

FURNELL, (M.C.)

CHOLERA AND WATER

IN

INDIA

BY

M. C. FURNELL, M.D., F.R.C.S.

COMPANION OF THE INDIAN EMPIRE; FELLOW OF MADRAS UNIVERSITY
LATE SURGEON-GENERAL AND SANITARY COMMISSIONER, MADRAS
ETC. ETC.



LONDON

J. & A. CHURCHILL

11, NEW BURLINGTON STREET

1887

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"I believe that water is the chief means by which cholera is spread, especially in India, and that it is on account of the peculiar treatment water obtains in that country, that India, the only country in the world, is subject to such frequently recurring and such terrible epidemics of this dread scourge."—*Vide Lecture, p. 14.*



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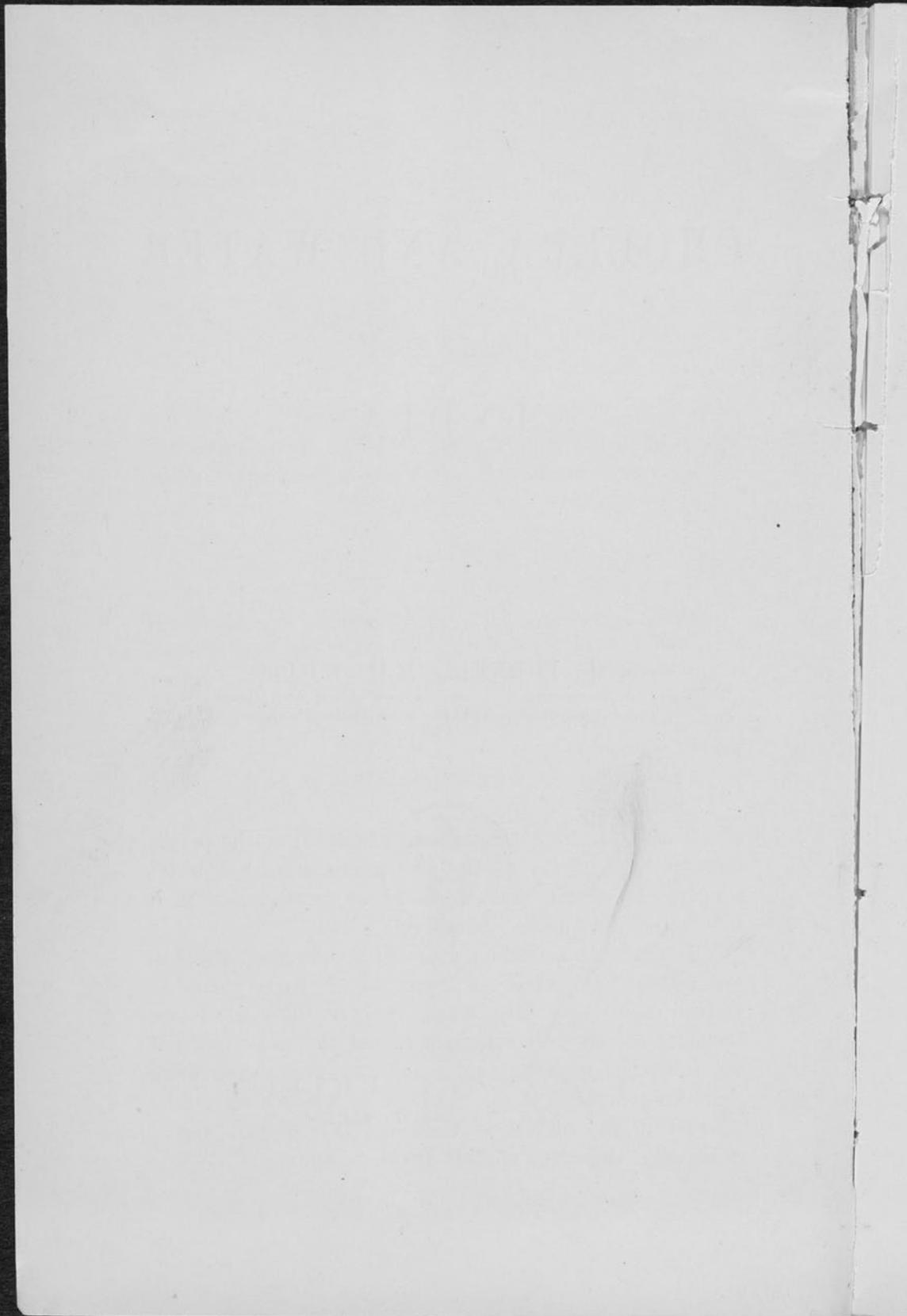


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P R E F A C E .

WE read in the papers, every now and then, some such announcement as the following, which I extracted, a few mornings ago, from the *Standard* :—

“THE CHOLERA IN INDIA.

“SIMLA, Aug. 15, 1887.

“Medical returns from the North-west Provinces show that seventy thousand persons died there from cholera during June and July, being one per cent. of the population.”

And the question immediately arises in the minds of practical people—

“Can nothing be done to put a stop to this?”

I answer—

“Yes! If the authorities would see that the people were provided with a pure and uncontaminated water supply, the cholera would disappear from India as it has from many parts elsewhere.”

The evidence on this point which presented itself to me during my career of upwards of thirty years in India, more especially when Sanitary Commissioner, seems to me so very convincing, and the importance of the subject is so great, that I feel prompted to republish some fragments of it, in the hope of awakening public interest in the matter; for cholera is a plague which, unhappily, does not confine itself to India.

The theory which has of late years found acceptance with the supreme Government of India, and which has been more or less authoritatively impressed on the minor Presidencies, is, that cholera is not spread by human intercourse or contaminated water, but is due to "*Local Influence.*" It is nowhere, however, explained what exactly we are to understand by "Local Influence"; and I confess that, to my mind, the term conveys no sort of meaning. It is about as clear as if cholera were said to be due to Acheron. But it is at present in India, "*by authority,*" the only "true faith," and woe to the Sanitary Commissioner or medical officer who publishes his belief in any other cause but "Local Influence." This is about as sensible as if Government were to pass an order that only the London doctors were to discuss, say, scarlet fever; the Faculty in Edinburgh and Dublin to hold their tongues.

The cure for this "Local Influence," we are further informed, in a work evidently published by authority, is "general sanitary arrangements."

Now "general sanitary arrangements" are all very well, and have my most cordial support; but I do not think they will ward off cholera any more than they will set a broken leg. A man with a fractured limb is none the worse for having his house whitewashed, and the general sanitary arrangements of his surroundings attended to, but, *quoad* his leg, he is no better; a sensible practitioner would scarcely expect a satisfactory union unless he applied splints.

So with cholera: whitewash the houses and clean up generally, by all means; but if the water supply is contaminated, or *open to contamination*, the inhabitants of the clean and whitewashed houses are not safe.

How water is open to contamination I have shown

at page 11 *et seq.*, and page 22 of a lecture delivered in Madras, and here in part republished; and, as there pointed out, the custom, common throughout India, and to which, no doubt, the previously mysterious spread of cholera is due, is totally opposed to the precepts laid down for the guidance of Hindus in the holy writings of their great lawgiver Menu.

The remedy seems very simple, and entails, as pointed out at page 43 *et seq.*, no useless or unnecessary expense. The question then immediately arises, Why not put the remedy into practice? and I confess I am at a loss to give an answer. The only answer which suggests itself to my mind is, that a pure water supply is in some mysterious manner opposed to "Local Influence."

That mere cleanliness, even scrupulous cleanliness, will not of itself protect from cholera, has been abundantly proven in our gaols. These institutions in the Madras Presidency, and I have no doubt in the sister Presidencies also, are models of cleanliness, and yet every now and then cholera makes its appearance in one or other of them.

