M R O 1—77,006—3 6-37.

(1) Number of pages________________

(2) Date of repair________________

(3) In[illegible] of the Referencer________________

MADRAS RECORD OFFICE.

Government of Madras.

Public works DEPARTMENT.

G.O. No. 1877-78 Press / Mis.

93-105

Dated 6. 8 1870.

Not to be folded or roughly handled

No 97. From the Superintending Engineer, 4th Division, to the Secretary to Government, Public Works Department, dated Madras, 22nd April 1870, No 315

I HAVE the honour to report, with reference to G Os, No 3,716 and No. 1,019, dated 22nd November 1869 and 12th April 1870, that no cases of disease in an epidemic form from the cultivation of irrigation have been brought to my notice personally, and Range Officers have reported that they are not aware of the existence of malaria engendering disease from swampy and ill-drained land in this division

2. I do not consider that the conditions which produce fevers of an endemic or epidemic type, and under which malarious poisons are generated in portions of Bengal, exist in Madras or Arcot. There have been no great public works to obstruct drainage, and there are no rivers discharging on the eastern coast of such a character that the low-lying districts are gradually filling up from deposits brought down and remain in the condition of an unhealthy swamp.

No 98. From the Acting Superintending Engineer, 5th Division, to the Secretary to Government, Public Works Department, dated Cuddalore, 6th May 1870, No 35

IN reference to G. O, No 1,019, dated 12th April 1870, and G O, No. 3,716, dated 22nd November 1869, communicating, for any remarks that the Superintending Engineers may think fit to offer, Dr. Sutherland's suggestions for the arrest and prevention of endemic disease in Lower Bengal, I have the honour to state that no case of endemic disease in this division has come to the notice of the department within the memory of any of its present members; and, considering the great extent of cultivation by irrigation in the division, and the especial freedom from all diseases of an endemic nature enjoyed by the ryots of those portions of the division so cultivated, it would appear that such diseases cannot, in this climate at least, be held, as a general principle, to be in any way attributable to the spread of irrigation projects Indeed, so far is this from being the case that I am informed that the Chedumbrum Talook is far healthier now than it has ever been before, solely in consequence of this spread of irrigation.

2 In the Salem District the most common disease is fever, but it rarely as[illegible]nes a bad form in those parts of the district that are cultivated by irrigation.

3 As regards this division, (and, in my humble opinion, the same remarks would apply to the Presidency generally,) I do not think that the Government need perplex themselves, as suggested by Dr. Sutherland, with a consideration of the question as to the amount of mischief that our "boasted improvements" have caused the natives

4 If our railways had "obstructed," as stated by Dr. Sutherland, "the natural drainage of the country," the "drainage" would long since have swept them off the face of the country.

5. As for "the deadly miasmatic atmosphere caused by the canals we "have created and wherever the irrigation system has been carried out" nothing can be wider from the facts, in this division, than such an imputation. On the contrary all our observations tend to exactly the reverse of this theory, so much so that it may be safely affirmed here that the effect of our irrigation is not only to render the air fresh and healthy, but it is almost a necessity in order to render the country habitable.

6. The sun is our great deodorizer, and compensates us, in a manner, in this respect for the great heat which our closer proximity to the equator entails on us.

7. Here, at Cuddalore, in the backwater and the channel that leads the drainage of the paddy-fields into the backwater, there is at day break that peculiar fetid odour to which the Cooum accustoms every one at Madras, and which especially delights to linger about the main entrance gates of Government House. By 8 A M or so the smell is deodorized by the sun, and at that time you may ride along the banks of the channel and backwater without the risk of being "incommoded"

8 Where the sun cannot freely penetrate, there is consequently a stagnation of air, such as exists at the foot of hills, especially those with dense vegetation and thick jungle—as is the case, for example, in the western portion of the Cullacoorthy Talook, where it abuts on the Kalry Hills, which form the western portion of the South Arcot District. This is a certain fever range, though the country there may be said to be marked with a total absence of vegetation.

9 The Western Ghauts form a noted instance in this respect: there, as is well known, the western slopes of the mountains are mostly steep and precipitous, and the sea-breeze blowing westwards drives back and blocks up, as it were, against these precipitous hills, the miasmatous air and poisonous night-exhalations from the dense jungle that is formed by an inordinate rainfall and sodden heat; and so poisonous is this miasma that even to be driven at night in a shut-up carriage through this jungle is almost certain death from jungle fever.

10 In the same way, in the bay of hills forming Courtallum in the Tinnevelly District, owing to the dead block of all currents of air, the miasma given off by the jungle entails certain fever until the rains set in, when the driving wind and rain scours out the ravine, and the air becomes fresh and purified, and renders the place a delightful residence, if not a sanitarium

11 From the above it will be seen that in this division, and I may add Presidency, the worst cases notoriously of endemic disease are in jungles where there are certainly no marshy soils The geological formation of the southern portion of the Peninsula differs entirely from that of Lower Bengal and the Gangetic Delta We have, as a rule, no underlying clay, but a sub-stratum of gravel, sand, or kunkur If for this reason only, the formation of gigantic cesspools, as advocated in Dr. Sutherland's letter, paragraph 13, is, to say the least, quite uncalled for.

12 In conclusion, I must confess that I fail to comprehend that portion of Dr Sutherland's letter, (paragraph 10,) in which he states that "the endemic having "exhausted itself in one locality by carrying off all the more susceptible, would "naturally progress into other districts where it would find fresh and predisposed

"victims" It appears to me that if fever is, as stated, caused by the emanations from marshy soils, the residents on those soils being all subjected simultaneously to the same climatic influences would be similarly and simultaneously effected by the miasmatic fever. Why the fever should first attack one village, and, after having decimated it by destroying all the sick and weakly should deliberately proceed to the next village, and indulge itself in a like manner until "exhausted," for want of victims it pushed on to the next again, and so on, is as much a mystery to me, and appears no more improbable than the havoc committed by the Dragon of Wantley or Guy Earl of Warwick's Dun-cow.

No 99. From the Superintending Engineer, 6th Division, to the Secretary to Government, Public Works Department, dated Tanjore, 21st April 1870, No 79.

With reference to G. O, No. 1,019, dated the 12th instant, I have the honour to forward copy of a letter* addressed by me to the Collector of Tanjore relative to the non-liability of the district to malarious fevers. My views on the subject are stated in the letter.

* No 1,258, of 31st January 1870

2 I was not aware that a separate reply to G. O,† No. 3,716, was required in this department.

† Dated 22nd November 1869.

From the Superintending Engineer, 6th Division, to the Collector of Tanjore, dated Camp at Coviladi, 31st January 1870, No 1,258

With reference to your letter, No 19, dated 27th instant, I have the honour to inform you that, so far as my observation goes, there are no localities in the Tanjore District in which malarious fever prevails This I attribute to the fact that, owing to the large volume of water which is available through a large portion of the irrigating season, water is constantly in motion, more water being taken than is required for the actual purposes of cultivation, and the superfluous water being allowed to pass off by the surplus streams, hence there is no stagnation of water.

2 Were it not for the constant flowing of the water over the country, it is very probable that Tanjore would be as unhealthy as large rice-producing tracts generally are, and hence I have always opposed propositions for the reduction of the supply which shall be permitted to enter the delta below the quantities which the daltaic rivers are known to be able to carry with safety, and these quantities are nearly two and a half times the theoretical supply for the cultivation under the Vennaur and nearly three and a quarter times that for the cultivation under the Cauvery.

Three cubic yards per hour per acre.

No. 100. From the Acting Superintending Engineer, 7th Division, to the Secretary to Government, Public Works Department, dated Coimbatore, 22nd April 1870, No. 16.

With reference to G. O., No. 3,716, of 22nd November 1869, and G. O, No. 1,019, of 12th April 1870, I have the honour to report that there are no new irrigation works in this division, but nearly the whole of the country irrigated, from

the Bhowany and Cauvery lying north of Erode in the Coimbatore District, is annually visited by fever from February to the end of May.

No. 101. From the Acting Superintending Engineer, 8th Division, to the Secretary to Government, Public Works Department, dated Kodaikanel, 4th May 1870, No. 199.

With reference to G. O, No. 1,019, of the 12th April 1870, I have the honour to state that in no part of the 8th Division does it appear that fever is attributable to the existence of irrigated land. The division is generally well drained and water does not stagnate; were the latter the case, it is not improbable that endemic disease would be generated.

2. On the low ranges of hills and along their bases fever of apparently a malarious type is always more or less rife from the month of January to the middle of June. The monsoons seem to have the effect of destroying the malarious poison, for, as soon as they have fairly set in, the hills and their vicinity are rendered healthy. A good instance of this may be seen in Courtallum, the sanitarium of the Tinnevelly District. This place is situated at the foot of a range of hills running north and south, and is, during the months of March, April, and May, a most unhealthy spot, but from the middle of June, when the south-west monsoon accompanied by strong winds has properly set in, the character of the locality is quite changed, it is then a most favourite resort for invalids, and is considered by Medical men perfectly healthy in every respect.

3. Another instance of the effect of the monsoon is observed on the hills at the head of the Cumbum Valley, in the Madura District. The plateau on these hills averages some 3,000 feet above sea-level, and, at times, from February to end of May, is considered a hot bed of fever. As soon as the rivers have been freshened up by the south-west rains, fever ceases and the hills are delightfully cool and quite healthy, whereas at Goodalor, a village distant only some ten miles from the ridge which stops the rainfall, fever continues, and the place is generally avoided as dangerous.

No. 102. From the Special Executive Engineer, Wynaad, to the Secretary to Government, Public Works Department, dated Vythery, 9th May 1870, No. 346.

With reference to G. O, No. 3,716, dated 22nd November 1869, I have the honour to forward the following remarks on the subject of malarious fever.

2. In the first place, in this district of Wynaad, fever is so notoriously prevalent that Wynaad and fever seem to be quite inseparable in the ideas of most people who have ever heard of the locality; but as regards its causes they certainly cannot in any way be attributed to artificial irrigation, as nothing of the sort exists, not even to the extent of distributing water by pecottahs from wells, the cultivation of wet crops being entirely left to the aid of nature, so far as irrigation is concerned, through the agency of natural water-courses and the heavy rainfall extending over several months of the year.

3. In my ten years' experience of this district I have observed that fever is most prevalent along the banks of rivers and in open forest land in which

the trees are of deciduous foliage, especially teak forests, the fever contracted in localities where this timber grows appearing to be the most virulent in type; on the contrary, when the forest is very close and the situation protected from wind, I have seldom seen people attacked by the disease, or, if they have been, it has been generally in a mild form.

4 I observe that the indigenous tribes, who are the least subject to the disease of any, do not build their houses on heights; in fact, as a rule they are to be found close to the edges of paddy flats, and even of swamps · their study seems to be to surround themselves with trees of thick, heavy foliage, such as jack, plantain, and the like, and to shut out the wind; positions also surrounded by heavy forest they are partial to. It is in the larger villages built on open ground, where fever is most rife, and more especially where the drinking-water is procured from rivers Whether in this latter case anything is due to the pollution of the water with coffee pulp, I cannot take on myself to say. Formerly the nuisance from this was intolerable, and the filthy fetid condition of every running stream in the district during the crop season could not but have been productive of much disease; a great effort has been made to prevent this pollution, and with a good measure of success, though not to a complete extent. It would, doubtless, be well to turn attention to this, but, as the bad condition of the water I believe is a good deal due to the great quantity of vegetable matter brought down and held in suspense, I look to the improvement of health more in the direction of wells than to any other resource.

5. A sum of Rupees 5,000 laid out on wells would, I am persuaded, do incalculable good, and, when the object is the health of a whole district, the amount is but trifling With Rupees 5,000 upwards of thirty wells might be sunk, and these distributed to such places as Goodalor, Sultan's Battery, Nellialum, Manantoddy, Panamaram, Vythery, Culpathy, Choondale, Meenenagady, Korote, Kelloorangady, Terriote, and other localities, would, I am convinced, show beneficial results In some of these a single well would be sufficient; in others two, three, and even four might be required.

6. I see in paragraph 11 of the letter of Dr. Sutherland my idea, of fever not being generated but rather held back by thick vegetation, is confirmed, and in 13 and succeeding paragraphs tanks are recommended. Very few of these exist in this district, but I think the opinion is one that might well be tested, and I would propose an experiment at a locality where latterly there has been a good deal of fever, and where, by embanking across a small gorge, a tank might be formed at no very great cost, the locality I mean is Sultan's Battery.

