

GOVERNMENT OF MADRAS.

PUBLIC DEPARTMENT.

READ—the following papers :—

From G. T. WALCH, Esq., Superintending Engineer, I Circle, to the Chief Engineer, Public Works Department, dated Dowlaishweram, 1st April 1887, No. 4—V.Z.

I have the honor to forward herewith, for such actions as you may see fit, a letter* from Lieutenant-Colonel A. T. Fraser,

* No. 1858, 21st March 1887 (in original.) Executive Engineer, Vizagapatam division, suggesting a special investigation into the causes of the fever prevalent in parts of the Vizagapatam district.

ENCLOSURE.

From Lieutenant-Colonel A. T. FRASER, R.E., Executive Engineer, Vizagapatam Division, to the Superintending Engineer, I Circle, dated Waltair, 21st March 1887, No. 1858.

I have the honor to request that the extraordinary unhealthiness of part of this district may be specially represented with a view to an investigation into its cause and prevention. There are large scientific resources at the disposal of Government, much light has been thrown by the science of the present day on questions of this nature, and one or other of the learned societies might not, if their co-operation were invited, be indisposed to give assistance.

2. The singular part of it is that while there is evidently some taint in the air of the whole of the Vizagapatam district, there is less observable in the hill tracts and worst localities for fever than elsewhere. The climate of Pottinghi is positively enjoyable compared to that of the low country and the surface is drained and bare; yet the fever obstacles in places I know, such as Canara and the Wynaad, are mere child's play in comparison with those met with there and more than a hundred miles beyond on the line of the new frontier road.

3. I may mention that I have been twice up to Pottinghi (3,469 feet above the sea) and last time on the 1st March; the Assistant Engineer had not got completely over an attack he had on the 25th February; the only medical attendant on the works, a hospital assistant, was running about throwing his things frantically here and there in fever delirium, and Supervisor Turner, who had come up a few days previously, and the only subordinate, was at Koraput unable to move. It is very common, the Assistant Engineer told me, for those delirious from the Pottinghi fever to have to be held.

4. On returning down the ghât I had a letter from overseer Lewis, asking if he could get another sub-division, as his health was affected, and there is one continual wailing from clerks and subordinates either not to be sent or to be withdrawn.

5. I had taken every precaution to have the ground round the inspection huts on the ghât cleared of undergrowth, and the huts themselves drained and improved; yet notwithstanding, though I was able to bicycle twenty miles between Bimlipatam and Vizianagram on the 17th February on the way up without any particular effort, it was very different returning at the same point of the route on the 9th current, or after little more than three weeks, owing to some fever which came on for no perceptible reason. In fact it took me seven days to be disembarassed of this fever.

6. It appears monstrous not to be able to examine work in an ordinary way without a liability approaching to certainty of being laid up with a lowering attack of illness before the end of the round, which happens nowhere but in the Madras Presidency on such a scale.

7. But this would be a mere personal matter too trifling for attention, were it not that besides the clerk I had with me having had fever at the same time and been ineffective since, as I would bring to notice, the miasma of the district has directly or indirectly precipitated the decease of several valuable Engineers—Colonels Blagrove, Wood, and Montgomerie, R.E., and Mr. Nordman and Mr. Harris, C.E.—who have had to do with it, and every subordinate of the

Public Works Department, European or Native, who has ever been stationed at Koraput has been invalidated from the place.

8. The practical results to be gained by the humane investigation I recommend would be numerous.

9. Turning up the ninth edition of the Encyclopædia Britannica under the head "Malaria" for the latest opinion on the subject, I was surprised to find it had not advanced, and the possibility of Dr. Oldham's supposition that there was no such substance was still admitted. Setting against it the immense consumption of quack remedies and Government medicine at the two hospitals, at the head and foot of the Pottinghi ghât, is in itself a refutation.