In 1864, for example, cholera broke out in the district gaol of Cochin, and created sad havoc. The gaol was a scrupulously clean one. Across the Backwater, about five miles off, was the native prison of the Rajah of Cochin, a model of dirt and overcrowding, which entirely escaped.

Perhaps the most instructive instance on record is that by Surgeon-Major Henry Blanc, M.D., formerly of the Bombay Medical Service (now of Cannes), given in the *Lancet* of August 21st, 1875. The evidence on which it is there proven that the cholera epidemic was owing to a contaminated water supply, is worked out with rare skill and conclusiveness.

If the republication of the following papers, namely a lecture delivered in Madras in 1882, and a letter addressed to Government on sending in my last annual report as Sanitary Commissioner in 1885, should perchance awaken interest in the matter in the minds of any one able to influence the question for good, the object of the writer will have been attained.

CHOLERA AND WATER IN INDIA.

A Lecture delivered at Pacheappa's Hall, on April 1, 1882.

MR. CHAIRMAN, LADIES AND GENTLEMEN,—I propose this evening to offer a few plain practical remarks on water and its connection with the public health.

* * * * *

POPULATION AND EPIDEMICS.

This immense continent of India is subject to some terrible epidemics, such as cholera, fever, small-pox, etc. The most constant death-producer is fever. In all India there died during 1879 five millions of people, of whom fever killed three and a half millions, cholera killed off 265,000. In some years it is much worse than this. In our own Presidency during 1879, something more than half a million of people died, and of these 285,477 died of fever, 13,296 of cholera. A good deal of this mortality is preventible, and the use of impure water is, I feel persuaded, answerable for much of it.

GOVERNMENT AND THE SANITATION OF THE COUNTRY.

The Government of this country has, of late years, concerned itself much in the sanitary welfare of the people committed to its charge, and it has fallen to my lot, in the course of my service, to reach the office of Sanitary Commissioner. One of my duties is to travel about and spy out, as it were, and report to Government the blots I discover in sanitary matters, and to suggest, as far as lies in my power, remedies for these defects. One thing has been very much impressed on my mind in my journeys, and it is this, that we may lay to the use of impure water a good deal of the sickness, the cholera, bowel-complaints and fever which yearly decimate our people; and I think I cannot better serve the Government, whose servant I am, and the people whom the Government so heartily desire to serve, than putting before an intelligent audience of Madras, such as I see before me this evening—with the hope it may thus reach other intelligent centres—a few plain statements on this matter.

THE PEOPLE OF INDIA AND WATER.

Water is a matter the people of India, of all people, should take an interest in, for the people of India are the greatest water drinkers in the world. It may be said to be the national beverage; hence to the people of India pure drinking water is a matter of primary importance. Moreover in this, as in many others, they were the first sanitarians. As I had occasion to point out in my speech at Convocation in 1879, the people of this country were the first physicians. When the

inhabitants of England were rude savages, running about naked, or nearly so, having few or none of the civilized arts of life, the ancient people of this country were far advanced in the profession and practice of medicine, and coeval with that time had laid down rules regulating the use and conservancy of water. I find numberless laws and regulations laid down by your ancient lawgivers on this point. To quote a few:—

I. In the Yajurveda, the part called Arana, contains the following commandments: “Do not spit out with retching in the water. Do not pass urine or discharge excreta in the water. Do not drop blood into water. Do not throw any hair, or nails, or bones, or ashes, nor dip dirty clothes into water. For to do so is to abuse a precious gift of the gods, and disgrace them.”

II. Then, passing on to the Smritees, or the rules laid down by the lawgivers, regarding the use and abuse of water, the following are universally quoted authorities:—

Yagnya Valkya prohibits the drinking of eight kinds of water: (1) Water kept boiled by a stranger; (2) foaming water; (3) heavy dirty water; (4) water giving off offensive smells; (5) water rising in bubbles; (6) hot water; (7) muddy water; (8) salt water.

The sage Shatátapa prohibits bathing in a tank or pond defiled by the following persons by washing or bathing: Those suffering from sore-eyes or itch on the head or ear; those subject to epileptic attacks, or ulceration in the head running off through the nostril, or to consumption; or those affected by leprosy, or small-pox, or diarrhoea, cholera, or other contagious diseases.

III. In the second book of Ramayana, the great epic poem of the Hindus, Prince Barata calls down upon

himself a curse if he were guilty of something charged against him by saying,—

“His sin, who deadly poison throws
To spoil the water as it flows,
Lay on the wretch its burden dread,
Who gave consent when Rama fled.”

The sin of spoiling drinking water was evidently considered by Prince Barata as one of the greatest possible gravity, as rendering the man who did it fit only for the infernal regions.

IV. In Uddhava Gita of the eleventh book of the Bhagavata Purana, or Krishna's legend, the pious old Uddhava is advised by Krishna to drink no other water but that filtered or strained through a clean cloth.

V. Again, the sage Yagnya Valkya prohibits the use of water that remains after washing one's feet or hands and *the private parts of the human body*, or the remnant of what another person drinks, or the water near the Dhoby's place for washing clothes, or where chandalas, or butchers, chucklers, and other outcasts wash themselves, or where women after menses or child-birth, or people under pollution bathe.

ECONOMIES AND PRIVATE MORALS.

The great lawgiver, Menu, in Chapter IV. of Manava Dharma Sastra, says:—

“Let him not cast into the water either urine or ordure, nor saliva, nor cloth, nor any other thing soiled with impurity, nor blood, nor any other kind of poison.”

All these authorities are taken from the chapter headed Acharakanda, on the use of water, in the book of the Hindu law by Vaidyanadha, held, I am told, in high esteem by the Hindu community of Southern India.

THE LAWS—HOW KEPT.

As it often occurs, the letter of the law is still observed, but the spirit in which it was conceived is lost sight of. All these regulations had for their object, to keep the water for domestic use perfectly clean and free from impurities, and the lower classes were forbidden to use the water of the higher classes because it was supposed that inasmuch as their manners and customs were less guided by cleanliness and purity, they would defile the water they came in contact with. And yet, I would ask you, in all fairness, can the customs of any be more repugnant to cleanliness and common-sense than what obtains now in most parts of Southern, and, I may say all India, at the tanks and wells of the higher as well as the lower castes of your countrymen? Let me tell you a few things I have seen in my travels. I have watched at many tanks during my journeys to and fro, and here are a few examples of what I have seen.

At Hosur, in the Salem District, I saw a small but very well-preserved tank at the foot of the sacred hill on which the temple is placed; in it men and women were bathing and washing their clothes. I counted at one time twelve people so engaged, and I watched one woman who had brought down with her a bundle which she deliberately washed, and then her body clothes and herself, and then, filling a brass chatty, went home. I watched many people wash themselves, their clothes, spit into the tank, etc., and the women take home chatties full of this water. I took away with me two bottles full, which I examined; it was of a pale green colour, had a sickly and offensive odour, and was full of animalculæ which were visible to the naked eye. It was not necessary to have a microscope to discover them. Whilst I

was still engaged in examining this water at the Bungalow, a most respectable native official called upon me, who gave me, I remember, a deal of information on other matters. I then spoke to him about this water, and asked him if it was used for drinking by the inhabitants. "Oh, yes," he said; "it is a very favourite water, it is so soft." This was soon after I had been appointed Sanitary Commissioner. Since then I have watched at a great number of tanks, and seen the same thing, and when asking questions have been answered in much the same manner. Sometimes, I hear, the water so washed in and used is not drunk, but that special tanks are set aside for washing, and others for drinking. This is the case, for instance, at Chidambarum, and all I can say is these people are acting not only in consonance with what Western science points out to be necessary to health, but in accordance to the ordinances and rules laid down in ages gone by by their wise forefathers. When the cholera was making its way down from the North-West to our Presidency at the end of the last and commencement of this year, I was asked by an energetic collector to send him a few simple rules on sanitation of villages that he might publish them in his District Gazette. Subsequently hearing from him that the rules I had sent answered the purpose, and were sufficiently simple and intelligible to the people, I took it upon myself to send a copy of them to all Presidents of Municipalities and Local Fund Boards. Lately I found myself inspecting a municipality in the north, a long way from Madras, and the manager showed me, amongst the proceedings of the Commissioners of that municipality, a resolution calling attention to my circular, and resolving that two important tanks, which I will call tanks A and B, should be strictly set