7. That fever will be entirely eradicated from Wynaad I look upon as hopeless; but much may be done to make it less prevalent, and still more towards alleviating the sufferings of its victims Supplies of febrifuge powders put into the hands of Government servants in Revenue, Police, and Public Works Departments for gratuitous distribution would do much, of course the gratuitous distribution being limited to the poor, while to those who can afford to purchase the drug might be sold at cost price. Dispensaries properly supported at Goodalor, Sultan's Battery, Manantoddy, Vythery, Culpathy, and Panamaram would all be most useful institutions, and, except at the three principal places, need not be of any expensive

character. A house for a Medical subordinate, a dispensary room, and a couple of wards for bad cases, all built in the cheapest, plainest manner, would be all that would be required. I consider no place in the whole district needs something of the sort more than Sultan's Battery, where there is a large native population, but no European settlers; so that the facilities for obtaining medicines and advice enjoyed by coolies on estates from their employers are not there to be found. The place is also likely to increase in importance, it being a point at which the principal lines of communication with Mysore will converge.

8. I do not know whether I have erred in thus going into detail, but it is difficult (when called upon to give an opinion) for one with a simply local experience to avoid what may perhaps be somewhat petty in considering a subject of large importance.

Proceedings of the Board of Revenue, dated 1st June 1870, No. 3,733.

Read the following papers :—

102 A

Letter from the	Acting	Collector	of Ganjam,	dated 29th Jan.	1870, No.	49.
"	"	"	of Vizagapatam,	" 18th Feb.	" "	133.
"	Offig.	"	of Kistna District,	" 10th March	" "	1,003.
"	"	"	of Nellore,	" 16th Feb.	" "	285.
"	Acting	"	of Bellary,	" 17th "	" "	38.
"		"	of Cuddapah,	" 26th March	" "	54.
"		"	of Kurnool,	" 27th Jan.	" "	34.
"	Acting	"	of Madras,	" 14th Feb.	" "	45.
"		"	of Salem,	" 28th Jan.	" "	20.
"		"	of North Arcot,	" 27th "	" "	28.
"		"	of do.	" 22nd Feb.	" "	73.
"	Acting	"	of Trichinopoly,	" 6th April	" "	73.
"	Offig.	"	of Madura,	" 17th Feb.	" "	54.
"	Acting	"	of Coimbatore,	" 15th Jan.	" "	8.
"	Commissioner		of the Neilgherry Hills	" 19th Jan.	" "	8.
"	Collector		of the Godavery District,	" 25th April	" "	110.

Proceedings of the Madras Government, dated 23rd April 1870, No. 96, Revenue Department.

Proceedings of the Madras Government, dated 12th April 1870, No. 1,019, Public Works Department.

Memorandum from the Assistant Secretary to the Government of India, to the Secretary to the Government of Madras, Public Works Department, dated Fort William, 24th March 1870, No. 158-1 B C.—

The undersigned is directed to invite attention to Public Works Department Circular, No. 75, dated 6th September 1869, forwarding, for an expression of opinion, a report by Dr. Sutherland containing suggestions for the arrest and prevention of endemic disease, and to inquire when a reply thereto may be expected.

COMMUNICATED to the officers concerned, in continuation of Government Order, No 3,716, dated 22nd November 1869, with a request that they will expedite the submission of the report therein called for.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R. E,
Secretary to Government, P. W.D.

FORWARDED to the Board of Revenue, with reference to Government Order, 7th December 1869, Miscellaneous No. 13, who will be good enough to expedite the submission of the report.

(True Extract.)

(Signed) H. WELLESLEY,
Acting Under-Secretary to Government.

THE Board resolve to submit these reports for the information of Government.

2. No facts corroborative of the views of Dr. Sutherland are reported from Ganjam or Vizagapatam, the two most feverish districts in the Presidency. Increased unhealthiness has been noticed in a limited area of the latter district recently watered; but the tract is a jungly district under the ghauts, and no positive conclusion can be drawn from the facts at present. No accurate statistics are available.

3. The Collector of Godavery reports the prevalence of fever of a manageable type during the cold weather, and finds that there is a larger number of deaths from fever in the delta talooks than in the sparsely-peopled upland talooks; but the proportion of deaths to population is not given, and the returns are avowedly unreliable for the earlier years of the series compared.

4. No serious increase of fever has been observed in the irrigated talooks of the Kistna District. The uplands and dry talooks are notoriously feverish.

5. From the dry districts of Kurnool, Cuddapah, (an unhealthy district,) and Bellary, the Collectors report that no increase of fever is attributable to irrigation operations, and the Collectors of Madras, North Arcot, Salem, Madura, and Coimbatore are of the same opinion in respect to the districts under their charge.

6. The Collector of Trichinopoly does not consider that either in this district or Tanjore, with which he is intimately acquainted, any prevalence of fever is attributable to irrigation. In Trichinopoly the disease is most prevalent and deadly in the upland talook of Udayarpalayam.

7. The opinions of local officers throughout the Presidency fail to corroborate Dr. Sutherland's views.

TRANSFERRED to the Public Works Department.

FORT ST GEORGE,
14th June 1870.

(Signed) H. WELLESLEY,
Acting Under-Secretary to Government.

No. 103 Endorsement of the Chief Secretary to Government in the Public Department, dated 15th June 1870 —

From the Sanitary Commissioner for Madras, to the Chief Secretary to Government, Fort Saint George, dated Madras, 17th May 1870, No. 528

I have the honour, in reply to Proceedings of Government, dated 29th April 1870, No 527, to state that the letter from Dr Sutherland, Deputy Inspector-General of Bengal, regarding the influence of obstructed lines of drainage in the production of malarious fevers, was recorded in the Proceedings of the Sanitary Commissioner for December last As Dr Ranking appears to have left no memorandum on record of his own views regarding the letter of Dr Sutherland, I presume he did not understand from the Government Order, No 1658, of the 2nd December 1869, that a special reply was expected of him I offer this explanation to account for the delay which has occurred in the disposal of the subject

Inquiry limited to causes of fever as affecting this Presidency

2. The general questions touched upon by Dr. Sutherland are undoubtedly questions of the very highest importance as regards the health and prosperity of the people of this country That gentleman's experience and observations refer more especially to the inhabited tracts of the Gangetic delta, and, as I can say nothing of my own personal knowledge of the physical conditions which have caused the lamentable mortality from fever in late years throughout great areas of Lower Bengal, I shall in the following observations confine myself to the inquiry "whether there is sufficient evidence to warrant the conclusion that malarious diseases have been increased in the districts subject to the Government of this Presidency by the obstruction of natural lines of drainage or by the increased moisture of soil produced by the extension of works of irrigation."

Influence of railway works in obstructing drainage not proved

3 In the first place I think it may with confidence be asserted that railways in this Presidency have not obstructed the natural drainage of the country or converted previously healthy localities into unhealthy and deadly hot-beds of malarious fever. I am tolerably well acquainted with the section of country traversed by the south-west line of the Madras Railway and also its Bangalore branch, and I have no hesitation in saying that these lines offer no obstacles to the natural drainage of the country through which they pass

Impounding of rainfall in tanks the rule in Madras Presidency

4. That the "natural drainage" of the country has from time immemorial, been retarded by the construction in every available spot of reservoirs of water for irrigation is quite true, but that the artificial obstructions of tank-bunds have tended to the diminution of the population by malarial poisoning is certainly not the case. Without these obstructions the whole of the plains and area eastward of the mountain chain, separating the Malabar from the Coromandel coasts, would for long periods be barren and incapable of furnishing food supplies to the present population

Alternate saturation and dessication of a soil needed for the production of malaria.

5. In a country depending so much for its natural fertility on the impounding of the rainfall in artificial reservoirs, it is certain that over very wide areas of this Presidency there must be alternate periods of saturation and dessication of the

soil, conditions which most authorities agree to be essential to the development of the unknown something we provisionally designate as "malaria" when occurring with a high atmospheric temperature

In certain localities, whether from the nature of the underlying rocks or soil or from other causes, the effects of this earth-born miasm on human beings is more apparent than in others, and these results may in some instances be due to excessive saturation of the soil with moisture, caused by obstruction to the normal drainage of the country.

System of irrigation in Madras not incompatible with health of people.

6. But, admitting that some evils attend the system of storing water in surface reservoirs by obstructing artificially its natural outlets, it is clear that, if the water derived from the periodical rains was not retained and artificially spread out over the country, the plains of the Carnatic would become a desert tract, incapable of affording food for man and beast. The system of bunding and storing up the rain waters for use in rice culture, whatever minor evils may flow therefrom, is not incompatible (as all our records prove) with a steady increase of population, such as could not possibly take place if exhalations from our tank-beds and paddy-fields were so powerfully malarious as they would seem to be in some other localities.

Fertility of the inhabitants of irrigated districts not impaired by malaria.

7 In the report of Dr Cutliffe, who made a sanitary inspection of the districts under canal irrigation in the North-Western Provinces in 1867, I observe that impotency and infertility of the inhabitants of the fever-stricken localities are noted as of common occurrence. Such results, if they occur at all in this Presidency, must be very limited in their operation, considering that irrigation has been practised on a very extensive scale from time immemorial, and that the human population within recent times has more than doubled itself. Malarial fevers do undoubtedly prevail in certain years and seasons; but they do not, as a general rule, interfere with the natural tendency to increase of population, nor is there any evidence showing that physical degeneracy of the people has resulted from malarial poisoning.

Physical changes in the soil influencing water levels

8 The causes alluded to by Dr. Sutherland, viz, the silting up of rivers and tanks, and the obstructions of the natural lines of drainage of the country, may or may not be productive of fever. These same causes are going on more or less in every part of the world, and have been in operation since the creation. Old rocks disintegrate, and are removed by aqueous currents to be deposited in new places The valley of the Ganges exhibits these processes of denudation and renewal on a vast scale; but the processes are essentially the same, whether the silt be deposited at the mouth of a river like the Ganges or in the bed of the smallest tank.

Malaria a product of any soil that is subjected to moisture and elevation of temperature

9. Malaria may be given off by any soil submitted to occasional moisture and exposed to a moderately high temperature Whether that soil be the alluvial of the Ganges or the hornblendic gneiss of sterile hills on the Mysore plateau, true malarious fever may be one of its natural products

The silting up of deltas of rivers not always followed by fevers

10. While accepting as probable the theory that the recent occurrence of fever in Lower Bengal may in part be due to certain changes in the water-level, it is quite certain that the slow silting up process to which Dr Sutherland is inclined to attribute so much evil may go on in other parts of the country without any marked accession of fever. Thus, in the delta of the Cauvery river, many thousand tons of silt are brought from the uplands every year by the flood-waters, the bulk of which silt is deposited over the area under cultivation, while nearly the whole of the flood-waters of the Cauvery river are taken up by irrigation channels and distributed over the surface of the country. The districts of Tanjore and Trichinopoly, which are thus plentifully saturated with water and silt for the cultivation of rice, are remarkable chiefly for their great immunity from malarious fevers, and in this respect contrast very markedly with the dry and comparatively unirrigated tracts of Bellary, Kurnool, and Cuddapah.

Statistics of fever in Revenue districts

11. In regard to the accompanying table, in which the fever mortality for the last four years of the several Revenue districts of this Presidency is compared, it is well to note that the figures are not absolutely reliable Apart from the difficulties of perfect registration by native agency, there must be admitted the fact that natives are apt to call many diseases "fever" which are not of malarious origin, and that some deaths from diarrhœa and dropsy, but really due to malarious poisoning, are not included amongst the deaths from fever. It must be remembered, too, that for every individual who dies of fever some fifty or sixty, or even a higher proportion, will suffer from a non-fatal attack of the disease If we wish to obtain a tolerably correct idea of the prevalence of fever in a district, it will be necessary to multiply the death ratios by fifty or sixty.

12. But making due allowances for these sources of error, the figures for the last four years afford us the means of judging of the relative prevalence of fevers in districts which are subjected to irrigation, or in which irrigation is not at all practised, or only on a limited scale. Thus the average fever mortality per one thousand of the population in certain districts noted either for the abundance or scarcity of wet cultivation has been for the four years ending 1869 as follows —

		Fever mortality
Districts under artificial irrigation	Godavery	8 7 per mille
	Kistna	3 2 ,,
	Tanjore	3 4 ,,
	Trichinopoly	2 9 ,,
Districts in which rice is chiefly grown from natural moisture of the south-west monsoon.	Malabar	6 5 ,,
	South Canara	8 6 ,,
Districts in which dry cultivation is chiefly practised	Bellary	6 6 ,,
	Kurnool	10 1 ,,
	Cuddapah	6 6 ,,

DEATHS from Fevers in the Districts of the Madras Presidency for four Years ending 1869.

