midst of soil damp with sewage or in stagnant collections of it. Hence, to drink water that has flowed over sewage-laden ground, as is the case with the tank water of parambas, or to store water in vessels near such collections, or to take water from open wells, are the correct ways to invite the entrance

Chairman's Remarks.

Inspection Notes.

of the organisms into the system. Neither open tanks nor open wells should therefore be used. Where water is obtained from suspicious sources, it should be boiled before use, and not be left exposed subsequently.

(f) Following these principles, therefore, the free use of tube wells would probably be the simplest method of temporarily meeting the local peculiarities. In five spots at least within the town, good water is said to be found. Tube wells should be sunk in the neighbourhood of these. The council will find a full description of the uses of these wells in G.O., dated 21st October 1890, No. 2708 L. They are very cheap*, as after paying for the sinking apparatus the sum of, say, Rs. 450, each well sunk (an operation that could be effected in Cochin in twenty minutes) would not cost more than Rs. 80—Rs. 100. Beyond the thickly-inhabited portions in the parambas, it would be well for the municipality to sink these wells at such frequent intervals as will prevent the distance to bring water being regarded as an important factor. The surface tanks in parambas should then be closed, as it would not meet requirements if this exposed water were still used for the inferior purposes of washing eating and drinking vessels. If this mode cannot be afforded, the next best course would be to persuade the inhabitants of parambas to sink pot-wells near their surface tanks, and provide these with lids that can be kept shut except when water is being actually drawn. This ought to prove a very cheap procedure. By these measures the people would be able to tide over the period of waiting for a public scheme. It might be argued that it would be useless to go to the expenditure in view of the advent of a permanent scheme; but this would amount to the council consenting in the meantime to the infection of a large number of persons who have hitherto escaped the life-long misery of elephantiasis.

6. *Conservancy*.—(a) For rubbish removal, wheelbarrows are employed. The carrying capacity of these wheelbarrows might be improved, without causing too great a weight to be borne, by placing an iron wire frame around the top, sloping outwards, after the style of a hay cart.

* These could be lifted and sold on the water-scheme being carried out by the Sanitary Engineer's Department—W.G.K

Chairman's Remarks.

As sinking of tube wells cannot at present be afforded, the other course suggested will be considered at an early date.

Steps will be taken to carry out the suggestion as far as possible.

Inspection Notes.

As there is no likelihood of rubbish becoming saleable in this locality, I think the best course the municipality could pursue is to use the cremation system. Mr. Roberts, of Messrs. Burn and Co., has lately devised an incinerator (Descriptive pamphlet enclosed) that would, I think, from personal inspection of its working, meet the requirements of the municipality as to cost, safety and rapidity in consumption.

(b) There are nineteen moveable metal dust-bins besides two of wood. I would advise the municipality to use sections 219 and 220, and insist upon the people having ready at a fixed hour a separate receptacle of an uniform pattern to be determined by it.

(c) *Night-soil Conservancy.*—Two latrines are placed along the Kalvetti channel, so that defecation takes place direct into the water. As the ebb leaves the sewage sediment exposed, it is not desirable that this mode should be further pursued. On the same principle, latrines are built by the municipality, so that discharge can occur into the backwater. I can see no objection to this, provided defecation takes place at a spot so distant from the shore that it will not be uncovered by the receding of the tide. Considering the small amount of faecal matter likely to be thus disposed of, and the large volume of water subject to ebb and flow at this point, I think it safe to ignore the possibility of faecal matter being washed on shore. The pattern of latrines now used for this purpose is, however, very poor, irrespective of the fact that they are at present in very bad repair. By the addition of a pump and small storage cistern attached to each latrine, it ought to be possible to secure a good form of flush water-closet washing faecal matter from the latrine automatically into the sea. Possibly, it would be cheap to float the latrines on pontoons. On these points the council should consult the Sanitary Engineer. In Chellái, the same practice is observed, and is open to objection on the same ground as in the case of the Kalvetti channel.

(d) The present number of latrines is far too small. Action should be early taken to increase the number.

(e) The provision of one night-soil cart and one bucket for the whole population is absurd; but the Chairman informs me that extra carts have been ordered.

Chairman's Remarks.

The sweepings of private houses are removed to the dust-bins by the house owners themselves and they are removed therefrom by municipal sweepers to depôts provided for the purpose.

These latrines will be removed and the suggested improvements to the latrines on the backwater will be considered and the opinion of the Sanitary Engineer invited on the point.

The number of latrines will be increased.

Six additional iron carts have since been provided.

Inspection Notes.

Chairman's Remarks.

(f) *Private Conservancy.*—Of a total of 2,570 occupied houses, only 277 are attended to by the municipality under this system. Every effort should be made to extend this method. Not only can sanitary requirements be thus best subserved but the method is economical in that the people pay for the establishment and the erection of expensive public latrines and expenditure for the staff required to work them are saved. I would advise the councillors to go systematically to house after house in their respective wards and endeavour their best to make people accept this mode, and, failing their adopting this or other reasonable means for maintaining cleanliness in their dwellings, to take steps under sections 207 and 221.

This will be attended to.

7. *Markets.*—(a) *Fish Market, Kalvetti.*—This is a mere tiled verandah; the floor is of gravel; no drain is provided; the surrounding surface is irregular; there is no water-supply at hand.