aside for drinking purposes, and a policeman set over each to prevent people washing their bodies and clothes therein. I confess I felt very pleased and proud when I read this; I felt we were getting on. Next morning I was going round the town when the manager pointed out in the distance a bank which he said was the bund of Tank A, one of the tanks in which washing of clothes and bodies was *strictly* prohibited. "Oh," I said, "let us go on and look at it." We went. The doctor of the station as well as the manager of the municipality were with me. We were soon there, and it was certainly a magnificent tank, twice as large as our Mylapore tank here. There were crowds of people at all four sides, *and all or nearly all busily engaged washing their clothes, and those that were not doing that were bathing their bodies!!* The expression on the face of my friend, the manager, when he saw all this, was slightly ludicrous. Just where we had reached the tank was an old man washing a not very clean cloth, and when he had done, he washed himself and spat repeatedly in the water. He then went away, and within a minute a woman came there, stood almost in the identical spot the old man had stood a minute before, and filled two bright brass chatties with the water, and took them home for drinking and cooking. She must, of necessity, have taken home some of the filth from the old man's clothes and a portion of his spittle to drink and cook with! What a repulsive idea! Now, what we had just seen passing under our eyes was taking place at various times of the day all round the tank, and not only all round this tank, but around the hundreds and thousands of tanks which lie scattered over this fair continent of India. And this being the case, can we wonder for a moment at the rapidity with which an epidemic of cholera spreads

through a community when once it makes its appearance in their midst? And yet how simple the remedy!

The people of India are very amenable to any order on such things, and if the wise resolution of the municipality I speak of, or better still, the wise rules of your ancient lawgivers had been carried out, such filthy and repulsive proceedings could be easily avoided. For, putting apart the question of epidemics, it must, I think, be admitted by all that drinking water in which another person has just washed his or her dirty clothes is not a pleasant notion. It is repugnant to all sense of decency, and directly counter to the order of your lawgivers and sages; and one must remember, moreover, that merely passing such orders on paper is of no avail; some one must see them carried out, or otherwise presently arises the sceptic and says, "In spite of the order to keep people from washing and bathing, we still have sickness." For instance, the people of the town in which Tank A is situated might say so; but look how the order was there obeyed. When these orders are obeyed, as I shall show you presently, sickness stops.

CHOLERA AND OTHER DISEASES SPREAD BY WATER.

You will, perhaps, ask me to advance some proof of the statement I make that cholera and other epidemic diseases are spread by water. In the first place I must premise I do not by any means maintain water is the *only* means by which cholera is spread or originated. I have my own views about its origin, but this is not the place to broach those views; and I believe the air, clothes, food, specially drink of all sorts, besides water, may and does spread it; *but I also believe that water is the chief means by which it is spread, especially in India, and that it is on account of the* PECULIAR TREATMENT *water*

obtains in this country that India, the only country in the world, is subject to such frequently recurring and such terrible epidemics of this dread scourge. My proofs are so many,—at least what seem to me to be proofs,—that I scarcely know where to pick and choose.

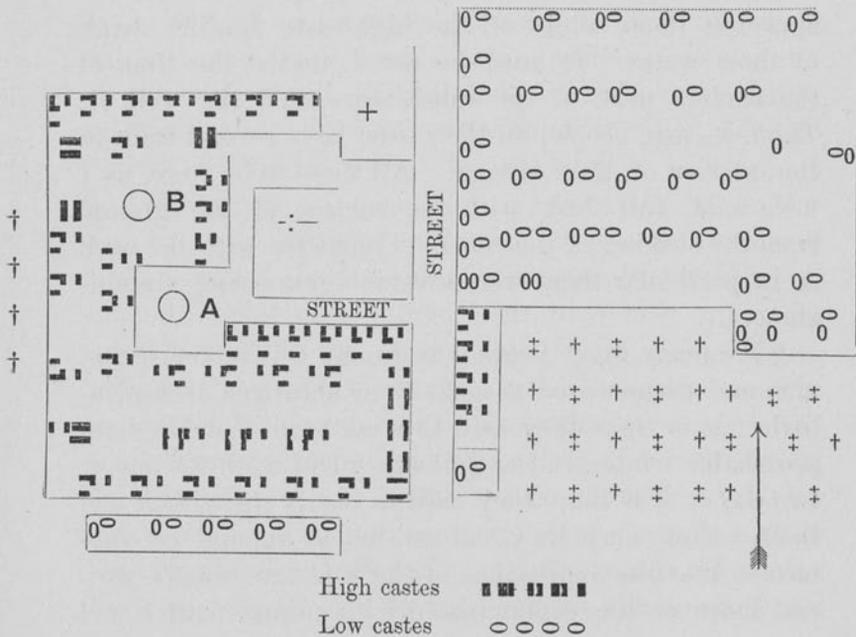
One of the first persons to draw attention to the connection between cholera and water was Dr. Snow, of London, and his well-known Broad Street Case has always been quoted in point. Here, in 1854, the people of a well-to-do and otherwise healthy district suffered immensely from cholera. This led to a minute inquiry into the surrounding circumstances, and it was discovered that a child who had been ill with cholera, died at No. 40, Broad Street, and that its excreta had been emptied into a cesspool situated only three feet from the well of the public pump in Broad Street, from which most of the surrounding people took their water. It was further discovered that the bricks of the cesspool were loose, and allowed its contents to drain into the pump well. In one day 140 to 150 people were attacked, and it was discovered on investigation that nearly all the persons who had the malady during the first few days of the outbreak drank of the water from the pump. When the pump was closed to public use, the epidemic subsided, but the most curious case connected with it is this: there occurred at West End, Hampstead, many miles away from Broad Street, a single case of cholera, which proved fatal in the person of a woman, aged 59 years, widow of a percussion-cap maker. Now this woman had formerly lived in Broad Street, but had not been there for many months. *But mark this*, a cart went from Broad Street to West End every day, taking out, amongst other things, a large bottle of water filled from the pump in Broad Street, because the lady in

question liked this water; she had drunk it all her life, and preferred it to all others! A niece who was on a visit to this lady also drank this water. She returned to her residence in a high and healthy part of Islington, was attacked with cholera, and died. There was no cholera at the time either at the West End or in the neighbourhood.