10. While there is any doubt as to the existence of malaria, or uncertainty what is its character, there is no knowing whether it is of any use cutting down the forest in the beds of streams and for a few feet on each margin, clearing the sides of the ghât road for a certain number of feet, or best to leave the trees, encouraging or preventing cultivation, planting gum trees round Pottinghi widely and where and the like. There might be some improvement in remedial treatment also, which is perhaps nearly as injurious as the fever, and at present mostly all groping in the dark with quinine and arsenic.

11. The Pottinghi-Koraput route affords an unusually well situated field for such an inquiry, on account of the ease with which an immense variety of evidence can be collected. There is much that is negative, for instance, very instinctive to any who are practised in modern research. The inhabitants of the hill tract are healthy, whilst those of malarious districts are feeble and sickly. They pine immediately on coming to live on the coast. Europeans may be some months at Pottinghi before they experience any fever, or it takes another form, or fever appears when they come down to the coast. The water is said to be wholesome. There is a rapid fall of temperature, as much as 20° after sun set. A thick bituminous mist rises at night at Pottinghi quite different in appearance from drifting mountain mist, and clears away late in the morning; streaks of the same mist are to be seen at the foot of the hills. The fever attacks unexpectedly, and may subside in a few hours.

12. Though therefore the task of identifying malaria by the microscope alone may be unpromising and tedious, there are conjectures offered by the circumstances not very difficult to prove or discard. The malaria may be the floating germs of one of the weeds in flower, or a fungoid growth on live or decayed leaves of some plant borne by the wind, or it may be the rise of a bacterial ferment from rock in decomposition, or from the upper stratum of the ground in the daily barometrical tide, or through subterranean pressure as I suspect. But for this a competent observer is required, and physical appearances may then guide to where malaria may at last be discovered.

No. 20 D.

Transferred to the Public Department for the consideration of the Surgeon-General with the Government.

Ootacamund,
18th April 1887.

(Signed) J. O. HASTED, Colonel, R.E.,
Secy. to Govt., P.W.D.

From G. BIDIE, Esq., M.B., C.I.E., Surgeon-General with the Government of Madras, to the Chief Secretary to Government, dated Ootacamund, 9th June 1887, No. O-217.

With reference to your memorandum, No. 1678 of 12th May 1887, referring a letter from the Executive Engineer, Vizagapatam, in which he brings to notice "the extraordinary unhealthiness of part" of that district, I have the honor to submit the following remarks to the Right Honorable the Governor in Council.

2. The late Professor Parkes remarked, that when a climate is called unhealthy, in many cases it simply means "that it is malarious," and there can be no doubt that the "taint in the air of the whole district" of Vizagapatam to which Colonel Fraser alludes is simply malaria. As a matter of fact, the district has always been malarious in many parts, but there is nothing to show that this kind of unhealthiness is on the increase, and there are other circles which suffer quite as much from malaria as Vizagapatam.

3. Appended to this letter will be found a table showing, for each of the past ten years, the ratio of deaths from fever in each district of the Presidency per thousand

of population submitting returns. From these figures it appears that while the mortality from fever in Vizagapatam has, as in other districts, fluctuated, there is nothing to show that it has been on the increase. The table further demonstrates the fact that other districts, such as Ganjam, Nilgiris, and Cuddapah were very much on a par with Vizagapatam as regards the scourge of malaria, while in Kurnool it was even more deadly. Even the city of Madras has in some years shown a fever death-rate not far behind that of the northern district; but in this connection it may be some consolation and ground of hope to know, that in 1558 ague was so fatal in London, now one of the healthiest cities in the world, that the living could scarcely bury the dead.

4. In thus contrasting the fever mortality of Vizagapatam with that of other parts of the Presidency, and showing that it has not been on the increase, my object has not been to make light of the unhealthiness complained of, but simply to show that there is nothing new or phenomenal in it, and no grounds for special alarm. With regard to Colonel Fraser's suggestion, that Government should institute a scientific inquiry into "the cause and prevention" of the sickness, as also into the existence and nature of malaria, it would give me great pleasure to recommend such an investigation, did I see the slightest chance of its being attended with any useful result within a reasonable time, but of this I cannot see any hope.