District.	1866			1867.			1868.			1869			Average Fever mortality for four years.
	Population	Deaths from Fever	Ratio per 1000 of population	Population	Deaths from Fever	Ratio per 1000 of population	Population	Deaths from Fever	Ratio per 1000 of population	Population	Deaths from Fever.	Ratio per 1000 of population	
GANJAM DISTRICT	1,016,265	7,085	6 9	1,182,349	6,809	5 7	1,227,757	7,412	6 0	1,068,992	8,451	7 9	6 6
Municipal Town, Chicacole ...										14,686	115	7 6	
Do Berhampore										20,570	201	9 7	
Total Municipal towns ..										35,256	316	8 9	
VIZAGAPATAM DISTRICT	798,877	6,815	8 5	1,424,652	5,913	4 1	1,503,164	6,812	4 5	1,079,926	9,226	8 5	5 9
Municipal town, Vizagapatam										16,867	162	9 6	
Do Bimlipatam										5,192	13	2 5	
Do Vizianagram										14,046	104	7 4	
Do Palcondah										8,335	36	4 3	
Total Municipal towns										44,440	315	7 0	
GODAVERY DISTRICT	1,329,626	9,675	7 2	1,401,762	13,885	9 9	1,423,436	8,262	5 8	1,427,472	17,200	12 0	8 7
Municipal town, Cocanada										16,167	125	7 7	
Do Ellore										19,940	122	7 5	
Do Rajahmundry										17,498	159	9 8	
Total Municipal towns										53,605	406	7 5	
KISTNA DISTRICT	792,744	3,164	3 9	726,398	3,537	4 8	1,127,075	2,709	2 4	1,246,852	3,397	2 7	3 2
Municipal town, Guntoor										15,184	23	1 5	
Do. Bunder ..										27,510	59	2 1	
Total Municipal towns .										42,694	82	1 9	
NELLORE DISTRICT ..	979,737	2,867	2 9	1,060,932	1,834	1 7	1,161,442	1,972	1 6	1,134,757	2,318	2 0	2 0
Municipal town, Nellore										22,851	44	1 9	
CUDDAPAH DISTRICT	1,040,878	6,594	6 3	1,091,920	6,168	5 6	1,092,266	7,196	6 5	1,144,759	9,272	8 0	6 6
Municipal town, Cuddapah										14,685	69	4 7	
BELLARY DISTRICT	1,200,316	11,514	9 5	1,312,705	8,227	6 2	1,096,235	8,445	7 6	1,257,147	8,503	6 7	7 5
Municipal town, Bellary ...										37,015	250	6 7	
Do Adony ..										17,828	139	7 7	
Do Ghooty										4,097	29	7 0	
Do Anantapoor										4,426	12	2 7	
Total Municipal towns										63,366	430	6 7	
KURNOOL DISTRICT ..	718,865	6,698	9 3	740,614	7,913	10 6	770,728	7,737	10 0	770,318	8,160	10 5	10 1
Municipal town, Kurnool ..										23,816	291	12 2	
Do Cumbum										7,983	128	16 0	
Total Municipal towns										31,799	419	13 1	
MADRAS DISTRICT	664,836	2,227	3 3	664,836	1,996	3 0	656,945	2,096	3 1	758,007	2,631	2 4	3 2
Municipal town, Madras ..	450,000	2,256	5 0	450,000	2,456	5 4	450,000	2,232	4 9	450,000	2,015	4 4	4 9
Do Conjeveram										31,939	78	2 4	
Total Municipal towns . ..										481,939	2,093	4 3	
NORTH ARCOT DISTRICT ..	1,069,685	6,273	5 8	1,147,896	6,895	6 0	1,733,238	7,491	4 9	1,775,506	8,454	4 8	5 8
Municipal town, Vellore ..										30,529	150	4 8	
Do. Wallajah .										10,993	34	3 0	
Total Municipal towns ..										41,522	184	4 4	
SOUTH ARCOT DISTRICT	1,100,266	2,790	2 5	1,172,902	3,501	2 9	966,579	2,335	2 4	1,092,958	3,252	2 9	2 7
Municipal town, Cuddalore										27,424	47	1 7	
TANJORE DISTRICT ..	1,572,703	4,906	3 1	1,580,602	4,699	2 9	1,719,479	5,943	3 4	1,717,268	7,151	4 1	3 4
Municipal town, Tanjore ...										36,941	209	5 6	
Do Combaconum										29,283	152	5 1	
Do Mayaveram .										17,025	106	6 2	
Do Negapatam										33,095	159	4 8	
Do Mannargoody.										19,447	88	4 5	
Total Municipal towns										135,791	714	5 2	
TRICHINOPOLY DISTRICT ..	835,887	3,174	3 7	890,673	2,456	2 7	998,395	2,521	2 5	990,037	2,689	2 7	2 9
Municipal town, Trichinopoly										53,623	203	3 7	
MADURA DISTRICT ...	2,229,378	4,652	2 08	827,554	3,510	4 2	1,944,010	4,411	2 2	1,108,083	3,569	3 2	2 6
Municipal town, Madura										(Figures not available)			
Do Dindigul										8,951	57	6 3	
Total Municipal towns . ..										8,951	57	6 3	

DEATHS from Fevers in the Districts of the Madras Presidency for four Years ending 1869—(*Concluded*)

District	1866			1867.			1868			1869			Average Fever mortality for four years
	Population	Deaths from Fever	Ratio per 1000 of population	Population	Deaths from Fever	Ratio per 1000 of population	Population.	Deaths from Fever.	Ratio per 1000 of population	Population	Deaths from Fever.	Ratio per 1000 of population	
TINNEVELLY DISTRICT	1,363,051	2,379	1 7	1,363,051	1,897	1 3	1,524,121	2,420	1 5	1,082,301	2,960	2 7	1 8
Municipal town, Tinnevelly	...	...	...	...	...	...	...	...	...	21,553	36	1 6	
Do Palamcottah	...	...	...	...	...	...		...	...	13,315	24	1 8	
Do Tuticorin	...	...	...	...	...	...		...	...	9,544	52	5 4	
Total Municipal towns	...	...	...	...	...	...		...	...	44,412	112	2 5	
COIMBATORE DISTRICT	1,209,740	3,275	2 7	1,278,482	2,908	2 2	1,414,252	3,425	2 4	1,393,582	3,483	2 4	2 4
Municipal town, Coimbatore	...	...	...	...	...	...	...	...	...	25,324	94	3 7	
SALEM DISTRICT	1,493,221	6,909	4 6	1,493,221	5,100	3 4	1,525,945	5,771	3 7	1,619,233	9,271	5 7	4 4
Municipal town, Salem	...	...	...	...	...	...	...	...	...	33,072	100	3 0	
SOUTH CANARA	781,767	4,287	5 4	809,150	11,426	14 1	831,927	6,912	8 3	834,425	5,596	6 7	8 6
Municipal town, Mangalore	...	...	...	...	...	...	...	...	...	23,608	90	3 7	
MALABAR DISTRICT	1,716,852	12,562	7 3	1,728,014	11,381	6 5	1,859,329	9,500	5 1	1,849,671	13,026	7 0	6 5
Municipal town, Tellicherry	...	...	...	...	...	...	...			17,726	100	5 6	
Do Calicut	...	...	...	...	...	...	...	...		36,602	270	7 3	
Do Palghaut		...	...	...	...	...	...	...	...	27,533	178	6 4	
Do Cochin	...	...	...	...	...	...	...	...	...	9,910	36	3 6	
Total Municipal towns	...	...	...	...	...	...	...	...	...	91,801	584	6 3	
NEILGHERRY DISTRICT		...	...	...	...	...	...	...	...	38,142	409	10 7	

NOTE.—The separate returns from Municipalities have not been available until the year 1869. They are entered separately with the view of showing whether the inhabitants of towns have a lesser or greater tendency to fever than the general population. The returns for a single year, however, are not of much value.

Fever mortality fifty per cent higher in three non irrigated districts than in three under wet cultivation

13. The districts under moderate irrigation need not be specially noticed here, it is only necessary to direct attention to the fact that in the four years ending 1869 the fever mortality was more than fifty per cent. lower in the irrigated districts of Tanjore, Kistna, and Trichinopoly than in the dry uplands of Bellary, Kurnool, and Cuddapah.

Caution necessary in receiving such figures

14. Facts like these would seem at first sight to be conclusive in regard to the general question of the effects on human beings of the system of irrigation which the Government in this part of India have done so much to develop and encourage. But practically the evidence is in contradiction of the experience of Northern India and countries in Southern Europe, and does not enable us to say conclusively that the saturation of the surface soil with water and its dessication under a high temperature may in all situations be practised with impunity even in the Madras Presidency. The facts as they stand seem to show the possibility of factors being at work, other than the swamping and drying of the soil in the production or limitation of fever, and these other factors are within the province of the Sanitarian to discuss.

Influence of sea air in neutralizing the malaria of irrigated districts in Madras

15. In a report on the causes of death in Madras for the year 1860 I took occasion to discuss the influence of certain winds, that is, of winds coming direct from the sea and of winds which had blown over and become contaminated by emanations from the earth in retarding or diffusing the disease cholera. Now the physical conformation of the peninsula of India is such as to expose many of the richest and best cultivated of the districts of the Madras Presidency to the direct influence of breezes from the sea, and it will probably be found to hold good of malarious fevers, more than of cholera, that, other things being equal, exposure of human beings to pure sea-air gives the best results as regards immunity from malarious diseases. As a broad fact it may be confidently stated that the low-lying and liberally watered valleys and deltas of our chief irrigation districts of Tanjore, Tinnevelly, South Arcot, Madras, Nellore, Kistna, Godavery, Vizagapatam, and Ganjam are the parts of the country in which the population is the least affected by malarious influences. The districts within reach of the sea-breeze are practically non-malarious districts during the seasons of the year when the winds from the sea predominate. Thus on the Coromandel Coast all malarial affections are at a minimum during the prevalence of southerly and easterly winds which have not blown over land. In the season of the south-west monsoon and in the cold dewy nights following the rains of the north-east monsoon malarial fevers are common on some parts of this coast. The inhabitants of the districts on the Western Coast are usually freest from fevers and other allied diseases during the time when sea-breezes prevail.

The south-west monsoon, laden with moisture and attended by a lowering of temperature and continuous rain is, however, a fertile cause of fever amongst the people of the Western Coast. The cold north-east winds of the dry season, which must traverse the breadth of the peninsula before reaching the Western Coast districts, invariably bring, or are coincident with, the appearance of malarious fevers.

Sea air antagonistic to malaria

16. The explanation of these local peculiarities would appear to be that there is not any special character of the soil or water which prevents the disengagement of malaria in localities near the sea; but that there is something in the sea-air itself when not over-saturated with moisture antagonistic to the miasms given out from the earth's surface, and which in their active condition produce fevers. Practically the malarious fevers which are generated in the interior of a country disappear on removal of the sufferers to the sea coast, and the sea coast fevers of India are usually mild in their symptoms and easy of cure.

Immunity of irrigation districts in Madras Presidency from fever probably due to their geographical position in respect to the sea coast.

17. From the above remarks it may be inferred that the comparative immunity of our chief irrigated districts from malarious fevers is due more to the geographical position of those districts and to their subjection to certain meteorological influences than to the absence of the usual causes of malaria in the soil.

Oxydizing properties of sea air

The liability of the inhabitants of the coast districts to suffer from fever during the season of the year when land-winds blow may be due either to the land-winds containing the malaria or to the inability of the winds to destroy the malaria locally extricated from the soil, or to a combination of these two causes. It is well known that sea-air is a powerful oxydizer. We can *see* the results of its action on a metal like iron, and we infer that it possesses a similar power in the oxidation of organic particles floating in the atmosphere which we cannot see. We know from observation also that a wind that has passed over many miles of land loses the property of rapidly corroding air-oxidizable metal like iron, and it is but fair to assume that it has lost the power, in some degree of neutralizing the pestilential miasmata, which the earth, amongst its other functions, gives birth to.

Violence of malaria in elevated tracts of country

18. There is a peculiarity in regard to the miasm which produces fever, that it often appears to be specially virulent in its effects in places which are much elevated above the sea-level and far removed from the sea-board. The explanation of this circumstance may be that, although malaria is extricated in greatest abundance from low grounds and places where the sub-soil moisture is near the surface, it may be wafted by prevailing winds against the neighbouring hill sides, and in such situations exhibit its effects most markedly. Thus in the Kistna and Godavery districts it is, I believe, a well-ascertained circumstance that fevers usually prevail with greater force and intensity amongst the people who occupy the upland taluqs than amongst those who live amidst the irrigated tracts on the sea-board.

All elevated tracts of country in South India which are far removed from the sea-board, especially the valleys between hill ranges and about the bases of mountains, are more or less malarious at certain seasons.

Malaria in the hilly districts.

19. The actual sources of malaria in the higher lands of the interior of the country afford a most difficult and complicated problem for study. There are localities in the Mysore territory ar removed from marshy lands and decaying vegetation which are notoriously subjected to fever. The history of the cantonment established a few years ago

---

near Mysore and subsequently abandoned on account of its unhealthiness is a case in point. (See Annual Report of Sanitary Commissioner for 1866, page 103)

Periodical accessions of fever.

20. Some of the districts of the Presidency have lately been subjected to cycles of fever prevalence, such as are known to be characteristic of malarious disorders. In the town of Kurnool in the year 1866 fever was so general that it was attributed by local observers to the water flooding of the sub-soil of the town from the works of the Irrigation Company.