You will see on the wall there a diagram, which tells a most interesting story, at least to me; and the story is told, not by a member of my profession, but by an intelligent Roman Catholic clergyman, and thus the story becomes doubly interesting, for I am old enough to remember the time when these visitations were looked upon, even in Europe, as direct inflictions of an offended Deity on mankind for their sins, and it was considered by the clergy presumptuous in man to use his intellect in looking about for some physical cause to account for these epidemics, and if possible remove it. It was Lord Palmerston, I believe, who so shocked a deputation that waited upon him, asking him as Prime Minister to order a day of humiliation and prayer against an epidemic of cholera that was then raging, by saying, "Well, gentlemen, let us first clean our drains and look to our water supply, and if that won't do it, we will go to our prayers." I have no doubt, indeed I know, there are many people in this country who teach, like our people taught, that these scourges are direct visitations of some offended deity. In fact, there is a name for her. She is called by the Tamil people Mariyama or Mariyatha, by the Telugu people Ummavaroo, and I am not bigoted enough on my side of the question to wish to hurt these peoples' feelings by saying that I am necessarily correct, and that they are necessarily wrong; but I claim this for our point of view, if we—by we I

mean modern sanitarians—and your ancient lawgivers are wrong, at any rate our views do no harm. It cannot possibly hurt a community to drink clean water as against dirty water, and I do not think any god or goddess would be offended at our doing so; whereas if the other side are wrong, they are perpetuating a frightful state of things, in forbidding people to use their intellects and reasoning powers to look about for the cause of these epidemics, and, if possible, remove it. Now, this diagram,* if we read it aright, tells a most instructive tale. It represents the village of Vadaken-colam, in the Tinnevelly country, which was attacked by cholera in December, 1877, and suffered immensely. It was observed, however, that the cholera confined itself to the higher castes of the community, and the lower

* ROUGH PLAN OF THE VILLAGE OF VADAKENCOLAM.



castes, who lived close by, escaped. Here, of course, according to one theory, it was that the deity was offended with the higher class, the Brahmins, but pleased, or, at any rate, not offended, with the Pariah or low-class people who escaped. I think the theory of the Rev. Mr. Delpuch much more plausible. He learnt and has here explained how the high-class people all used certain wells, from which, of course, the lower classes were excluded, and he has, moreover, pointed out how these high-class wells were most faulty in construction, allowing water, etc., used in ablution of the person and clothes to trickle back again into the well. I will quote his own words: "It is evident that a cause should be sought, confined in its action to the only caste struck by the disease. Now, there are two wells, A and B, in the middle of the village of the high-castes preserved for their exclusive use. The low-caste people dare not even approach them, whilst all the high-caste families drink of their water. It must be noted, that at the time of the cholera most of the inhabitants used the well A. The low-caste people, on their side, have several wells in the interior of their village. All these wells were, as I have said, full flush with the surface of the ground from the soaking of the rains. Connected with the well A in particular there were several aggravating circumstances.

"For many many years it is around this reservoir that men and women used to make their ablutions or health-baths; it is there they used to wash to preserve in irreproachable whiteness the cloths they had worn for one or two days; it is there they used to purify their linen and their bodies when they had assisted at funeral ceremonies. Also the approaches of the well are always wet, and more or less contaminated with animal matter and

fetid mud. Further, it was noticed at this time that the rice cooked in the water of this well had a bad smell, and spoiled rapidly. A curious enough fact again attracted attention. I have said that not one of the low-caste people had died. I am mistaken,—one and one only died of this cholera, and this was the washerman of the high-caste people. Now, this individual who, on account of his caste, could not approach the well A, drank nevertheless of this water, for by a special privilege the washerman's wife got her pitcher filled by a high-caste woman. Suspicion therefore fell upon the well in question, and by common consent it was resolved no longer to draw water from it until further orders. From this time forward, whether it was that the true cause of the epidemic had been discovered, or whether it was that the unknown causes had ceased to act, the disease sensibly diminished, and soon disappeared altogether.”*

* Curiously enough, not long ago I received just such a similar story from Cuddapah. During the year 1883 the people of Cuddapah had cholera amongst them, and another reverend gentleman, Mr. J. R. Bacon, thus writes to the collector on the subject. The collector, Mr. Burrows, was kind enough to forward me the letter.

Mr. Bacon thus writes :—

“I have made a careful analysis of the cholera cases in Yerramukapalli, Bellammundy, and Kondayapalli, as reported on the 9th. In Bellammundy there have been fifty-two cases and twenty-one deaths. The main water supply was the Bugga channel, or, rather, the tank channel below the anicut; some, however, came to the river higher up. Since the order passed forbidding the use of the river water, cholera has disappeared there; there have been no cases there for some days. A police guard patrols the banks along that part of the channel.

“In Yerramukapalli there have been twenty-seven cases and eleven deaths amongst the Sudras, and only one case amongst the Malahs, and this a slight one. The Sudra population exceeds the Malahs in

I could multiply these examples, but it would take up too much of the time at my disposal this evening.

And this defect in wells, either from faulty construction or produced by dilapidation, is what I constantly see in my journeys.

Wells which have originally been thoroughly well

proportion of about four to three, I think, but I have no exact means of telling.

“The Sudras are not more closely packed nor less clean—being a higher caste, are probably cleaner—than the Malahs (Telugu name for Pariahs). The whole of the Sudra village lies to the west, and part of it immediately adjoins the Malah houses, and the prevailing wind has been from the west during the outbreak.

“The Sudras tell me that to a man they all have, up to this morning, (August 10, 1883) drank no other than river water. There were three attacks here yesterday (the 9th), and all died, and several this morning.

“The Malahs, on the other hand, say that they all draw water from the wells by the tank. There are no cases there, nor has there been but one as reported, and that a slight one. I examined the river at the spot whence I was told they (the Sudras) all took their water. There was a slight running stream choked with weeds, and a large stagnant pool very filthy. The slight stream here has to run through the pools near the railway bridge, where the majority of the town Dhobies wash, and is the only stream on the surface in this part of the river bed.”

Now, here we have another instance of a higher caste, and presumably cleaner people, suffering from cholera, whilst a lower caste escape. The houses, as regards crowding, are much the same. The two villages are so close—only a road separating them—that we can scarcely imagine any difference in atmosphere, and yet one people lose eleven out of twenty-seven attacked, and the other none. I went down to Cuddapah to examine and verify this case, and the only difference I could see was, as described by Mr. Bacon, one people used a sluggish stream in which the town Dhobies washed the clothes, and the others—the Malahs, or Pariahs—drew their water from a fine well close to their village.

This case was given only in the third edition of the Lecture; it took place subsequent to delivery of Lecture.

built have, in course of time, been allowed to get into such dis-repair, that leakage back into them of soiled water is permitted. Such a well, for instance, exists in Coimbatore. The well known as Ananta Iyer's is a large fine well built in the middle of the town by some good Sudra, and used by Brahmins in the morning and Sudras in the afternoon. It must have cost a deal of money to construct, and is really a splendid well, giving an abundance of clear, sparkling, cool water even in the hottest weather; but now, owing to neglect, it is defiled every day. The flags round about it have become loose, and the water in which the people frequenting it have washed their bodies, and often their clothes, instead of running right away as originally intended by the construction, trickles back into the well, and is drawn up in chatties and taken home and drunk. To my mind, there is something singularly repulsive, putting aside all idea of epidemics, in the notion of drinking water, in a portion of which your neighbour has just been washing his clothes and even his body.

Just imagine how easily a community can thus be poisoned. Arrive some travellers or pilgrims from another town, say some of them suffering from incipient cholera, the premonitory diarrhoea. They go to a well or tank such as I have described, and they wash their bodies and soiled cloths. A goodly portion of this water trickles back into the well, or, if it is a tank, all of it is thus returned. They have barely left when some woman comes, as I saw at Tank A, who fills her chatty with water thus contaminated, and takes it home to her family. Need we be astonished that we have presently a sharp outbreak of cholera in a household where previously all was well. In fact, if the

pilgrims had poured so much strychnine or arsenic into the water, they could not more effectually have poisoned their innocent neighbours than they have; the only excuse that can be pleaded for them is their ignorance: they did it unknowingly, unintentionally. In law, I believe, this plea does not hold good. If I do an act which, however innocently it may be done on my side, is done without proper regard for possible consequences, and injures or kills my neighbours, the law punishes me. If a man from outside were to fire a gun into this room and kill one of the audience, I take it his plea that he did not know any one was in here listening to my lecture, would not exculpate him. It would be said it was his duty to find out,—to take reasonable precautions. He would wound, perhaps kill, one man, and he would be punished accordingly. The passengers or pilgrims I describe, kill perhaps some hundreds, indirectly it may be thousands, but no notice is taken of their acts; they escape scot free. And yet it is clearly punishable by law. The Penal Code provides the remedy if only communities would put it in force. Chapter XIV., para. 277, says: "Whoever voluntarily corrupts or fouls the water of any public spring or reservoir, so as to render it less fit for the purpose for which it is ordinarily used, shall be punished with imprisonment of either description for a term which may extend to three months, or with fine which may extend to five hundred rupees, or with both." As in the case of the old man washing his clothes and his body in the tank I called Tank A, what was to prevent, say, the cloth he had just washed having come off the body of a person who had died of cholera? If certain tanks were strictly set aside for drinking purposes, it would soon be recognized as a custom or mamool by all the people of the country, and the

possibility of such a misadventure would be reduced to a minimum.