(b) *Fish Market, Amarávati.*—This is a gravel platform provided with a roof; there are no drains; the surroundings are soaked with filth; the sellers squat in the enclosure.

(c) *Municipal Fish Market.*—This is a platform with a roof; the floor is of gravel; no drain is provided; there is no water-supply.

(d) *Beef Market.*—This is an ordinary bazaar shop with a verandah. No drains are provided; the floor is earthen.

(e) *Mutton Market.*—This is a building provided with rough planks for a flooring.

8. *Slaughter-houses.*—All are private. It is unnecessary to describe them. They all fail to fulfil sanitary requirements.

9. From the above, it is evident that, both in the matter of markets and slaughter-houses, Cochin is behind the age. It would be advisable to erect a proper slaughter-house on a correct plan, as well as a general market. Both these investments imply, not only better safety, but an increase to the municipal income. I advise that plans for both be secured from the Sanitary Board.

10. *Vaccination* is conducted by First-class Vaccinator K. Manivakko. The cases are not verified by the Civil Surgeon. In view of the fact that in doing local

It is in contemplation to generally improve all the markets.

The municipal fish market at Kalvetti is situated on the margin of the river and is well supplied with water. The two other fish markets are supplied with the required water from the neighbouring tanks by the lessees.

The establishment of a public slaughter-house is under consideration. The Sanitary Engineer will immediately be consulted with regard to the plan and specification.

Inspection Notes.

fund work lately, the vaccinator was detected in falsifying cases, I would advise that his work be carefully verified. There ought to be no difficulty in effecting this if the rules laid down in G.O., No. 1502 M., dated 19th October 1894, be worked correctly.

Chairman's Remarks.

The rules laid down in the Government order quoted are now being carried out.

Total births during preceding six months, i.e., from 1st July to 31st December 1893.	Number vaccinated.		Number vaccinated a second time because first operation proved unsuccessful.		Postponed under medical certificate at the end of six months.	Died.	Left the town.	Unaccounted for.	Ratio of successful vaccinations to total births per cent.
	Successful.	Unsuccessful for the first time.	Successful.	Unsuccessful.					
271	49	..	..	..	89	26	46	61	18.08

Registration.—The people rarely come to office for declaration of births and deaths, unless directed personally to do so by the overseers who search for cases. Yet, there has been no prosecution under the compulsory clauses during the last fifteen years. Under such a system, many events must escape registration. The requirements of the law should be proclaimed by tom-tom at intervals, and boards notifying the clauses of the Act should be placed on various conspicuous places in the town. After this, prosecution should be resorted to when persons fail to appear at the office without warning. The following are the results secured during the last three years:—

Is being done.

Years.	Ratio of births per mille of estimated population.	Ratio of deaths per mille of estimated population.	Percentage of deaths from						Ratio of deaths of infants under one year of age per mille to registered births in the preceding year.	Ratio per mille of deaths of infants between one and five years of age to population of that age.
			Cholera.	Small-pox.	Fever.	Dysentery and diarrhoea.	Injuries.	Other causes.		
1892	31.1	47.3	3.2	38.2	5.5	10.4	0.1	42.6	199.3	96.0
1893	31.5	27.9	12.4	5.7	11.7	13.2	0.8	56.2	153.8	28.9
1894	32.5	37.4	35.3	1.7	8.5	8.0	1.0	45.5	164.0	39.9

Sanitary Administration.—The part of Cochin under the rule of the Rajah is a continuation of the British Cochin Municipality. It is obvious that the sanitary precautions taken on one side must be in great part depreciated in value by inaction on the other. I therefore think it is desirable that the highly insanitary state

Inspection Notes.

of the adjoining portion of the independent territory should be represented to the Government of the Rajah, with the object of advising that a municipality or other form of administration that will permit of better hygienic measures being pursued should be appointed.

(Sd.) W. G. KING, Surgn.-Lt.-Col.,
Ag. Sanitary Commissioner.

FORT ST. GEORGE,
9th February 1895.

Chairman's Remarks.

It is stated that the inauguration of a municipality in the adjoining portion of the Cochin State is in contemplation.

(Sd.) S. LOCKE,
Chairman.

COCHIN,
20th April 1895.

Forwarded.

CAMP, CANNANORE,
29th April 1895.

(Signed) H. MOBERLY,
Ag. Collector.

ORDER—dated 10th June 1895, No. 960 M., Local and Municipal.

Recorded.

2. The action which the municipal council proposes to take to remedy the defects noticed in paragraph 4 (b) and the latter portion of paragraph 5 (b) of the inspection notes should be reported.

3. Steps should be taken to extend the private scavenging system and to improve the system of registration without delay.

4. The attention of the Sanitary Commissioner will be drawn to paragraph 2 of the Chairman's letter.

(True Extract.)

J. F. PRICE,
Chief Secretary.

To the Chairman, Municipal Council, Cochin.

" Collector of Malabar.

" Sanitary Commissioner.

" Sanitary Engineer.

Editors' Table.

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LOCAL AND MUNICIPAL.

Issued

Recd.

Encl.

G.O., 10th June 1895, No. 960 M.

JUNE.

Inspection Notes.

Recording, with remarks, the Sanitary Commissioner's — on the Cochin Municipality.

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Inspection Notes

Recording, with remarks
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