Prevalence of fever in Kurnool, Cuddapah, and Bellary

But, as a matter of fact, the same type of fever prevailed simultaneously in many parts of the district, and also in Bellary and Cuddapah. Recently fever has disappeared from the town of Kurnool, though no change has taken place in the mode of water-supply or of irrigation in the neighbourhood. In the district of the Godavery fever has been particularly fatal during the year 1869. From the table it will be observed that twelve per thousand of the people died from fever, while the mortality in the former year was only 5 8 per mille. The Godavery District is very largely irrigated by canals leading off from the anicut at Rajahmundry.

Godavery District

The fever mortality both in the Godavery and Kistna districts is much influenced by seasons, it being always highest after the setting in of the north-east monsoon. Irrigation in these districts begins actively with the "freshes" which result from the filling of the rivers by the rains of the south west monsoon. There is no apparent relation between the irrigation season and the fever of these districts It is worthy of note here that, although fever prevailed so extensively in the Godavery District in 1869, it was absolutely free of cholera during this, its worst year of fever.

Epidemic influences common over large tracts of country

21. The general circumstances favouring a development of malarious fevers in various parts of this Presidency as in Ganjam, Godavery, Canara, Kurnool, and Bellary have apparently been operative also in the tract of country included in the delta of the Ganges.

The great accession of fever spoken of by Dr. Sutherland as now spreading over Lower Bengal is nothing more, I think, than the periodical intensification which is so characteristic of all the common epidemic diseases of India

A similar intensified form of malarial poisoning in the Bengal districts attracted the attention of the authorities some few years ago, when a Medical Officer was deputed to visit the affected localities and report upon them. For several years the districts were comparatively healthy, but the time would appear to have again come for a flow of the fever wave to recur.

22 It is, I think, very doubtful whether these periodical accessions of fever over great tracts of country are the result of any changes which man in his limited capacity has been enabled to effect on the earth's surface. The remote causes are probably far beyond human control or influence. The history of ruined cities like Gour in Bengal shows that man has had to do battle with malaria in the past

as he has in the present, and that he does not always gain the victory. Even within comparatively modern times there are histories of widely spread malarious fevers in India which must have had their origin in some very generally diffused causes. Orme in his History of India notes the prevalence of a terrible fever in the southern provinces of India following upon a general inundation of the country. In 1809—13 the districts of Coimbatore, Madura, and Tinnevelly suffered so severely from a malarious fever that the Government of the day appointed a special Commission to visit the districts and report on the great mortality of the people. From the report it would seem that the fever was mainly the common intermittent of the localities, intensified in an unusual degree The abandonment of Tippoo's great stronghold, Seringapatam, as a station for British and Indian troops was due to the persistent malaria which haunted the locality. Whether the cultivation of the island was "wet" or "dry" apparently made but little difference. Both systems were tried and given up, and ultimately the station had to be abandoned by troops, as was the native cantonment of Mysore in still more recent times. The causes of the malaria are still in operation at Seringapatam. The few inhabitants left in the town are sickly, and in a few years time the town will probably suffer the fate of all cities built on highly malarious sites.

Dr Sutherland's suggestions concurred in

23. The practical suggestions in Dr Sutherland's letter in regard to the drainage of swamps and the removal of obstructions to the natural outlets of the rainfall are no doubt most sound and judicious in reference to the locality he had in mind; but, in regard to the malarious fevers which prevail in this Presidency, I do not think his precautionary recommendations are generally applicable. In the construction of irrigation channels it is no doubt of the greatest importance to prevent leakage and the conversion of dry ground into swamps, but the localities are not very numerous in which such a condition of things exists, and the people in this part of India, as a rule, know too well the value of water to waste it unduly. Still the increase of fever during the past year in the Godavery District warns us that canal irrigation requires careful watching, especially in reference to the drainage of tracts of country under irrigation.

A higher condition of agriculture in India essential to the prevention of malaria.

24. In conclusion, I must express my conviction that it is to the careful and more general culture of the soil, whether by the help of water from artificial channels and reservoirs or aided only by the natural moisture of the seasons, that we must look for any marked improvement in the diminution of the prevalence of malarious fevers. There are possibly some localities in India where, from the difference of temperature between the water and the soil to which it is applied, or from other little understood causes, irrigation works can never be generally followed with safety to the health of the people. Such localities, however, do not exist, so far as I know, in the great irrigation districts of this Presidency. Wet cultivation in these districts entails very careful preparation and tillage of the soil, and is an agricultural operation of a high order.

25. There may be circumstances which might render it politic on the part of a State to refrain from stimulating unduly the culture of the rice plant, such as the fact that cereals grown without irrigation are more nutritive and better fitted for the sustenance of a hard-working people than rice, and the possible danger that a rice-feeding people may in time degenerate into a slothful and effeminate race, such as the inhabitants of the fever-stricken villages of Lower Bengal are to this day; but these are questions somewhat wide of the suggestions of Dr. Sutherland in regard to the eradication of malaria from the soil, and need not be referred to on the present occasion.

26. I had intended supporting the views I have taken, as to the cause of the exemption of districts on the sea-board, by diagrams showing the prevalence of fever in such districts as compared with those inland; but, rather than delay this reply, I shall have the honour of forwarding the diagrams and accompanying explanations, so soon as they can be got ready, in a separate letter.

From the Sanitary Commissioner for Madras, to the Chief Secretary to Government, Fort Saint George, dated Madras, 31st May 1870, No 607 —

In re-considering the question how far works of irrigation in this Presidency may be accountable for the prevalence of fever, I have thought it advisable to examine the monthly registers of deaths from fever for the past four years somewhat minutely, and have now the honour to submit the following observations in continuation of my letter, No. 528, of the 17th instant.

2. The primary object I have had in view has been to arrive at a clearer and more definite idea as to the influence of climate or meteorology in the causation of malaria, apart from the question whether the intensity of fever in certain localities may or may not be influenced by irrigation works. In the examination of the data for the solution of the former question, however, the peculiarities in regard to fever of our chief irrigated districts are brought out so clearly, that the views expressed in my former letter as to the comparative exemption of irrigated tracts are quite corroborated.

Diagrams of seasonal prevalence of fever

3. In order to give a clear notion of the influences of season and climate on fever mortality, I have projected diagrams for each district showing the registered deaths in each month of the past four years in proportion to population.

The results I have given in three diagrams—

I.—Districts on the Eastern Coast, or not elevated much above the coast, and exposed to influences from the sea.

II.—Districts inland, and more or less removed from sea influences.

III.—Districts on the Western Coast exposed to sea influences, but also to the full force of the rains of the south-west monsoon.

4. The period of four years is not long enough to exhibit the duration of cycles of fever prevalence or of the intervals between them, but some interesting results are brought out as regards the time of year when the causes of fever most abound.

Remarks on diagrams.

5. DIAGRAM I.—EASTERN COAST DISTRICTS —GANJAM —The fever mortality of this district is apparently influenced by the setting in of the rainy weather, as in 1866, 1867, 1868, and 1869; a rise is distinctly evident in July and August, continuing until the end of the cold season. There is a tolerable steady fall during the hot dry months, and the mortality is greatest during the prevalence of the north-east monsoon.

Around the town of Ganjam fever seems to increase early in April, and this is no doubt due to some local development of malaria

6. VIZAGAPATAM —When the registration of deaths was commenced, this district in 1866 had apparently passed through a cycle of fever prevalence. The mortality, which was very high in the early months of 1866 and cold seasons of 1865-66, began to rise again in 1869 There is a general depression of the fever curve for March, April, and May, and a rise in November and December coincident with the north-east monsoon. The coast line along the Vizagapatam District is almost due north-east, so that the north east winds for the great area of the district are *land-winds*

7. GODAVERY AND KISTNA.—There is a remarkable similarity in the fever curves of these districts · the one irrigated by channels from the Godavery, and the other from the Kistna river. In the Godavery District, however, the fever mortality is the highest, and the influences productive of fever prevail with greater force than in the district immediately to the south. It will be observed that, although a slight increase of fever deaths occurs in September, the mortality springs up with a sudden bound in November and December, reaching its highest point in the month of December and then rapidly subsiding. These results have been uniform for each one of the four years, showing the dependence of the fever on some general cause connected with the season of the year. It is interesting to note that, although the irrigation channels from the Godavery and Kistna begin to fill in June and the whole area of the low lands is soon after under cultivation, there is no accession of fever evident at this season of agricultural activity.

In 1868, when the north-east monsoon entirely failed, the rise in fever mortality both in the Godavery and Kistna districts was comparatively insignificant. This would seem to indicate the importance of the *moisture* of the north-east monsoon as an element in the fatality of fevers in this locality. The north-east winds in these districts are for the most part *land winds*, and it is during the prevalence of such winds that fever rises so suddenly and falls so rapidly on their termination.

8 NELLORE —The seasonal variations of fever mortality in this district have been too slight to call for any particular notice

But, in connexion with the general absence of fever, the geographical position of the district must not be lost sight of. A long narrow strip of country with a sea-face of about 180 miles, it catches all the southerly, east, and north-east winds as breezes direct from the sea A small portion of the northern extremity of the district would have the north-east wind as a land-wind, but for the remainder the north-east monsoon would blow over nothing but sea before striking the coast. This district, in fact, presents a typical example of the law, that a pure sea-air, whether from the north-east or south-west, is antagonistic to malaria.

9. MADRAS DISTRICT INCLUDING THE TOWN —The fever mortality of this district is never heavy; but it shows a slight tendency to rise in the south-west monsoon, and again in November and December. The most regular feature is the depression of mortality in March, April, and May, the hot dry months of the year, when southerly winds prevail.

10. SOUTH ARCOT.—The general features of the curve approximate to that of Madras.

11. TANJORE—The diagram for this district, where irrigation is so largely practised, shows almost a straight line, and a very low line, of fever mortality. This district from its geographical position jutting out into the Indian ocean like a small peninsula is open fully to influences from the sea, and, if my deductions as to the influence of sea-air are true, should not exhibit any great seasonal variations in its fever-rate, which rate should be as near as possible a minimum rate. The four years' record of deaths go to establish the truth of the law

12 TRICHINOPOLY.—I have placed Trichinopoly amongst the eastern sea-board districts, because, although it runs more inland than some others, yet it is open to winds from the sea, and is not elevated far above sea-level, and is also an irrigated district. Here again it is most interesting to note that the sea influences being favourable, irrigation causes no periodical or other accessions of fever mortality.

13. MADURA.—The district of Madura being partly on the Eastern Coast has been put in the sea-board districts, but, for purposes of great accuracy, it should be divided into coast and inland districts The diagram, however, contains the reduced ratios of fever for the whole population, except of zemindaries which are near the sea coast. In this district the fever deaths appear to have been numerous in 1866 and 1867, falling very low in 1868 and commencing to rise again in October 1869 The inland portions of this district suffer from an augmentation of fever with the north-east monsoon and the depression of night temperature and heavy dews which mark the cold season The valleys between the mountain ranges are very malarious in the dry season.

14. TINNEVELLY.—The Tinnevelly District shows the lowest fever death-rate of any part of the country. In 1869 it seems to have been slightly raised during the north-east monsoon months, but at other times to have never risen or fallen beyond a level line.

15. The general results of an examination of the diagrams for the "east coast districts" bear out the truth of the rule I have laid down in paragraph 15 of my letter, No 528, that "exposure of human beings to pure sea-air gives the best results as regards general immunity from malarious fevers." This will be seen better when we come to examine diagram No. 2 and to compare it with that for the "coast districts."

16. DIAGRAM II —INLAND DISTRICTS —KURNOOL —The district of Kurnool, which stretches by its northern borders into the 17th degree of north latitude, is the most northern of the central districts of the Madras Presidency It is essentially a district in which dry cultivation is practised, the rainfall being light and occurring in the south-west monsoon Fever was very prevalent and fatal in

the district in the cold dry months of 1866, October, November, and December, (the north east monsoon does not influence Kurnool). The district had only recently experienced a severe cholera epidemic, when the fever followed in its wake. The mortality fell, and continued at a minimum during July, August, and September 1867, rising again in the next month (October) and continuing high all through the year 1868, with the usual accession at the end of the year. Fever also has been high throughout 1869, with the seasonal fluctuations less marked. In this district fever apparently begins to exceed its normal limits about September, or after the ending of the south-west monsoon.

17. BELLARY.—Bellary, to the south-west of Kurnool, has exhibited almost the same general rise and fall of fever as Kurnool. The months of November and December in three out of the four years have given high ratios of mortality from fever. Towards the end of the year 1869 the fever cycle to which this district had been subject in 1868 and 1869 was declining.