But whilst cholera is a very frightful disease from the rapidity with which it destroys its victims, and the horrible suffering which attends its attack, it is not the most constant or the greatest destroyer of human life in this country. Fever is far and away the most important enemy, and I firmly believe, although this is more difficult to prove, that to impure water we owe a good deal of it. The natives themselves in many parts of India are firmly convinced that certain waters give fever. But there are many other complaints which kill off large numbers. Thus bowel-complaints during 1879 killed off 250,000. I take 1879, because it was a favourable, at least a good average year. Now, these bowel-complaints are a great source of weakness and suffering to the people of this country, and it requires one to have been, as I have, many years in charge of dispensaries and large hospitals to know how many people suffer therefrom. It is quite appalling how many of the poorer classes suffer excruciating torments from the presence of worms in the intestines; and often when you read of a poor woman, and for that matter of a woman in the well-to-do classes, committing suicide by flinging herself down a well, unable any longer, as she will have told her friends, to stand the pain and torment caused by the demons inside her, the poor creature has been suffering from worms in the intestines—*lumbri* as Doctors learnedly call them—and these come from cooking with, and drinking the impure water of tanks.

Dr. Parkes, who is accepted, and very properly so, by our profession as the greatest authority in Hygiene, sums up the department of his manual

which treats of water with the following practical conclusions:—

i. An epidemic of diarrhœa in a community is almost always owing either to impure air, impure water, or bad food. If it affects a number of persons suddenly, it is probably owing to one of the last two causes, and if it extends over many families almost certainly to water. But as the cause of impurity may be transient, it is not always easy to find experimental proof.

ii. Diarrhœa or dysentery constantly affecting a community, or returning periodically at certain times of the year, is far more likely to be produced by bad water than by any other cause.

iii. A very sudden and localized outbreak of either typhoid fever or cholera is almost certainly owing to the introduction of the poison by water.

iv. The same fact holds good in cases of malarious fever, especially if the cases are very grave; a possible introduction by water should be carefully inquired into.

v. The introduction of the ova of certain entozoa by means of water is proved in some cases and is probable in others.

vi. Although it is not at present possible to assign to every impurity in water, its exact share in the production of disease, or to prove the precise influence on the public health of water which is not extremely impure, it appears certain that the health of a community always improves when abundant and pure water is given; and apart from this actual evidence, we are entitled to conclude from other considerations that abundant and good water is a primary sanitary necessity. Dr. Macnamara, in his admirable treatise on cholera, goes a step further and says: "This I maintain is one grand means of self-preservation when once cholera has appeared amongst

us. If we can only establish the principle that nothing but freshly and properly filtered water shall be consumed by the inhabitants of a town, barrack, or house, not only when at home, but at work—at all times, in fact, when cholera is abroad—we may, I believe, discard all and every other means of preservation.”

I think, gentlemen, I have said enough to awaken within you some interest in this matter. The remedy is simple, and lies in your own hands. Government can do much in advising and controlling sanitary matters, appointing Municipal Boards, Sanitary Commissioners, Medical Officers, who will, I hope, soon be each a Sanitary Officer also of his own immediate circle; but it cannot carry out the details of its well-conceived legislative regulations without cordial assistance by the people themselves. As in the case of Tank A, mere paper orders will do nothing. Sanitation—real sanitation—must be carried out by the people themselves, and this water question, although most important, is really not a difficult one. There is no chemistry, or mystery, or any sort of “ology” about it, and what is most important, no appreciable expense or outlay of public money. It is as simple as Columbus’ egg trick *directly you know it*. It is a mere common-sense plain matter, known well to yourselves ages ago, but unaccountably and most unfortunately lost sight of. What can possibly be more easy to pass, aye, and to carry out a resolution, that in all municipalities, villages, and communities, certain tanks and wells shall be set aside *strictly* for drinking only. That bodies, clothes, animals, etc., shall not be washed there, but in other certain tanks. Look at the effect of this in our own town, Madras. Years ago, when cholera visited Southern India, Madras was one of its favourite halting places. It numbered here its victims by thousands.

This year, although it was the second place in point of time visited, it found its old quarters not so congenial, and passed on to other places. It came again and again—the traffic with Madras from surrounding towns is, of course, so great—but it never took firm root; and the reason I take it is this: the people—at least, the mass of the people—now do not drink ordinary tank water, but use Red Hills water, and this is so laid on that although I see men washing themselves often at the taps, the water cannot run back again and contaminate the rest.

The table you see before you, showing how cholera was distributed in Madras, is very interesting; you will see the parts which have Red Hills water laid on suffered very slightly; but it was in those parts which have no Red Hills water laid on where the cholera did most mischief. It is beyond the people's power to contaminate it—they would, if they could—and it is this universal use of Red Hills water (where it is to be had) which makes me hopeful of the spread of sanitation even in this country. Sometimes I hear it said, "Oh, it is no use trying to improve these people. They have certain habits and customs, and, say what you like, you won't get them to change them." That is all nonsense! Exactly the same opposition arose at first in England against sanitation, and in many things still exists. The water supply of London and other large towns, until quite lately, was most disgraceful, and even now is nothing to boast of. In fact, in London it is in many parts still very bad, and strong as is public opinion in the capital of our Empire, it has not as yet been able to overcome the passive resistance of powerful water companies who hold the monopoly of supplying its citizens with indifferent drinking water. Well, but I remember when this laying on water from the Red Hills was first

DEATHS FROM CHOLERA IN THE VILLAGES OF THE TOWN
OF MADRAS.

		NAMES OF VILLAGES.	No. of Deaths.
Not supplied with Red Hills Water.	}	TONDIARPETTAH	48
		WASHERMANPETTAH	57
		ROYAPURAM	88
		CASHMODE	54
		GUNPOWDER MILLS	1
		PERAMBOOR	4
		VEYSURPAUDY	2
		ALWARPETTAH	0
		CHETPUT	0
		NUNGUMBAKAM	2
		KISTNAMPETTAH	2
		SAINT THOME	23
		John Pereira's Garden	0
		Pedoo Naik's Pettah	25
		Mootheal Pettah*	52
Supplied with Red Hills Water.	}	Uttapaliam	0
		Fort St. George (Seven Wells)	0
		Big Parcherry	0
		Choolay	1
		Purseivalkum	6
		Pareamettoo	1
		New Town	5
		Vepery	2
		Poodoopettah	0
		Egmore... ..	2
		Comaleeswarapuram	2
		Royapettah	7
		Meersaib's Pettah	3
		Kilpaukam	0
		Mackay's Garden	1
Poodoopakam	6		
Chintadripettah	9		
Narasingapuram	1		
Triplicane†	30		
Theroovateesvarenpettah	9		
Teynampettah	0		

* In Mootheal Pettah is a large unclean tank still freely used by the people.