5. Besides a portion of the proposed inquiry has been forestalled by workers in Europe. In certain parts of South Italy malaria has taken possession of tracts of country which, within the historical period, were perfectly healthy, so that in this quarter it has been possible to trace the cause and development of malaria with much success. In the latter days of the Roman Empire there were various districts occupied with splendid villas and surrounded with smiling gardens, which are now uninhabitable. The primary causes of this great change were the invasion of the Goths and subsequent political convulsions, which led to the destruction of dwellings, woods and gardens, depopulation and the return of the land to a state of nature. Such changes could not fail to have a prejudicial effect on climate, and in fact we know that it gradually became unhealthy, the malaria increasing as the degrading processes in local conditions went on. Here then we have a striking illustration of the causes which led to a country, originally healthy, becoming malarious, and an inquiry in Vizagapatam would not be likely to throw any new light on this part of the subject.

6. As to the nature of malaria, it is not yet quite certain whether it is due to a pathogenic organism or simply to climatic conditions. But fortunately this is not of much practical importance, as we know but too well where it exists and how it behaves; and our chief concern is how to subdue and banish it from a district and how to prevent and cure the disease which it produces in man.

7. The great enemies of malaria are cultivation and drainage of the soil, but unfortunately Government can do very little directly to extend the influence of these beneficial agents. Possibly railway extension and the improvement of one or more of the northern ports, so as to promote trade and increase the demand for agricultural produce, would prove the most effectual means of extending the area of cultivation, and thus gradually banishing malaria. Planting of trees judiciously in denuded tracts, and the substitution of trees for scrub are also valuable agencies. In short, by culture and drainage of the soil, and by the growth of trees in a district, we are able to make its climate more equable, and to get rid of great and often sudden changes of temperature which have a powerful influence in producing malaria. Apart therefore from the economic value of timber, it will be seen that the operations of forestry are of immense importance in connection with the health of a country.

8. With regard to Colonel Fraser's inquiries in paragraph 10, as to whether it would be of any use "cutting down the forest in the beds of streams and for a few feet on each margin, clearing the sides of the ghât road for a certain number of feet, or best to leave the trees," it may be stated that, so far as sanitary requirements are concerned, it will probably be better to leave the trees and vegetation alone, so long as working gangs are employed in the neighbourhood, as the cutting down of timber and exposure of the soil in feverish districts is apt to increase the malaria for a time.

9. With reference to Potinghi, as the surface is stated to be bare, very probably the planting of *gum trees* would have a beneficial effect on the climate, especially if placed in positions in which they would serve as screens to prevent the influx of malaria from suspicious places in the neighbourhood.

10. Great care should be exercised in selecting the site of camps, and there can be no doubt that an elevation of some feet above the ground for huts, such as we see in houses in Burma, is of some service in warding off malaria. High ground should be chosen for the location of dwellings, and nullahs, ravines, shut in valleys, and the neighbourhood of marshes avoided. The direction of the prevalent winds in the most unhealthy months should also be ascertained and there should be no windows on that side of the dwellings. Exposure to night air and the mists of the early morning should also be avoided; and night fires, warm clothing, and good food will all help to ward off the effects of malaria.

11. With regard to the remark in the margin, I beg to demur to it, as the treatment of paroxysmal fevers is perfectly well understood, and there is no more groping in the dark when quinine or arsenic is given than there is when an Engineer puts a charge of dynamite or gunpowder into a hole in a stone. Because such fevers are often fatal does not imply that their nature and treatment are not understood, but simply that in some cases the effects of the malaria have been so powerful or the patient so weakened by previous attacks, or handicapped by other latent disease, that recovery is impossible.

Ratio of deaths per thousand of population from 1877 to 1886.