18. CUDDAPAH.—Cuddapah, to the south of Kurnool, is influenced by the same seasonal causes as Bellary and Kurnool. The maximum of fever mortality takes the same months, viz., October, November, and December, and the minimum corresponds with the period before the south-west monsoon has become fairly established, viz., June and July. The hot weather fever mortality, March, April, May, and June, of this district is comparatively slight.

In all these districts, which get their rainfall in the south-west monsoon, it will be observed that the fever death-rate increases just at the end of the rains, when moisture in the air and soil is highest. Heavy rain does not usually fall in these districts before August or September. Having no population returns for the inhabitants of the Mysore table-land, I am unable to give the months of maximum fever mortality, though, as regards the more eastern divisions of the province, I have reason to suppose that the period of maximum prevalence is the same as in Bellary and Cuddapah, and that the same general causes influence all this tract of country.

19. NORTH ARCOT.—The rise and fall of the fever curve in this district does not follow the general outline of the other inland districts. The district is exposed, more or less, to influences from both monsoons, and some parts of the district are within reach of the diurnal sea-breeze, and should, therefore, have appeared in the diagram of the Eastern Coast districts. The mortality, though rising and falling with monsoon influences, is lower than that of any of the three districts already given.

20. SALEM.—This district, more to the westward, is subjected to influences from both monsoons, but derives its chief rainfall from the south-west. The fever mortality accordingly begins to rise with the moisture of the south-west monsoon in July, and attains its maximum about the end of the year, it being prolonged apparently by the setting in of the north-east monsoon in October. There is a marked decrease of fever deaths during the dry and hot months from February to June.

21. COIMBATORE.—This is, on the whole, one of the driest districts in all India, being in great part sheltered from the south-west monsoon by the mountain chain forming the Western Ghauts, and by local peculiarities of smaller hill ranges. The chief rainfall is brought up by the north-east monsoon, the clouds of which are arrested against the mountain barrier of the Neilgherry chain of hills. The rainfall is very capricious and uncertain, except in the few taluqs between the Annamally and Neilgherry Hills, which catch the lighter clouds of the south-west monsoon. The fever mortality of the district as shown in the diagram for the past four years has been remarkably low and apparently subjected to little seasonal variation.

The hill jungles of this district are most notedly malarious after the end of the south-west monsoon rains, viz., from November until May. This, however, is a feature common to all jungles in the south of India, that is, below 16 degrees north latitude. All jungles above that line appear to be most malarious during the rainy months of July, August, September, and October, and to be comparatively healthy in the dry season of the year.

22. DIAGRAM III.—WESTERN COAST DISTRICTS.—SOUTH CANARA.—An unusual amount of fever seems to have prevailed in this district in 1867. So bad was it in certain localities that the Revenue officials desired an inquiry might be made into its causes. Filthy habits, combined with excessive moisture of the season, appears to have aggravated the usual type of malarious fever. The general prevalence of fever on the Western Coast is, as the diagram shows, markedly affected by the rainfall of the south-west monsoon. On this coast the rainfall varies from 120 to 160 inches, and occurs for the most part in June, July, August, and September. These are the months, it will be seen, in which (at least the first three of the months) the fever mortality rapidly rises.

During these monsoon months the common people are exposed to frequent changes, from cold and wet to heat and moisture. While the air is saturated with humidity all exhalation from the skin is in abeyance, and the means which nature has provided every one with to get rid of noxious matters from the body are thus reduced to a limit below what is compatible with healthy function. The skin is a "second liver" for the inhabitants of warm climates, and, when it ceases to work, fever is tolerably certain to ensue.

There are no canals or tank irrigation in these districts. The natural rainfall is sufficient for the cultivation that is practised. Owing to the great moisture to which the districts are exposed vegetation of all kind is most luxuriant.

23. MALABAR.—The general progress of fever in Malabar has been the same as in South Canara, though not locally aggravated in June 1867 as in the neighbouring province. The influence of the north-east land-winds in November, December, and January in raising the general mortality from fever is better seen in this district than in South Canara. The south-west monsoon influences are perhaps rather more slightly marked.

24. The diagrams, I think, bring out very clearly the practical fact that the irrigation districts have not shown any tendency to excess of fever mortality; but, on the other hand, where they have been exposed to healthful breezes from the Indian ocean, the fever mortality has been absolutely lower than in the non-irrigated districts.

The seasonal rise of fever in the Godavery and Kistna is not coincident with the time of year in which wet cultivation is most actively pursued, but with the appearance of northerly or north-easterly land-winds in the cold months of the year.

25. With regard to the exact influence of natural rainfall in the various districts in the production of fever, although the facts in this report seem to establish a connexion between the two, I shall report more fully at some future period when I have had an opportunity of examining and comparing the rain registers of the several districts.

No. 103-A From the Inspector-General of the Indian Medical Department, to the Chief Secretary to Government, Fort Saint George, dated 2nd June 1870, No. 131.

I have the honour to acknowledge receipt of Proceedings of Government, Public Department, and Order thereon, No 3716, of 22nd November 1869, and to offer the following remarks on Dr. Sutherland's letter regarding endemic fever in India. I have to apologize for the delay that has occurred in forwarding these, as I did not quite understand that any special report from this Presidency was desired until receipt of Government Order, No 527, of 29th April.

2. The chief questions which Dr. Sutherland discusses are as follow —

(*a*) "Has not the railroad obstructed the natural drainage of the country "and converted some previously healthy localities into unhealthy and deadly hot-"beds of malarious fever?"

(*b*) "Have not our canals created, wherever the irrigation system has been "carried out, a deadly miasmatic atmosphere, which has destroyed as many lives as "would have been lost by the casual famines which swept over these districts?"

These I shall now consider in so far as they concern this Presidency.

3. As a preliminary it may be well to point out that some of the most feverish localities in Southern India are those in which dry cultivation is carried on, or which are surrounded by barren rocky ground. In illustration of this I may instance various villages in Western Mysore. It would thus appear that, although malarial influences are usually attributed to the alternate saturation and desiccation of the soil under a warm sun, there may be other causes in operation which we have as yet failed to discover.

4. Indeed, the whole question is one of great difficulty. Thus, in the feverish-wooded districts of the Western Ghaut range, the miasm is most abundant in the dry hot spring months, whereas in similar districts in the northern part of the Presidency it is most prevalent immediately after the first rains of the monsoon.

5 As regards railroads in this Presidency, it does not appear that they have in any instance obstructed the natural drainage of the country So far as my observation goes, the Railway Companies have in their own interests made ample provision for the flow of perennial streams as well as of occasional currents appearing after rain. It must be remarked, too, that the lines in Southern India pass, for the most part, through a dry country in which there is naturally no water near the

surface to be dammed up by the weight and slope of a railway embankment so as to form a swamp. Lands under wet culture are frequently traversed by the lines, but in no case, I believe, have they been allowed to lapse into a swamp, water and ground under its influence being far too valuable to permit of such an issue

6. I am of opinion, therefore, that railway works have not in this Presidency, in so far as regards drainage, had any prejudicial effects on the public health.

7. Irrigation in Southern India is carried on in two ways, viz, by means of water collected from local receiving surfaces in tanks, and by means of channels from large rivers. The tanks are dependent for their water on the periodical rains and chiefly fed by small streams, dry during the greater portion of the year. A large number of these reservoirs were in existence prior to the establishment of British rule, and there is absolutely nothing to show that irrigation by means of them has, during the period of our experience, had any prejudicial effect on the public health.

8. On the contrary, these works have converted barren wastes into fruitful districts, and thereby contributed to the increase and general welfare of the population It is not in genial seasons either, when tanks are full and the fields flooded, that the inhabitants of such districts suffer most from endemic and epidemic disease, but in dry years when the water-supply is scant and the land dry and uncultivated

9. In connection with this it may be mentioned that prior to the recent terrible outbreak of malarial fever in the Mauritius, there had for some years been a general complaint there of increasing dryness of climate and deficient water-supply. These changes have now been traced to the destruction of forests, more especially on the high lands of the island, and an attempt is to be made to re-plant it with the view of restoring the wonted salubrity of climate and fertility of the ground

10 It must also be pointed out, with regard to wet cultivation in Southern India, that the fields have but little of the character of a malarial swamp, as the water is never left so long at rest as to permit it to become putrid and offensive. At the same time the growing crops are active purifying agents, appropriating most of, if not all, the gases that may be generated by the action of heat and water on the soil.

11. Practically it is found that fever, when it does occur, is most prevalent just after the cutting of the crops, when the fields are dry. This may, however, be partly accounted for by the labouring classes being more exposed to the sun and night air, and harder worked at that than any other season of the year.

12. The other mode of irrigation by means of channels from large rivers is carried on chiefly in the Southern Division, Northern Division, and the Kurnool District. In the first-mentioned the system has been in operation for a long period, so that ample time has elapsed for any prejudicial influences to have been developed, and facts as to the actual effects of irrigation on public health there will be of proportional value. The districts of Trichinopoly and Tanjore are the two chiefly irrigated from the Cauvery, and it may be stated generally that the population in those do not suffer more from malarial fever than the inhabitants of other districts

on the Eastern Coast. As the health statistics, however, of the civil population are not very complete or reliable, it will be more satisfactory to notice the effects of residence in the Southern Division on native troops. During a period of ten years, viz, from 1859-60 to 1868 inclusive, the total strength of troops in the division amounted to 30,247, the total admissions from fever to 3,892, and the total deaths from the disease to 19. In the same period the annual percentage of fever cases to strength ranged from 25·91 to 4·15, but the percentage for the total strength and entire term was only 12·87.

13. Fever, therefore, cannot be said to be a very common disease in the Southern Division, but, with the view to a clearer appreciation of this, it may be well to contrast these figures with the fever statistics of native troops in the Mysore Division. In the latter dry cultivation chiefly obtains, and river irrigation is comparatively rare, at any rate in the neighbourhood of cantonments. During the same ten years the total strength of the Native Army in Mysore was 56,806, the total admissions from fever 16,632, and the total deaths 62. The percentage of admissions to total strength was no less than 29·28, being more than double that which obtained amid the irrigated lands of the Southern Division.

14. In the Kurnool District canal irrigation is of more recent introduction. Fever of a very malignant type prevailed there in 1866 and 1867; but cannot be fairly attributed to wet cultivation, as it was not confined to areas near the canals merely but appeared indiscriminately all over the district, and also extended to the adjoining collectorate of Cuddapah. This outbreak of fever, therefore, can only be regarded as a coincidence, and not a consequence of canal irrigation.

15. In the Northern Division canal irrigation is very extensive, and in the delta of the Godavery some of those changes alluded to in paragraph 3 of Dr. Sutherland's letter would appear to be taking place. In the lower reaches of the delta, the sedimentary deposits are said to be converting considerable areas into swamps, covered with rank herbaceous vegetation, and at some seasons evolving putrid gases.

16 Throughout the whole of the delta malarious fevers are generally prevalent in the cold season, and in 1867-68 the type was very malignant, cases often proving fatal in from twenty four to thirty-six hours. The most feverish months are November, December, and January; in other words, fever is contemporaneous with the exclusion of water from, and the desiccation of, the rice-fields. At the same time it must be observed that the population at that season undergo an unusual amount of fatigue and exposure to the sun and chill night air while harvesting and watching their crops Making allowance for all that, however, it still seems probable that irrigation in this quarter has to some extent rendered fever more prevalent.

17. Reviewing the whole subject at this stage, it would appear that, when the cultivated lands are alluvial and but little above the level of the river, as in Lower Bengal, irrigation does increase fever; whereas in more elevated tracts, having a different soil and geological structure, no such effects follow to any notable extent.

18. In paragraph 14 of his letter Dr. Sutherland recommends the draining of swamps by the formation of tanks. When from any cause this resource may be inadmissible, it might be well to try the effects of certain trees on marshy localities. In a Woods and Waters Report of the North of France it was pointed out that a wet, tract of land near Valenciennes was in time completely dried on the surface by planting the *Pinus sylvestris* Borings were then sunk, when it was found that a bed of water existed at a depth of six feet, its level having been evidently lowered to that extent by the trees. This effect of such trees has also, it appears, been known for many years and turned to account in Germany, and it is now a very general opinion on the Continent of Europe that firs and other acicular-leafed trees have this action on swamps. It would, of course, be vain to attempt the culture of any pine on the plains of India, but we have a very good substitute in the casuarina, which has besides the advantage of growing in brackish water.

19 In conclusion, I beg to observe that in making these remarks I have in no instance had the desire to controvert the opinions and statements of Dr. Sutherland, although the facts brought forward by me may at times appear opposed to his conclusions, this may be explained by the difference in the physical conformation, soil, and climate of the districts regarding which we respectively write.

TRANSFERRED to the Public Works Department with reference to G. O , dated the 23rd November 1869, No. 3,716, and 12th April 1870, No. 1,019.

FORT ST. GEORGE,
15*th June* 1870.

(Signed) R. S. ELLIS,
Chief Secretary

No. 104. ORDER THEREON, 6th August 1870, No. 1,877.