† In Triplicane dwell a large number of Mussulmans, whose women are strictly Goshas, and are not allowed out of their houses to go to the pipes for Red Hill Tank water; hence they use contaminated water of their gardens.

mooted and carried into effect, it used to be said, "It is of no use, they won't use it when you have laid it on." I remember Lord Napier, the then Governor, on whose staff I had the honour of serving, being in considerable fear of this. He took a vivid interest in this question, as he did in all things which concerned the welfare of the people of this country, and, if you remember, stayed here on his way home from Calcutta as Viceroy on purpose to open the water works. "Well," he remarked, the day after the ceremony, "now we have given them good water, will they use it? I hope they will, but, from all I hear, I am afraid they will not." On the contrary, all these fears have been dissipated. One has only to watch one of these water-stands in a busy thoroughfare to see how thoroughly it is appreciated and used by the people of all classes. If there were twice as many stands, they would be in request; and, as I said before, I believe it is owing to the improved quality of the water provided for the people, and the impossibility of their contaminating it, Madras has escaped so well the last epidemic. *For if being dirty was the only necessity of having cholera, Madras ought to have suffered handsomely.* Guntur is another most encouraging instance. Many years ago it was a sort of head-centre, as the Fenians would call it, of cholera. (Bengal is always the Head-Quarters.) The disease was nearly always there, and if you read in the Sanitary Commissioner's Annual Report for 1879, the account given by the Rev. Mr. Unangst of what went on in the town, one need not wonder at it. Presently there came to the town Dr. Biggwith, who was made Vice-President of the Municipality. He set to work to clean this Augean stable. Of course he was strongly opposed, misrepresented, and maligned. It seems there is some chronic inevitable law

of nature that men in all countries and climes should wish to stone their prophets. He persevered, however ; he laid down rules as regards cleaning the roads, lanes, drains, and houses, clearing away prickly-pear, above all he was very particular in guarding the water supply. I will read what he says on this point : Before he came, "no attention was paid to keep the water in the tanks, reservoirs, and wells clean. When I came here in December, 1870, I was astonished to see the natives polluting the water supply everywhere, but particularly in the reservoirs." "Here were found people washing their *mouaths* of a morning, spitting the foul water out of them into the reservoir, washing their soiled clothes, bathing their persons, and doing other dirty acts which the authorities ought not to have allowed. The tank banks in the wet, and the beds in the dry weather, were converted into privies by people of all classes. The intelligent Brahmin, the ignorant Pariah, the Government official, and the poor cooly were all found defecating on the banks and the beds of the tanks which supplied their reservoirs with drinking water. Most of the wells of the town had no parapet walls, and as the natives, especially Komatee and Brahmin women, resorted to them for bathing and washing their soiled linen, all the impurities contained in their persons and in their foul clothing were carried back into the well with the spilled water. During the prevalence of cholera, cloths stained with cholera discharges were no doubt washed here, and the water thus poisoned was drunk by thousands. At present the reservoirs and tanks are watched by men appointed by the municipality to see that no pollution of the kind enumerated is made by the people who resort to them for water, etc."

What Surgeon Biggwither so well commenced, Dr.

Tyrrell, his successor, maintained and extended; and now what is the result of all these sensible efforts? Guntur has been free from cholera since 1868!—a place, mind you, that always suffered when cholera found its way into our Presidency — one of its most congenial haunts. Now, if the cholera were a goddess, as many of your countrymen believe, don't you think she would have settled with these doctors long ago, for thus interfering with her rights and prerogatives? She must be a very poor goddess indeed to be beaten by a doctor! At any rate, if she does allow herself to be thus beaten, let us go over to the side of the doctors, or rather to the goddess of cleanliness—that is the goddess I should like to see started. Let us keep our houses, drains, and surroundings clean; *above all, let us keep our water supply uncontaminated and unpolluted, and as far as in us lies from the possibility of being polluted,* and then, having, like brave men, done all that prudence and common-sense dictates, we can calmly sit down and await the attack of the enemy, saying, in the words of the old play, "'Tis not in mortals to command success, but we'll do more, Sempronius; we'll deserve it."

LETTER FROM HIS HIGHNESS THE MAHA RAJAH OF
TRAVANCORE, G.C.S.I.

TREVANDRAM, April 20, 1882.

To Dr. M. C. FURNELL,
&c. &c. &c.

MY DEAR DR. FURNELL,

I don't know when the idea of writing to you would have occurred to me but for your excellent lecture on "Water." That lecture alone would entitle you to the niche of a public benefactor.

I am anxiously looking for the copies I have ordered from Higginbotham & Co., to distribute them to my friends. You will be glad to learn that your lecture has already begun to appear in Malayalam, part after part, in the *Trevandram Official Gazette*.

* * * * *

Believe me,

Yours very sincerely,
(Signed) RAMA VARMA.

DISEASE AND WATER IN INDIA.

From the "Lancet" of July 12, 1884.

"In connection with the interest which now attaches to the condition of tank water in India, we would refer to an excellent lecture on the relation of wholesomeness

of water and the maintenance of health, which was delivered some two years ago to the native population, by Dr. M. C. Furnell, Sanitary Commissioner for Madras. The lecture fully confirms, by means of its numerous details, the views that have so often been expressed as to the facilities which are afforded by the tank water supplies of India for the diffusion of infectious diseases, and especially of cholera and of enteric fever. Men and women habitually wash their clothes and garments, and then bathe their bodies in the same tank as that from which they take their water for domestic purposes; the approaches to some of the tanks are filthy in the extreme, and Dr. Furnell has even seen women collecting water for home purposes, when the contents of the tank have, at the same moment, been in use for ablution, being foul to the senses of sight and smell. So long as conditions such as these remain, it must be obvious that one of the most fertile and well-known channels exists for the rapid diffusion of cholera, and it is impossible to prove that the aerial communication of this infection is the one which is most commonly in operation. The multiplication of such lectures to the native population would be most useful, and we are glad to note that in addition to the circumstance that the Bombay Government ordered Dr. Furnell's lecture to be translated into the Vernaculars of Northern and Southern Deccan, Guzerat, Sind, and Arabic; it has also been reproduced in several other languages."

This lecture was, quite unsolicited by the author, translated into Tamil, Telugu, Malayalam, Burmese, and Urdu. The Bombay Government ordered it to be translated into the Vernaculars of Northern and Southern Deccan, Gujarat, Sind, and Arabic.

From M. C. FURNELL, Esquire, M.D., F.R.C.S.,
Surgeon-General with the Government of Madras.

TO THE CHIEF SECRETARY TO GOVERNMENT.

SIR,—I have the honour to forward herewith the cholera report for 1883.

* * * * *

I feel, however, I should fail in my duty if I did not in this, my last report on cholera, record my firm conviction, founded on some forty years' experience of the pestilence, not only in India but in England, that we possess in our hands a remedy against these frightful ravages of cholera, if only we had the courage to use it.

All previous epidemics point distinctly to cholera being an invasion of the Madras Presidency from the north and north-east, and this epidemic commencing in 1881 was no exception to the rule. It took what Dr. Bryden has so well called the "Great Epidemic Highway," across the Central Provinces and southward through the Deccan and Bombay Presidencies towards Madras. Its advent was clearly foreseen and foretold, both by the Sanitary Commissioner and the Surgeon-General, and it came exactly in the manner indicated.

From this and all past histories of cholera in our Presidency, it will be seen the disease is not endemic in Madras; every now and then, as at the present time of writing, the Presidency is more or less free of the pest until the plague is re-awakened by a fresh invasion.

What then is the remedy? I reply, *Uncontaminated drinking water.*

As I have stated elsewhere, I believe that "Water is the chief means by which cholera is spread, especially in India, and that it is on account of the *peculiar*

treatment water obtains in this country, that India, the only country in the world, is subject to such frequently recurring and such terrible epidemics of this dread scourge."