Districts.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
Ganjam	9.8	15.5	11.2	10.4	12.6	12.6	8.4	10.5	10.7	11.1
Vizagapatam ..	9.8	10.9	14.4	10.9	12.0	11.8	10.9	12.9	13.7	12.6
Godavari	8.4	10.3	11.0	7.1	7.5	9.0	7.9	9.4	9.2	10.7
Kistna	7.4	11.5	10.3	7.9	6.9	9.1	8.3	9.0	8.3	9.6
Nellore	19.3	21.5	7.1	5.5	6.1	4.5	6.6	6.8	7.7	7.7
Madras	15.6	12.7	8.9	9.1	9.5	9.6	8.7	9.5	9.1	9.6
Chingleput ..	11.2	6.6	7.8	7.9	7.5	5.9	5.6	6.2	6.2	6.8
South Arcot ..	16.3	8.9	10.4	6.1	5.2	5.5	5.5	5.8	5.8	6.7
Trichinopoly ..	11.2	8.6	6.2	4.9	5.6	4.9	5.2	4.9	4.6	4.5
Tanjore	2.9	2.9	2.8	2.2	2.3	1.7	1.7	1.9	1.5	1.6
Madura	20.6	15.1	12.2	6.0	6.0	6.0	7.0	7.3	7.9	7.6
Tinnevely	6.2	6.6	5.9	4.9	4.4	3.3	3.4	3.7	3.4	2.9
Kurnool	60.5	35.7	21.6	17.8	10.2	13.0	14.0	15.1	16.2	16.9
Cuddapah	45.6	32.9	18.6	16.6	11.4	9.8	10.0	10.9	13.0	13.7
Bellary and Anantapur ..	18.3	15.3	7.9	6.3	5.2	4.0	4.4	4.6	4.6	4.3
North Arcot ..	23.9	13.3	10.7	7.3	5.5	4.6	5.8	6.4	8.6	8.7
Salem	25.5	12.4	11.0	5.8	5.5	4.7	6.3	6.8	7.8	8.8
Coimbatore ..	12.2	7.9	8.1	5.6	6.1	6.3	7.7	7.7	6.5	6.7
Nilgiris	32.2	13.7	9.2	9.5	10.6	10.6	8.6	12.0	13.3	11.7
South Canara ..	6.6	18.9	11.9	6.1	6.5	4.8	7.7	10.3	9.4	8.08
Malabar	7.06	8.4	6.9	6.8	7.9	8.0	11.8	10.5	9.6	8.2

From Surgeon-Major J. A. LAING, Officiating Sanitary Commissioner for Madras, to the Chief Secretary to Government, dated Madras, 11th July 1887, No. 782.

With reference to your memorandum, No. 1678, dated 12th May 1887, referring a letter * from the Executive Engineer,

* Forwarded to me by the Surgeon-General with the Government of Madras. Vizagapatam division, I have the honor to submit the following remarks to the Right Honorable the Governor in Council.

2. Vizagapatam district, on account of its situation and conformation, has great varieties of temperature. Thus along the sea coast the climate is relaxing and the

variations in temperature are slight. A few miles, however, from the sea the air is very dry and hot for four months (February to June) in the year, and during the winter months the weather is cool and bracing. The climate of the ghâts is again different, the nights always being cool. In the Jeypore hill tracts there are great and sudden alterations of temperature, the days being generally warm and the nights cold.

3. No portion of the Vizagapatam district can be said to be completely free from fever. In the Jeypore hill tracts the fever generally assumes a severe type, but along the sea coast it appears in a mild form.

4. In Colonel Fraser's letter he alludes particularly to the Jeypore hill tracts as being very unhealthy, and states that the Potinghi-Koraput route affords an unusually well situated field for an inquiry into the cause and prevention of fever. Last year I made a tour in the Vizagapatam district and went into the Jeypore hill tracts by the Potinghi-Koraput route visiting Potinghi, Koraput and Jeypore. The Jeypore country in some places is undulating, and in others there are lofty ranges of hills. In parts there are dense forests, while in others the hills are comparatively bare or covered with low jungle, but nearly every where there is an under-growth of tall rank grass.