CIVIL WORKS, No. 16.

ORDERED that these papers be forwarded to the Government of India :—

(Here enter No. 1,878, dated 6th August 1870.)

(True Extract)

Colonel, R.E.,
Secretary to Government.

Exd E C. Shunker.

Govt. of {1870} Madras.

PUBLIC WORKS.

To

Dated August, 6th

Recd. *Encl*

G. O., 6th August 1870, No 1,877

AUGUST.

Nos. 93-101

Endemic Disease.—Passing orders on papers relating to Dr. Sutherland's suggestions for the arrest and prevention of endemic disease.

Public Works Department,
Fort St. George, 6th *August* 1870.

No. 105.

No. 1,878.

To

The SECRETARY to the GOVERNMENT of INDIA,
Public Works Department.

CIVIL WORKS, No. 17.

Sir,—With reference to the Circular of the Government of India under date the 6th September 1869, No. 75, communicating a report by Dr. Sutherland, the Deputy Inspector-General of Hospitals, Presidency Circle, Bengal, on the causes of fever in that Province, with suggestions for the arrest and prevention of endemic disease, and calling upon this Government for an expression of its opinion on the subject, I am directed herewith to forward the papers marginally noted, containing, respectively, the views of the Superintending Engineers and the Revenue and Medical authorities.

From the Supg Engr,	1st Division,	No	3,216,	dated	6th Dec 1869
	1st ,,	,,	247,	,,	21st April 1870
Do. ,,	2nd ,,	,,	12,	,,	23rd ,, ,,
Do ,,	3rd ,,	,,	138,	,,	21st ,, ,,
Do ,,	4th ,,	,,	315,	,,	22nd ,, ,,
Do ,,	5th ,,	,,	35,	,,	6th May ,,
Do. ,,	6th ,,	,,	79,	,,	21st April ,,
Do ,,	7th ,,	,,	16,	,,	22nd ,, ,,
Do ,,	8th ,,	,,	199,	,,	4th May ,,
Do Special Exe Engr,	Wynaad,	,,	346,	,,	9th ,, ,,
Proceedings of the Board of Revenue,		,,	3,733,	,,	1st June ,,
From the Public Department,		,,			15th ,, ,,

2. The position assumed by Dr Sutherland is that fevers of an endemic type are generated by the disturbance of the natural drainage of the country which railways, projects of canal irrigation and other great public works cause, leaving water to stagnate and to create a degree of dampness favourable for the production of malaria.

3. The experience of the officers whose opinions have been invited in this Presidency does not appear to confirm the views entertained by Dr. Sutherland, and the statistics furnished by the Sanitary Commissioner show that, although there was a marked increase last year in the malignity of the malarious fever generally prevalent in the delta of the Godavery in the cold season, the rate of mortality from fever in the four years ending 1869 was fully 50 per cent. lower in the irrigated districts of Tanjore, Kistna, and Trichinopoly than in the dry districts of Bellary, Kurnool, and Cuddapah. In 1866 fever prevailed so greatly in the town of Kurnool that it was believed to be due to the works of the Irrigation and Canal Company, but it is reported that the same type of fever prevailed simultaneously in many parts of the district as well as in Bellary and Cuddapah, and that recently it has disappeared from the town of Kurnool.

4. The Inspector-General of the Indian Medical Department expresses the opinion that railways have not in this Presidency had any prejudicial effect on the public health, the Railway Companies having in the construction of their works made ample provision as regards drainage.

5. The opinions formed by Dr. Sutherland and his suggestions may doubtless be sound and useful so far as they relate to the localities regarding which he writes, but they are believed to be generally inapplicable to the districts of this Presidency in which the physical conformation, soil, and climate are not analogous to those which have come under Dr. Sutherland's observation.

I have the honour to be,
Sir,
Your most obedient Servant,

Colonel, R.E.,
Secretary to Government.

Exd. E. C. Shunker.

Superintending Engineer's Office, 1st Division
Dowlaishwaram, 6th December 1869

No. 3216

From

Major J. F. Fischer R.E.
Superintending Engineer
1st Division

To

Colonel C. A. Orr R.E.
Secretary to Government D. P. W.
Madras

SIR,

With reference to para 2 of G.O. No. 3716 dated 22d Ultimo, I have the honor to report for the information of Government that, fever of a most virulent type made it's appearance in this station and it's vicinity, about a month back, and continues to carry off it's victims by dozens daily.

2 As this epidemic invariably rages here in the cold weather, before the crops are cut, the origin may safely be traced to a soil made artificially damp with Canal water, and to other organic impurities.

I have the honor to be
Sir,
Your most obdt. servant

Wm. F. Fischer Major R.E.
Actg. Supg. Engr. 1st Division

5. The opinions formed by Dr. Sutherland and his suggestions may doubtless be sound and useful so far as they relate to the localities regarding which he writes, but they are believed to be generally inapplicable to the districts of this Presidency in which the physical conformation, soil, and climate are not analogous to those which have come under Dr. Sutherland's observation.

I have the honour to be,
Sir,
Your most obedient Servant,

Colonel, R.E.,
Secretary to Government.

Exd. E. C. Shunker.

Superintending Engineer's Office, 1st Division
Dowlaishwaram, 6th December 1869

No. 3216

From
Major J. F. Fischer R.E.
Superintending Engineer
1st Division

To
Colonel C. A. Orr R.E.
Secretary to Government D. P. W.
Madras

SIR,

With reference to para 2 of G.O. No 3716 dated 22d Ultimo, I have the honor to report for the information of Government that, fever of a most virulent type made its appearance in this station and its vicinity, about a month back, and continues to carry off its victims by dozens daily.

2 As this epidemic invariably rages here in the cold weather, before the crops are cut, the origin may safely be traced to a soil made artificially damp with canal water, and to other organic impurities.

I have the honor to be
Sir,
Your most obedt. servant
Wm. H. Fischer Major R.E.
A. G. Supg Engr 1st Division

P.W. 1869 Dept
Pro. of Govt. for Augt.
From No. 5237.
The Supg. Engineer
1st Division
To The Secretary
to Government
P. W. D. Madras
Dated 6th December /69
Recd. 14

Reports for the information of Government that fever of the most virulent type made its appearance at this station and its vicinity about a month back and continues to carry off its victims by dozens daily.

No. 93

Ordr. No. 11th July 1870 No. 26

No. 1877/1878 - 6 Augt/70

Superintending Engineer's Office, 1st Division
Dowlaishwaram, 21st April 1870

No. 247

From

The Superintending Engineer
1st Division

To

The Secretary to Government D. P. W.
Madras

Sir,

Adverting to G. O. No 1019 dated 12th Instant, I have the honor to invite your attention to my letter number and date as per margin on the subject of Endemic disease and its origin.

No. 3216 dated 6th Decr. 1869.

I have the honor to be
Sir,
Your most Obedt. Servant
H. Inman Asst. Engr.
for Supg. Engr. 1st Dn.

P.W. 1870 Dept.
No 247 of Govt Irrigt.
No 1644

From The Supdg Engineer
1st Dn.
To. The Secretary to Governmt
P.W. Dt
Madras

Dated 21st April/70.
Received 26 " "

Invites attention to letter No 3216 dated 6th December 1869, on the subject of Endemic disease and its origin.

N° 1871/1878 6 Aug/70

C. N. 94
[illegible] 11 July 1870 [illegible] 26

No 12

Supg. Engineers Office 2nd D.
Camp Gudiwadah
23rd April 1870

From
Colonel F. J. Proberly R.E.
Superintending Engineer 2nd Division

To
Colonel C. A. Orr R.E.
Secretary to Govt. P.W.D.

Sir

Referring to G. O. No 1019 - 12th instant, I have the honor to observe that as the Collectors undertook the reply, after consulting me on the subject generally, I thought I should be needlessly troubling Government.

2 From the returns with which Mr. Boswell furnished me I find that fever is more prevalent in the upland talugs, where the drainage is more perfect, than in the Delta.

3 More attention is needed to the drainage of the Kistna Delta but principally, so far as I can see, for the ripening of the crops - the general health of the people does not appear affected, since there is as much fever in the drained as in the undrained parts.

4 The filthy habits of the people are in

my Opinion the principal cause of sickness -

The streets in the villages of Dachepally and Vincondah talugs were most offensive to me merely riding through - water is scarce and no attempt is made to keep that used for drinking from being spoiled by water used, on the wells' edge frequently for washing &c

I have the honor to be
Sirs
Your most Obedient servant
J. Moberly Colonel R.E.
Supg. Engineer 2d. Division

Mad. P.W. 70 Deptt
[illegible] No. 1705
From The Supdg Engineer
3rd Dn
To The Secretary to
Government
P.W.D.
D/ 21 April 1870
Rd 2 May "

Observes that the
health of the people
does not appear
affected by the Drainage
[illegible] Lines
there is a comparatively fewer
in the drained as in the
undrained parts

[illegible] 6 Augst 70
[illegible]

[illegible]

No. 138.

Superintending Engineer's Office.
3rd Division.
Bellary 21 April 1870.

From,
The Superintending Engineer
3rd Division.

To,
The Secretary to Government
Public Works Department
Fort Saint George

Enclosures.
—

Sir,

With reference to G.O. No. 3716 of 22nd November 1869, I have the honor to inform you that I have no remarks to offer.

I have the honor to be
Sir
Your most Obedt. Servt.
[illegible] Lieut Col.
Executive Engineer
for Supdg. Engineer
3rd Division

P.W. 1870 4 Dept

From, Pro: of Govt for Augst No. 613

The Superintending Engineer
3rd Division.

To,

The Secretary to Government.
Public Works Department.
Fort Saint George.

No. 138.

Dated 21
Received 25 April 1870.

Nos 1877+1878 - 6 Aug/70

Informing that he has no remarks to offer relative to Dr Sutherland's suggestions for the arrest and prevention of Endemic disease

No 96

No. 315. Supg. Engineer's Office 4th Divn.
Madras 22nd April 1870 (2)

From,

Lieut Colonel J. Bean R.E.
Superintending Engineer
in charge of 4th Division

To,

Colonel C. A. Orr R.E.
Secretary to Government P.W.D.

Sir,

I have the honor to report with reference to G.O. No. 3716 and No. 1019 dated 22nd November 1869 and 12th April 1870 that no cases of disease in an epidemic form from the cultivation of irrigation have been brought to my notice personally, and Range Officers &c. have reported that they are not aware of the existence of malaria engendering disease from swampy and ill drained land in this Division.

2 I do not consider that the conditions which produce fevers of an endemic or epidemic type, and under which malarious poisons are generated in portions of Bengal, exist in Madras or Arcot. There have been no great public works to obstruct drainage, and there are no rivers discharging on the eastern coast of such a character that the low lying districts are gradually filling up from deposits brought down and remain in the condition of an unhealthy swamp.

I have the honor to be
Sir
Your most obedient Servant

W. Rian Lieut Col R.E.
Supdg Engr in ch. of 4th Dn

No 35. Super

P.W. Dept
[illegible]
No. 1016.

From
The Supdg. Engineer 5th Divn.

To
The Secretary to Govt.
[illegible]

Dated 22nd April 1870.
Recd 25th

No. 315.

Submitting that no cases of disease in an epidemic form from the cultivation or Irrigation have been brought to notice generally and that the Range Officers are not aware of the existence of Malaria engendering disease from Swampy & ill drained land in the 5th Division.

Nos. 1877 & 1878 6 Aug 1870

No. 97
[illegible]

No. 35. Superintdg. Engrs Office, 5th Divn.,
Cuddalore, 6th May 1870.

From,
Captain R. A. Roberts. R.E.,
Actg. Suptg. Engineer, 5th Divn.

To,
Colonel Charles A. Orr, R.E.,
Secretary to Government,
Public Works Departt.

Sir,

In reference to G.O. No. 1019, dated 12th April 1870, and G.O. No. 3716, dated 22nd November 1869, communicating for any remarks that the Superintending Engineers may think fit to offer, Dr. Sutherland's suggestions for the arrest and prevention of endemic disease in Lower Bengal, I have the honor to state that no case of endemic disease in this Division has come to the notice of the Department within the memory of any of its present members, and considering the great extent of cultivation by irrigation in the Division, and the especial freedom from all diseases of an endemic nature enjoyed by the Ryots of those portions of the Division so cultivated, it would appear that such diseases cannot, in this climate at least, be held, as a general principle, to be, in any way, attributable to the spread of irrigation projects. Indeed so far is this from being the case, that I am informed that the Chedumbrum Talook is far healthier now than it has ever been before, solely in consequence of this spread of irrigation.

2. In the Salem District the most common disease is fever, but it rarely assumes a bad form in those parts of the District that are cultivated by irrigation.

3. As regards this Division, and in my humble opinion the same remarks would apply to the Presidency generally, I do not think that the Government need perplex themselves, as suggested by Dr Sutherland, with a consideration of the question as to the amount of mischief that our "boasted improvements" have caused the natives.