It may be asked, "Is there any proof that a pure and uncontaminated water supply protects people from the ravages of cholera?" I reply—Ample proof.

The evidence on this point in the cholera literature of Europe is voluminous, but unfortunately scattered, and although in this country small, not without interest and instruction.

To take our own Presidency: there is Guntur, formerly notorious for its cholera epidemics; now, and since 1868, quite free from them. (*Vide* the Sanitary Commissioner for Madras's Annual Report for 1879.) It owes its immunity, no doubt, to its carefully conserved water supply, for it is impossible to suppose that either the "telluric" or "atmospheric" or "local" influence suddenly changed, and coincidentally with Dr. Bigg Wither's exertions in the matter of water supply.

Take Pondicherry, where cholera is practically unknown, even when raging in English taluqs around. Its artesian well supply, and a fine lake, Montirepoleon, some miles outside, from whence the water is led by pipes into the town and distributed from hydrants, are, no doubt, the secret of its immunity. For, again, it is absurd—at least it seems so to me—to suppose "atmospheric" or "telluric" or "local" influences should suddenly become benign in a small spot in the midst of an infected area.

Take our own Presidency Town, Madras. The decrease in number of deaths from cholera since the Red Hills water supply has been laid on (omitting the famine years, when people from outside simply flocked in to

lie down and die, and every death almost was registered as cholera) is very marked.

Since 1881 we have had one of the severest epidemics that ever visited the Presidency, and yet the deaths in Madras Town are much fewer than in former years, as may be seen from the accompanying table:—

RETURN SHOWING THE DEATHS FROM CHOLERA IN THE TOWN OF MADRAS FROM 1855 TO 1884.

Years.	Deaths from Cholera.	Remarks.
1855	1,956	
1856	805	
1857	1,378	
1858	1,965	
1859	1,082	
1860	2,580	
1861	2,776	
1862	3,635	
1863	1,684	
1864	574	
1865	944	
1866	2,984	
1867	614	
1868	13	
1869	568	
1870	861	
1871	493	
1872	5	Red Hills water supply opened.
1873	6	
1874	0	
1875	879	} Famine years.
1876	2,035	
1877	6,246	
1878	64	
1879	34	
1880	2	
1881	123	} A severe epidemic raged throughout the rest of the Presidency.
1882	461	
1883	168	
1884	269	

Moreover, it has been found on inquiry that the greatest number of deaths during the years 1881 to 1884 have taken place in the outlying districts of Madras—Tondiarpettah, Washermanpettah, Royapuram, and Cashmode, where Red Hills water is not yet laid on. And Madras would have still a cleaner bill of health from cholera if a number of old tanks, dirty, but popular from ancient use, could be closed.

Take the fairs and festivals of the Madras Presidency: it has very rarely occurred of late years that any epidemic of cholera has broken out thereat. Water conservancy is most rigidly enforced by the police.

Quite recently, Dr. Townsend, late Sanitary Commissioner for the Punjab, has sent me from England the accompanying instructive communication:—

No. 788.—From W. M. YOUNG, Esquire, Secretary to Government, Punjab and its Dependencies.

TO ALL COMMISSIONERS AND DEPUTY-COMMISSIONERS IN
THE PUNJAB.

Dated Lahore, 3rd November, 1882.

Home.—Medical and Sanitary.

Schemes for supplying pure water to the inhabitants of large towns are under consideration in various municipalities of the Province. In order to encourage the Municipal Committees in such places to carry out these projects, the accompanying statement, prepared by Surgeon-General S. C. Townsend, C.B., Surgeon-General of the Punjab, and formerly Sanitary Commissioner in the Central Provinces, showing how far cholera has disappeared from Nagpur, a city of nearly 100,000 people, where the disease used to be almost endemic, is circulated for information. If, as is probable, the registration of vital statistics during the

past ten years has been more accurate than during the previous period, the decrease in the number of deaths from cholera has been even larger than will appear from the table.

2. The Lieutenant-Governor considers that a plentiful supply of wholesome drinking water is the greatest boon a Municipal Committee can confer upon the people of an eastern town; and, although the provincial finances cannot confer large grants-in-aid on such projects, the Lieutenant-Governor will be prepared in very special cases to consider whether help may not reasonably be afforded if local resources are insufficient to carry out such a project.

The number of deaths from cholera in the city during

STATEMENT SHOWING CHOLERA DEATHS IN THE CITY OF NAGPORE FOR SEVEN YEARS PREVIOUS AND SEVEN YEARS SUBSEQUENT TO THE INTRODUCTION OF WATER FROM THE AMBAGHIRA RESERVOIR.

Year.	Cholera Deaths in City. Population, 84,500.	Remarks.
1865	420	
1866	387	
1867	...	
1868	44	
1869	412	
1870	1	
1871	4	
1872	23	Water from Ambaghira let on.
1873	...	
1874	...	
1875	32	} Deaths occurred in a section of the city } where Ambaghira water has not extended.
1876	61	
1877	3	
1878	69	
1879	12	
1880	...	
1881	60	

the seven years subsequent to the introduction of pure water, is less than one-seventh of the number recorded in the seven years prior to that event (177 against 1,264). Epidemic outbreaks of cholera may be said to have ceased to occur in the city, or, at any rate, are limited to certain sections in which open tanks exist. In many of the cases that occur in the city when cholera is epidemic over the country, the disease has been contracted outside.

The water service extends to twenty of the twenty-six circles into which the city and station are divided. The better classes in some of the remaining circles fetch the Ambaghira water for use; *but the poorer classes depend upon tanks, or wells sunk at the edge of the tanks, and it is in these circles that the deaths from cholera that appear in the city registers chiefly occur.* Of the sixty deaths from cholera registered in 1881, thirty-one occurred in one of these circles, leaving only twenty-nine distributed over the remaining twenty-five circles.

It will be observed that, while the mortality from cholera has greatly decreased in the city of Nagpore, there has been no diminution in the district; on the contrary, epidemics have of late years been frequent and severe."

The literature of Europe simply bristles with facts showing that a pure and uncontaminated water supply confers an immunity from cholera. It would be impossible, in the short limits of this letter, to quote one-twentieth of the extracts I have collected on this point; but I may draw attention to a very interesting article which appeared in a late number of the *Nineteenth Century* (August, 1883), on "Water and Cholera," from the pen of Professor Frankland.

In this very remarkable paper the writer points out how London has suffered from cholera on four different occasions, viz., 1832, 1849, 1854, and 1866, and that these epidemics, although more or less severe, had some very striking and instructive differences. The mortality in 1832 was undoubtedly great, but at that time there was no official registration of the causes of death; according to information received, however, the Privy Council put down the number of deaths as 5,275. Taking the population of the time, this represented a mortality of 31·4 per 10,000.

In 1849 the deaths attributed to cholera in the Metropolis amounted to 14,137, or 61·8 per 10,000. In 1854 there were 10,738 victims, or 42·9 per 10,000; whilst in 1866 cholera was fatal to 5,596 persons, or 18·4 per 10,000 of the inhabitants.