5. In the Jeypore hill tracts are to be found the characteristics of countries where malarious diseases prevail, viz. :—

- (1) Dense jungles, uncultivated wastes and decaying vegetation. In places where there are dense jungles the ground, during most part of the year, is wet or moist, and the air is loaded with unwholesome damp and charged with decaying vegetable matter. The desiccating rays of the tropical sun (owing to the luxuriant vegetation) are kept from the surface of the soil, preventing free evaporation and drying of the surface, and also the dissipating influence of fresh breezes is lost.
- (2) A damp soil and, in some places, a water-logged condition of the sub-soil.
- (3) Sudden alternations of temperature there being great fluctuations between the midday heat and the extreme cold night air.
- (4) Drinking water from a malarious district.
- (5) The housing, clothing and feeding of the people (especially those who go into camp) are often so inferior as not to protect them from the ordinary daily climatic changes. The huts are frequently placed on a damp soil in the midst of luxuriant rank vegetation—overcrowded and badly ventilated.

6. From the annual returns of deaths from fever for some years past (*vide* table sent by Surgeon-General G. Bidie, M.B., C.I.E.,) it does not appear that the mortality from fevers is increasing in the Vizagapatam district, and there are other districts which show as high death rates from this cause. I may here mention that no returns of births and deaths are sent from the Jeypore hill tracts, and therefore no accurate opinion can be formed as to the mortality from malarious diseases in that country.

With regard to an investigation being held as proposed by Colonel Fraser into the cause and prevention of malarious diseases in the Vizagapatam district, I agree with Surgeon-General G. Bidie, M.B., C.I.E., in thinking that such an inquiry is not advisable, as there is very little chance of its being attended with any useful results within a reasonable time. Many investigations have already been made and by authorities who have studied the subject most deeply, but although "malaria" is a word in common use, yet it is not easy of definition, as it has no exact scientific signification. There are many theories in regard to the actual nature of the cause of malarious fevers, but the question is still unsettled, and many of the conditions formerly believed to be essential to its production are now known not to be so. Geology has little to do with malaria, except in so far as it affects the physical nature of the soil, and all attempts to discover an organism capable of producing the disease in the air, soil or water of malarious districts have signally failed. In fact, many well-known authorities discredit the existence of such a thing as malaria altogether, the phenomena attributed to it being accounted for by alternations of temperature and chill. Without entering further into the various theories which have been put forward as to the cause of malaria, we may take it as a generic term for a certain insanitary condition of the atmosphere, and that it has a most intimate relation to the soil and to local climate.

Although no exact knowledge as to the nature and source of malaria has been obtained, yet the methods by which a malarious district can be converted into a healthy one are well recognised. These are thorough and efficient drainage (which purifies both the ground air and ground water) and agriculture. That these means may be employed with certainty of success has been proved beyond doubt. During the last 200 years cases of ague in England have been greatly on the decrease as agriculture and good drainage have become more general and perfect. In fact we are reminded of the prevalence of intermittent fever two centuries ago by the well-known words of Oliver Cromwell, himself a victim to ague, "matrem pientissimam, fratres, sorores, servos, ancillas, nutrices, conductitias, quotquot erant intra eosdem nobis cum parietes, ac fere omnes ejusdem ac vicinorum pagorum incolae, hoc veneno infectos et decumbentes vidi," and when we remember the state the country surrounding London was in Cromwell's time, we cannot feel surprise at the extraordinary mortality from ague.