4. If our Railways had "obstructed", as stated by Dr Sutherland, "the natural drainage of the country," the "drainage" would long since have swept them off the face of the country.

5. As for "the deadly miasmatic atmosphere" caused by the canals we "have created and "wherever the irrigation system has been carried out", nothing can be wider from the facts, in this Division, than such an imputation. On the contrary, all our observations tend to exactly the reverse of this theory, so much so, that it may be safely affirmed here that the effect of our irrigation is not only to render the air fresh and healthy, but it is almost a necessity in order to render the country

habitable.

6. The sun is a great deodorizer, and compensates us, in a manner, in this respect, for the great heat which our closer proximity to the Equator entails on us.

7. Here at Cuddalore, in the backwater and the channels that lead the drainage of the paddy-fields into the backwater, there is at day-break that peculiar fetid odour to which the Cooum accustoms every one at Madras, and which especially delights to linger about the main Entrance Gates of Government House. By 8 A.M. or so the smell is deodorized by the sun, and at that time you may ride along the banks of the channel & backwater without the risk of being "incommoded".

8. Where the sun cannot freely penetrate and there is consequently a stagnation of air such as exists at the foot of hills, especially those with dense vegetation, and thick jungle - as is the case for example in the Western portion of the Cullacoorchy Talook, where it abuts on the Kalry Hills, which form the Western portion of the South Arcot District, this is a certain fever range, though the country there may be said to be marked with a total absence of vegetation.

9. The Western Ghauts form a noted instance in this respect - there, as is well known, the Western slopes of the mountains are mostly steep and precipitous, and the Sea-breeze blowing Westwards drives back & blocks up, as it were, against these precipitous Hills the miasmatous air & poisonous night-exhalations from the dense jungle that is formed by an inordinate rain-fall and sodden heat; and so poisonous is this miasm that even to be driven at night in a shut-up carriage through this jungle is almost certain death from jungle fever.

10. In the same way in the

bay of hills forming Courtallum in the Tinnevelly District, owing to the dead block of all currents of air, the miasma given off by the jungle entails certain fever until the rains set in; when the driving wind and rain scour out the Ravine, and the air becomes fresh and purified and renders the place ~~becomes~~ a delightful residence, if not a Sanitarium.

11. From the above it will be seen that, in this Division and I may add Presidency, the worst cases notoriously of Endemic disease are in jungles where there are certainly no marshy soils. The geological formation of the Southern portion of the Peninsula differs entirely from that of Lower Bengal and the Gangetic Delta. We have, as a rule, no underlying clay but a substratum of gravel, sand or Kunkur. If for this reason only, the formation of gigantic cess-pools as advocated in Dr Sutherland's letter Para 13, is, to say the least, quite uncalled for.

12. In conclusion, I must confess that I fail to comprehend that portion of Dr Sutherland's letter [Para 10] in which he states that "the Endemic "having exhausted itself in one locality "by carrying off all the more susceptible "inmates naturally progresses into other "Districts where it would find fresh "and predisposed victims". It appears to me that if fever is, as stated, caused by the emanations from marshy soils, the residents on those soils being all subjected simultaneously to the same climatic influences, would be similarly and simultaneously affected by the miasmatic fever. Why the fever should first attack one village and, after having decimated it by destroying all the sick and weakly, should deliberately proceed to the next village and indulge itself in a like manner until "exhausted" for want of victims it pushed on to the next again, and so on, is as much a mystery to me and appears no more improbable

than the havoc, committed by the Dragon of Wantley, or Guy Earl of Warwick's Dun-Cow.—

I have the honor to be
Sir
Your most obedient Servant

Richd. J. Roberts Captain R.E.,
Actg. Superintg. Engineer

No 137 Public
[illegible]
From The S. Engineer
5th Division
To
The Secy to Govt
P.W. Dept
Madras.

Dated 6th May 1870.
Recd 9th "

No 35

Endemic disease —
Offering remarks
on the suggestions of
Dr. Sutherland for
the cause and preven-
-tion of Endemic di-
-sease in Lower
Bengal.

No 1877-1878 6 May 1870

No 98
Dated 6 Aug 1870 R 26:

No 1258

Supg Engineers Office 6th D
Camp Coiladi 31st January 1870

From
The Superintending Engineer
6th Division

To
The Collector of
Tanjore

Sir,

With reference to your letter No 19 dated 27 Instant I have the honor to inform you that so far as my observation goes there are no localities in the Tanjore District in which malarious fever prevails. This I attribute to the fact that owing to the large volume of water which is available through a large portion of the Irrigating Season water is constantly in motion more water being taken than is required for the actual purposes of cultivation and the superfluous water being allowed to pass off by the surplus streams hence there is no stagnation of water.

Were it not for the constant flowing of the water over the country it is very probable that Tanjore would be as unhealthy as large rice producing tracts generally are and hence I have always opposed propositions for the reduction of the supply which shall be permitted to enter the Delta below the quantities which the Deltaic Rivers are known to be able to carry with safety and these quantities are nearly 2½ times the theoretical supply for the cultivation under the Vennaur and nearly 3¼ times that for the cultivation under the Cavery.—

I have &c. &c.

(signed) R. F. Oakes Captn. R.E.
Supg. Engineer 6 Divn.

"True Copy"

R. F. Oakes Captain R.E.
Supg. Engineer 6 Division

No 79

Supdg Engrs Office 6th Dn
Tanjore 21 April 1870.

79

From,
Captain R. F. Oakes R.E.
Superintending Engr 6th Dn

To,
Colonel C. A. Orr. R.E.
Secretary to Govt. P.W.D.

Sir,

With reference to G.O. No 1019 dated the 12th Instant, I have the honor to forward Copy of a letter addressed by me to the Collector of Tanjore relative to the non-liability of the District to malarious fevers. my views on the subject are stated in the letter.

I was not aware that a separate reply to G.O. No 3716 was required in this Department.

I have the honor to be
Sir,
Your Most Obdt Servt
R. F. Oakes Capt. R.E.
Supdg Engineer 6th Dn

Enclosure in a letter
from the Supdg Engr
6th D to the Se-
cretary to Govern-
ment No 79
dated 21 April/70

P.W. 1596/70

Copy of letter
addressed by the Supdg
Engr 6th Dn to the
Collector of Tanjore
relative to the non-
liability of the District
to malarious fevers

P.W. 1870 Dept
From Supg Engr for Irrigh
No 1595
The Supg Engineer
7th D.

To
The Secretary to
Govt D. P. W.
No 79

Dated 21st
Recd 23d April/70
Enc 1
Nos 1877 & 1878 6 Augt/70
Forwards, with reference to G. O. No 1019, dated 12th Inst copy of a letter to the Collector of Tanjore, relative to the unhealthiness of the District to malarious fevers.

No 97.

Reg No. to Coly 11 July/70 No 26

No 16

Supg Engineer's Office 7th
Coimbatore 22d April 18

(33)

From,

Lt Colonel W. Farewell
Ag Supg Engineer 7th Dn

To,

Colonel C. A. Orr R.E.
Secretary to Govt D.P.W.

Sir,

With reference to G O No
3216 of 22d November 1869 and G. O.
No 1019 of 12th April 1870, I have the
honor to report that there are n
new Irrigation works in this Div
but nearly the whole of the count
Irrigated from the Bhowany and
Cauvery lying north of Erode in
the Coimbatore District is annual
visited by fever from February to
end of May.

I have the honor to b
Sir,
Your most obedt Servant

Lt Coll
Ag Supg Engr 7th Dn

R.P.

P.W. 1870 Dept.
From the Supdt. of Engineers
7th Division
No. 1022
To the Secretary to Govt.
Department Public Works
Madras
11/6
Dated 22nd
Recd. 25th April 1870

Report about fever prevalent in Coimbatore District. —

17

No. 199

Kodaikanal
4th May 1870

(3)

From

Major G. M. Payne
Acting Superintending Engineer
8th Division

To

Colonel C. A. Orr R.E.
Secretary to Government P.W.D.
Madras

Sir,

With reference to G.O. No. 1019 of the 12th April 1870, I have the honor to state that in no part of the 8th Division does it appear that fever is attributable to the existence of irrigated lands.

The Division is generally well drained and water does not stagnate: were the latter the case, it is not improbable that Endemic disease would be generated. —

On

2 On the low ranges of hills, and along their bases, fever of apparently a malarious type is always more or less rife from the months of January to the middle of June. The monsoons seem to have the effect of destroying the malarious poison for as soon as they have fairly set in, the hills and their vicinity are rendered healthy. A good instance of this may be seen in Courtallum, the Sanitarium of the Tinnevelly District. This place is situated at the foot of a range of hills running North and South and is during the months of March, April and May a most unhealthy spot. But from the middle of June

when

when the South West monsoon accompanied by strong winds has properly set in, the Character of the Locality is quite Changed. It is then a most favorite resort for invalids and is Considered by Medical men perfectly healthy in every respect. -

3 Another instance of the effect of the monsoon is observed on the hills at the head of the Cumbum valley in the Madura District. The plateau on these hills averages some 3000 feet above sea level and at times, from February to end of May, is Considered a hot bed of fever. As soon as the rivers have been freshened up by the South West rains, fever Ceases and the hills are delightfully Cool

and quite healthy: whereas at Gudalur, a village distant only some 10 miles from the ~~[illegible]~~ ridge, which stops the rainfall, fever continues and the place is generally avoided as dangerous.

I have &c.

C. M. Payne Major
Acting Superintending Engineer
8th Division

ting
over

No. 1874 Dept.
[illegible] No. 1062

[illegible] Sanitary Commr.
[illegible]

[illegible] to Govt.
[illegible]
Madras

Dated 14th May 1870

No. 1778 1878 6 Aug 1870
[illegible] the fever is [illegible] to the [illegible] land [illegible] and where [illegible] prevalent [illegible] from other causes

No. 181
Recd 11th July 70 R 26

31

No. 346.

Special Executive Engineer's
Office Wynaad, Vythery
9th May 1870.

From, The Special Executive Engineer
Wynaad

To, The Secretary to Government
Department Public Works
Madras.

Sir,

With reference to G.O. No. 3716 dated 22d November 1869 I have the honor to forward the following remarks on the subject of malarious Fever.

In the first place, in this District of Wynaad Fever is so notoriously prevalent, that Wynaad and fever seem to be quite inseparable in the ideas of most people, who have ever heard of the locality, but as regards its causes, they certainly cannot in any way be attributed to artificial irrigation, as nothing of the sort exists, not even to the extent of distributing water by from wells; the cultivation of wet crops being entirely left to the aid of nature, so far as irrigation is concerned, through the agency of natural water courses, and the heavy rainfall extending over several months of the year.-

3. In my ten years experience of this District I have observed that fever is most prevalent along the Banks of Rivers, and in open Forest land in which the trees are of deciduous foliage, especially Teak forests; the fever contracted in localities where this Timber grows appearing to be the most virulent in type; on the contrary, where the Forest is very close, and the situation protected from wind, I have seldom seen people attacked by the disease; or if they have been, it has been generally in a mild form.-

4. I observe that the indigenous tribes, who are the least subject to the disease of any, do not build their houses on heights; in fact, as a rule they are to be found close to the edges of Paddy flats, and even of swamps; their study seems to be to surround themselves with trees of thick, heavy, foliage, such as Jack, Plantain, and the like; and to shut out the wind; positions also, surrounded by heavy forest, they are partial to. It is in the larger villages, built on open ground, where fever is most rife; and more especially where the drinking water is procured from Rivers.- Whether in this latter case, anything is due to the pollution of the water with Coffee pulp I cannot take on myself to say. Formerly the nuisance from this was intolerable, and the filthy, fetid condition of every running stream in the District, during the crop season, could not but have been productive of much disease; a great effort has been made to prevent this pollution, and with a good measure of success though not to a complete extent. It would doubtless be well to turn attention to this, but as the bad condition of the water I believe is a good deal due to the great quantity of vegetable matter brought down and held in suspense, I look to the improvement of health more in the direction of wells, than to any other resource.-

5. A sum of Rupees 5000 laid out on wells would I am persuaded do incalculable good; and where the object is the health of a whole District the amount is but trifling; with Rupees 5000 upwards of 30 wells might be sunk, and these distributed to such places as Goodaloor, Sultan's Battery, Nellialum, Manantoddy, Panamaram, Vythery, Cutpathy, Choondale, Meenangadi, Korote, Kelloor angady, Terriote and

other localities would, I am convinced, show beneficial results.— In some of these a single well would be sufficient, in others two, three, and even four might be required.—

6. I see in para 11 of the letter of Doctor Sutherland my idea of Fever not being generated, but rather held back, by thick vegetation is confirmed; and in 13, and succeeding paras, tanks are recommended; very few of these exist in this District but I think the opinion is one that might well be tested, and I would propose an experiment at a locality where latterly there has been a good deal of Fever, and where by embanking across a small gorge, a tank might be formed at no very great cost; the locality I mean is Sultan's Battery

7 That Fever will be entirely eradicated from Wynaad I look upon as hopeless but much may be done to make it less prevalent, and still more towards alleviating the sufferings of its victims: supplies of febrifuge powders put into the hands of Government servants in Revenue, Police, and Public Work Departments for gratuitous distribution would do much; of course the gratuitous distribution being limited to the poor;

while

while, those who can afford to purchase, the drug might be sold at cost price.— Dispensaries properly supported at Goodaloor, Sultan's Battery, Manantoddy, Vythery, Culpathy and Panamarum would all be most useful institutions: and except at the three principal places need not be of any expensive character. A house for a medical subordinate, a dispensary room, and a couple of wards for bad cases all built in the cheapest, plainest manner would be all that would be required.— I consider no place in the whole District needs something of the sort more than Sultan's Battery, where there is a large native population, but no European settlers; so that the facilities for obtaining medicines, and advice, enjoyed by Coolies on Estates, from their employers, are not there to be found; the place is also likely to increase in importance, it being a point at which the principal lines of communication with Mysore will converge.—

8 I do not know whether I have erred in thus going into detail, but it is difficult (when called upon to give an opinion) for one with a simply local experience to avoid

what may perhaps be ſomewhat petty in conſidering a ſubject of large importance. —

I have the honor to be
Sir,
Your most Obedient Servant
Robt. W. Kennedy Major
Special Executive Engineer
Wynaad. —

~~P.W. 1870 Dept Augt~~
~~Procdgs of Govt No 1877~~
The Special Executive
Engineer - Wynaad
To, The Secretary to
Government
D. P. W.
Madras
Dated 9th May 1870
Recd 12th
No 346.