“This diversity in the mortality during different epidemics is thus accounted for:—

“In 1832 a considerable part of London was supplied with water abstracted from the Thames and the Lea, the remainder being obtained from shallow wells. At that time the river waters within the Metropolis cannot have been nearly so much polluted as subsequently, owing partly to the smaller population on their banks; but chiefly to the absence of an efficient system of sewerage in the Metropolis. In 1849 the sources of water supply remained substantially the same, except that the river water had probably more and more taken the place of the shallow well water. In the meantime, however, the sewerage system had become fully developed in London. The drainage of nearly the whole population was thus rapidly conveyed into the three rivers from which the water supply of London was drawn—namely, the Thames, the Lea, and the Ravens-

bourne. The rivers became proportionately fouled before distribution. *In fact, at this time the water companies rapidly restored to the inhabitants of London the drainage matters which the sewers had discharged.* It was in this epidemic (1849) that London suffered more severely, the mortality from cholera amounting to nearly 62 per 10,000 inhabitants. On examining this mortality more in detail, we find, upon the evidence of the late Dr. Farr, medical adviser to the Registrar-General, that amongst the populations supplied with water taken from the Thames at Kew, cholera was fatal to 8 in 10,000 of the inhabitants; whilst in the district supplied with water taken from the river at Hammersmith, it was fatal to 17 in 10,000; and again, in the population supplied with water abstracted from the river below Chelsea Hospital, it was fatal to 47 in 10,000; whilst the districts drawing their supply still lower down—namely, at Battersea, and between Hungerford and Waterloo bridges, where the river was still more foul—suffered to the extent of 163 deaths per 10,000 inhabitants.

“Before the next visitation in 1854, a small portion of the water abstracted from the Thames within the Metropolis had been replaced by a corresponding volume taken from the river above Teddington Lock, and, consequently, beyond the reach of the London sewage. Corresponding to this improvement in the water supply, we find a reduction in the mortality from cholera, which in the subsequent epidemic of 1854 was only 43 per 10,000, although in the same epidemic we find that in those districts still supplied with the foul water below Teddington Lock the mortality was actually greater than in 1849. Thus, on the south side of the river the two great competing Water Companies are the Lambeth

Company on the one hand, and the Southwark and Vauxhall Company on the other. Of these two companies in 1854, the Southwark and Vauxhall still pumped from the Thames at Battersea; whilst the Lambeth had removed their pumping station to Ditton, above Teddington Lock. The houses supplied by these two Companies were in the same district, the pipes of the two Companies interlacing, and sometimes running parallel in the same street; so that, excepting as regards the water supply, the conditions affecting health in the two sets of houses may be safely assumed to have been identical; but whereas the mortality amongst the population supplied with the comparatively pure water of the Lambeth Company was only 40 per 10,000, that of the population supplied with the foul water of the Southwark Company was 130 per 10,000 inhabitants.

“In the last epidemic, which occurred in the year 1866, all the Companies drawing from the Thames had fortunately removed their in-takes to points above Teddington Lock, and, corresponding to this improvement, we find that the mortality fell in this epidemic to 18 per 10,000 inhabitants. It is, however, in this epidemic that perhaps the most striking evidence of the effects of drinking water is to be obtained. In this year certain parts of the East End of London suffered most severely from cholera. These parts of London were in the area of one Water Company, and what makes the case more remarkable and conclusive, is that not the whole area of that Water Company suffered. The Water Company gave two waters, and the high cholera mortality was apparently restricted to those parts of London which received one of these two supplies—so to speak, to half the districts of the East London Company. The source from which this Com-

pany supplied this half of its district was a source peculiarly exposed to contamination from a foul part of the Lea.

“On August 1st of that year, 1866, the Registrar-General gave notice to the East London Company of the danger of distributing this polluted water supply, and from the day they discontinued, the intensity of the disease began to abate, and within the month the number of deaths from cholera was less in the East End than in other parts of London.”

Quite lately, M. le Dr. Marey, an eminent French doctor, of Paris, “Membre de l’Institut et de l’Académie de Médecine, Professeur au Collège de France,” has published a pamphlet, “Les Eaux Contaminées et le Choléra,” in which the same facts as shown in the article quoted above—viz., that in Paris the intensity of cholera was in exact proportion to the contaminated water supply—are very clearly brought out. He shows by a map that cholera was very heavy in Paris on the right side of the river Seine, and very light, almost infinitesimal, on the left. The part of Paris which suffered heavily from cholera was supplied with water from the rivers Seine and Ourcq, into which rivers the sewers of Paris empty themselves. Here we have exactly the same state of things as occurred in London in 1849: “the water rapidly restored to the inhabitants the drainage matters which the sewers had discharged.”

The part of Paris which escaped cholera was supplied by water from the wells of Grenelle, “proceeding from a deep spring sheltered from all filth, which,” remarks Dr. Marey, “well explained the immunity enjoyed by the inhabitants who drew their water supply from this source.”

At first glance, it may seem an almost impossible task

to ensure to so large a population as Southern India pure water. It is a "big affair," but not more considerable than many other blessings which have been conferred on the country, such as "justice," "police," etc. What has been done in one place—say, "Guntur" or "Nagpore"—can surely be repeated, say, in Tinnevely and Bellary, and so on, until all the towns, and even villages, are protected.

In my report to Government on the cholera in Tanjore District (G. O., August 28, 1884, No. 1889), I drew attention to this matter, and I beg leave to repeat my remarks.

"I would propose that in every one of these villages a good deep well be sunk, properly made of brickwork and masonry, with parapet, sloping sides, etc., under the superintendence of the Local Fund Engineer; in some of the larger and more wealthy villages, one or two wells might be constructed. I think the people, as at Negapatam, would soon come to see the greater advantages of drawing water from such wells, than from open and contaminated tanks. I would even go a step further, and in some of the larger villages I would have a pump to raise the water into reservoirs, from which it might be drawn by stop-cocks, as is being done in Madura, and is to be adopted at Negapatam. The use of small pumps to raise water into reservoirs is common at many stations of the South Indian Railway. This not only saves much labour, but keeps the well from the possibility of being defiled by dirty ropes and chatties, etc.

"The use of 'driven tube wells,' commonly called 'Abyssinian wells,' is well worthy of consideration. It would make this communication too lengthy to go into details, but from a small work on the subject lately

published by Mr. John Scott ('Irrigation and Water Supply,' London: Crosby, Lockwood & Co.), it would seem they are now the form of wells most commonly sunk in many parts of England, and are not expensive, as the following extract will show:—

“‘It may be interesting to refer to some particular instances, where large supplies of water are thus obtained. At West Thurrock, in Essex, a cement company is pumping, from two five-inch tube wells, about eighty feet deep, 220,000 gallons per day of ten hours. Another cement works at Northfleet is pumping 60,000 gallons per day. These have been pumped daily for about four years, and still give a constant supply. As expense is an important feature, it may be mentioned that the cost of these did not exceed £60 each. The coupled tube wells are to be found in greatest numbers at the centres of beer manufacture, where abundance of pure and cool water is an absolute necessity. At Burton-on-Trent about two million gallons are pumped daily from these wells.’”

I think there ought to be no difficulty as regards ways and means, for I find that during the past four years Rs.1,17,748 have been allotted in the district of Tanjore for improvement of village sites and water supply, of which only Rs.37,274 have been spent. The balance, Rs.80,474, would sink a good many wells.

It is the same throughout the Presidency: the amount set aside for the improvement of water supply is never spent.

Nor is there anything repugnant to the religious prejudices of the people in thus improving their water supplies. On the contrary, as I have pointed out elsewhere, to keep their drinking water free from contamination is a religious duty strictly enjoined on all

Hindus in their ancient Shastras, and, as far as I have been able to gather in my various tours in this Presidency, the importance of this duty is fully admitted and recognized by all respectable natives.

Although I feel, as sure as I can feel sure of anything, that a "pure and uncontaminated water supply" would practically abolish the enormous mortality of these cholera epidemics; yet, if we are wrong, and it did not—if the scheme fell short of our (or my) expectations—no harm would be done, no useless expense incurred. All sanitarians are agreed that a pure water supply is, especially in tropical climates, the greatest boon that can be conferred on a community.

Now, the towns in the Madras Presidency which have a pure, or comparatively pure, water supply can be counted on the fingers of one hand.

The rest of the towns and communities use mostly sewage.

M. C. F.