Unfortunately the beneficial measures mentioned above cannot be extended at once, for obvious reasons, to large areas such as the Jeypore hill tracts, and so malarious diseases will continue to exist until, in the course of time, the country is brought into complete tillage drained and cultivated. There are, however, precautions which should be adopted by those who visit, or live in, malarious districts, and if carried out the evil influences of ground damp and malaria are to a great extent avoided. As a small elevation above a malarious soil has been found to afford some protection, it is therefore very advisable that the houses should be raised on arches, &c., some 6 or 8 feet above the ground, and if any upper floors, they only should be occupied at night. There should be no opening towards the side of the malarious currents. On no account should the people when in camp sleep on the ground; always on cots. Measures should also be taken to improve the warmth of the dwellings and to counteract the general damp and chill and night air by the use of fires in houses especially during nights. The purest supply of water should be used. Well water being generally the best and should be only drunk after boiling. The people should also clothe themselves in a manner best suited to the requirements of the season and climate so as to protect them from the daily climatic changes, especially in such a climate as Jeypore with its sudden weather changes and alternations of temperature. The early morning air should be avoided for some hours after sun rise, and also the night air. Good food and a meal before exposure to the malaria have, in many cases, been found preventive measures. In and about villages, places should be kept clean and free from excretal deposits and other filth. In selecting sites of camps or for hutting coolies, ground covered with rank vegetation should be avoided, because of the decaying matter in the soil and because such vegetation generally indicates the presence of much sub-soil water. In temporary camps, trenching and draining the ground as much as possible should be done, and it is astonishing what a good effect a few well-planned surface drains have. In malarious parts, where it is necessary to hut coolies or other employés, the plan of raising the huts above the ground should be adopted, and there can be no doubt that the extra cost of construction will be more than repaid by the increased healthiness of the workmen and consequent gain in the amount of work obtained from them. The huts must be raised, however, sufficiently high to admit of any dirt or rubbish that may gather under them being cleared away, and the space below the floor must neither be allowed to become a deposit of garbage or to accumulate stagnant waters.

With regard to Colonel Fraser's inquiries in paragraph 10, it would not be advisable to make the clearances suggested indiscriminately or otherwise than under proper supervision. To cut down vegetation, &c., and there to let it lie and rot is but to produce the very evil we are trying to remedy. It is also an established fact that the cutting down of woods and forests has, in many known instances, converted the ground into swamps and marshes. Growing vegetation tends to diminish the dampness of the soil by causing rapid evaporation, and at the same time uses up the organic matter in the soil. It is therefore to this extent a benefactor and not an enemy, and the attention of the sanitarian is directed not so much in the way of cutting down and destroying vegetation as in amending the conditions under which such vegetation abounds and which encourage its rank luxuriance. Cutting down jungle would be ineffectual in altering the malarious characteristics of a locality unless the land be

properly drained and kept clean and free from all filth and cultivated. All waste lands or bare hills might, however, be planted with trees, care being taken to select such as discourage undergrowth and do not keep the rays of the sun from the surface of the soil. The common sun-flower, which is very easy of cultivation, has a powerful influence in reducing the dampness of the soil, and the well known blue gum tree of Australia might be planted with advantage in places.

In conclusion, I think it hopeless to expect the Jeypore hill tracts—where nature has her own way and jungle and virgin forests abound—to be otherwise than malarious until the inhabitants are brought more within the influence of civilization. The great want of the country is roads, but lately much has been done, and the road to Pottinghi is an important step towards the improvement of this large district.

ORDER—dated 4th August 1887, No. 1097, Public.

The papers read above will be communicated to the Government Agents, Vizagapatam, Ganjam and Godáviri for information and guidance. Copies will also be communicated to the Public Works Department, the Inspector-General of Police and the Commissioner of Salt, Abkari and Separate Revenue.

(True Extract.)

H. P. L. S.
Ag. Chief Secretary.

To the Public Works Department.
 „ Revenue Department.
 „ Judicial Department.
 „ Local and Municipal Department.
 „ Surgeon-General with the Government of Madras.
 „ Sanitary Commissioner for Madras.
 „ Government Agent, Vizagapatam.
 „ „ „ Ganjam.
 „ „ „ Godáviri.
 „ Inspector-General of Police.
 „ Commissioner of Salt, Abkari and Separate Revenue.

2366 W. of 2. Sept. 1887

Govt. of (1887) Madras.

PUBLIC.

Communicated to
the Superintending
Engineer I Circle with
reference to his letter
No 4 V. 3. dated 1st April
1887.

mcw
29. 8. 87

Jee
26/8/87

Issued

Recd.

Encl.

G.O., 4th August 1887, No. 1097.

110 2366 W. of 2. Sept. 1887

AUGUST.

Sanitary.

Communicating to officers concerned papers
regarding the unhealthiness of part of Vizaga-
patam.

Supdy. Engr. I Circle.
request to act
3/9

G. 29-8-87

With order