Report on the
subject of malarious
Fever in Wynaad -

No 102
Refd to Actg 11 July 70 R 26

Nos 1877 & 1878 - 6 Aug/70

No 3,733

PROCEEDINGS OF THE BOARD OF REVENUE, dated 1st June 1870

Read the following papers —

Letter from the	Acting	Collector	of Ganjam,	dated 29th January 1870,	No 49
,,	,,	,,	of Vizagapatam,	,, 18th February ,,	,, 133.
,,	Offg	,,	of Kistna District,	,, 10th March ,,	,, 1,003
,,	,,	,,	of Nellore,	,, 16th February ,,	,, 285
,,	Acting	,,	of Bellary,	,, 17th ,, ,,	,, 38
,,		,,	of Cuddapah,	,, 26th March ,,	,, 54.
,,		,,	of Kurnool,	,, 27th January ,,	,, 34.
,,	Acting	,,	of Madras,	,, 14th February ,,	,, 45.
,,		,,	of Salem,	,, 28th January ,,	,, 20.
,,		,,	of North Arcot,	,, 27th ,, ,,	,, 28
,,		,,	of do.	,, 22nd February ,,	,, 73.
,,	Acting	,,	of Trichinopoly,	,, 6th April ,,	,, 73
,,	Offg	,,	of Madura,	,, 17th February ,,	,, 54
,,	Acting	,,	of Coimbatore,	,, 15th January ,,	,, 8.
,,	Commissioner of the Neilgherry Hills			,, 19th ,, ,,	,, 8.
,,	Collector of the Godavery District,			,, 25th April ,,	,, 110

,, Proceedings of the Madras Government, dated 23rd April 1870, No 96, Revenue Department

Read Proceedings of the Madras Government, dated 12th April 1870, No 1,019, Public Works Department

Read Memorandum from the Assistant-Secretary to the Government of India, to the Secretary to the Government of Madras, Public Works Department, dated Fort William, 24th March 1870, No $\frac{153}{1}$, B C —

THE undersigned is directed to invite attention to Public Works Department Circular No 75, dated 6th September 1869, forwarding, for an expression of opinion, a report by Dr Sutherland, containing suggestions for the arrest and prevention of endemic disease, and to inquire when a reply thereto may be expected

ORDER THEREON, 12th April 1870, No 1,019

COMMUNICATED to the officers concerned, in continuation of Government Order, No 3,716, dated 22nd November 1869, with a request that they will expedite the submission of the report therein called for

(True Extract)
(Signed) C A ORR, Colonel, R E,
Secy. to Govt, P. W D

ORDER THEREON, 23rd April 1870, No 96

FORWARDED to the Board of Revenue, with reference to Government Order, 7th December 1869, Miscellaneous No 13, who will be good enough to expedite the submission of the report

(True Extract)
(Signed) H WELLESLEY,
Acting Under-Secy to Government

To the Board of Revenue.

THE Board resolve to submit these reports for the information of Government

2 No facts corroborative of the views of Dr Sutherland are reported from Ganjam or Vizagapatam, the two most feverish districts in the Presidency. Increased unhealthiness has been noticed in a limited area of the latter district recently watered, but the tract is a jungly district under the ghauts, and no positive conclusion can be drawn from the facts at present. No accurate statistics are available.

3 The Collector of Godavery reports the prevalence of fever of a manageable type during the cold weather, and finds that there is a larger number of deaths from fever in the delta talooks than in the sparsely-peopled upland talooks, but the proportion of deaths to population is not given, and the returns are avowedly unreliable for the earlier years of the series compared.

4 No serious increase of fever has been observed in the irrigated talooks of the Kistna District. The uplands and dry talooks are notoriously feverish.

5. From the dry districts of Kurnool, Cuddapah, (an unhealthy district,) and Bellary, the Collectors report that no increase of fever is attributable to irrigation operations, and the Collectors of Madras, North Arcot, Salem, Madura, and Coimbatore are of the same opinion in respect to the districts under their charge

6 The Collector of Trichinopoly does not consider that either in this district or Tanjore, with which he is intimately acquainted, any prevalence of fever is attributable to irrigation. In Trichinopoly the disease is most prevalent and deadly in the upland talook of Udayarpalayam.

7. The opinions of local officers throughout the Presidency fail to corroborate Dr. Sutherland's views.

(True Extracts)

J Grole
Acting Secretary

To the Acting Secretary to Government, Revenue Department,
with a file of Collectors' replies

Copy to all Collectors.

Exd. T. Cartledge.

Transferred to
the Publ. Works
Department.

Fort St George
14 June 1870
Acting Under Secy

~~Part~~ 1870. Dept
Board of Revenue,
No. 2303.
MADRAS.

~~1779~~

PROCEEDINGS, 1ST JUNE 1870, No. 3,733.

Despd 11 June 70
14

Encl 1.

Received 15 June 1870.
No 940

JUNE.
No 3,733.

Endemic disease,—Reports of Collectors on Dr Sutherland's suggestions for arrest and prevention of, submitted to Government, with remarks

No 102 A

39

File of Collectors' replies on Dr. Sutherland's suggestions for arrest and prevention of Endemic disease

From G ELLIS, Esq , Acting Collector of Ganjam, to the Acting Secretary to the Board of Revenue, dated Russelcondah, 29th January 1870, No. 49

WITH reference to the Board's Proceedings, No. 9,294, dated the 18th ultimo, I have the honour to state that no fever has appeared in conjunction with the excavation of the Chilka canal, the only one in this district, nor are there any works of irrigation in this district of sufficient size to justify me in venturing any opinion as to whether endemic disease is to be attributed to their construction.

Exd. J. Tulloch.

From R. J MELVILLE, Esq , Acting Collector of Vizagapatam, to the Acting Secretary to the Board of Revenue, dated Jeypore, 18th February 1870, No 133

I HAVE the honour to reply to the Proceedings of the Board of Revenue, dated 18th December 1869, No 9,294, calling for my opinion on the subject of fever

2. I have received reports on the subject from the Acting Principal Assistant and from the Acting Junior Assistant in charge of Jeypore The opinion of the latter officer is entitled to much weight owing to his having served so long in a country so notoriously feverish as Jeypore

3 The Acting Principal Assistant reports that it is the received opinion among natives in the Golgonda Talook that fever has become more prevalent since the construction of the Gubbada anicut and the canals in connection with it, and the consequent increase of wet cultivation He also observes that the year after an unusually copious monsoon there have been many more deaths from fever in the Sub-division than there were in last year, which was very dry

4 Mr Turner observes that the theory set forth by Dr Sutherland is not supported by his experience in Jeypore He mentions as an instance the town of Jeypore, which has two or three tanks, which receive the drainage of the surrounding country, and which are seldom known to be dry, yet it is well known to be the most unhealthy spot of a not very healthy district On the other hand Nowrungapore, though surrounded by paddy-fields and with two or three tanks, is a comparatively healthy place.

5. Nundapore is a high tract with jungly downs, no paddy swamps, and good drainage, yet it is notoriously unhealthy. Koraput, my present camp, is an open breezy place with hardly a tree about it, and it is in Mr. Turner's opinion less subject to fever than any place in Jeypore

6 Mr. Turner, while expressing himself unwilling to express a decided opinion, states that one of the conditions necessary for fever is plenty of jungle

7 I quite agree with Mr Turner as to the difficulty of laying down any positive rule From my experience of feverish places I am of opinion that the conditions most favourable to fever are plenty of low under-growth and a want of circulation of air

8 I do not believe that the vicinity of trees is at all conducive to fever, provided the air can circulate Much harm has been done by the indiscriminate felling of trees in stations under the impression that it was a sanitary measure.

Exd. J. Tulloch.

From J. FRASER, Esq, Collector of the Godavery District, to the Acting Secretary to the Board of Revenue, dated Cocanada, 25th April 1870, No 110

WITH reference to the Proceedings of the Board, No. 9,294, of 18th December 1869, and their order thereon, I have the honour to state as follows —

2 A fever which seems very much to resemble that reported on by Dr Sutherland, only perhaps not so deadly when properly treated, is very prevalent in this district during the cold weather months, or November, December, January, and February I send a statement taken from the records of my office showing the deaths from this case from Fusly 1261 to end of February in Fusly 1279

3 The information prior to Fusly 1275, when the Death Registration Returns were first commenced, is taken from the Jummahbundy reports, and cannot be much depended on. That from Fusly 1275 is from the Death Registration Returns, and gives the deaths from fever alone in the delta and upland talooks separately, and, bad as the upland talooks are from this cause, this return shows that the mortality in the delta talooks exceeds that in the upland ones

4 The fever I believe to be one that readily succumbs to proper treatment if taken in time, but the native mode of treatment is by lankanams, meaning thereby with entire starvation as regards food, and very little to drink, for as many as eleven and twelve days Of course this mode of treatment kills its thousands I append extracts from the annual reports of Messrs Boalth and Doig, showing their opinion of the fever

---

ENCLOSURE No 1

Statement showing the deaths from Fever from Fusly 1261 to end of February in Fusly 1279, in the Godavery District

	No of deaths from Fever.	
Fusly 1261	6,357	
,, 1262	894	
,, 1263	2,492	From Fusly 1263, anicut irrigation extended
,, 1264	5,469	
,, 1265	4,203	
,, 1266	4,546	
,, 1267	3,062	
,, 1268	2,782	
,, 1269	4,236	
,, 1270	3,587	
,, 1271	3,470	
,, 1272	3,782	
,, 1273	4,085	
,, 1274	3,343	
,, 1275	7,302	
,, 1276	10,005	
,, 1277	15,209	
,, 1278	6,955	
,, 1279 up to February 1870.	17,173	

(Signed) J. FRASER,
Collector.

COCANADA,
25th April 1870

ENCLOSURE No 2

Statement showing deaths from Fever in the delta and upland talooks in the Godavery District from Fusly 1275.

Fusly	In delta talooks	In upland talooks	Total.
1275 ..	3,448	3,854	7,302
1276 .	4,760	5,245	10 005
1277 ..	9,821	5,388	15,209
1278 ..	3,805	3,150	6 955
1279 to end of February 1870	10,560	6,613	17,173
Total ..	32,394	24,250	56,644

COCANADA,
25th April 1870

(Signed) J FRASER,
Collector

ENCLOSURE No 3

Extracts from the Annual Medical Report for the year 1869

DURING the past year a remarkable freedom from cholera was enjoyed by the inhabitants of the joined towns of Jaganaikpoorum and Cocanada, in fact, the district at large was to a certain extent free from that dire disease Small-pox has also not been as severe as the year previous, but fever which is more or less prevalent during the cold season has been unusually severe, and the number of fatal cases reported, very high The towns of Jaganaikpoorum and Cocanada were to a great extent free from the fever, but it was the district that suffered so severely The fever, of which a few cases come under treatment, was of a malarious nature, and susceptible to treatment when taken on hand early I have no doubt that the plan of starving the patients so commonly adopted by the people here has much to answer for the number of deaths Supplies of medicines on several occasions have been forwarded to the district on the requisition of the Collector, and distributed to the people with good result I believe

COCANADA,
1st January 1870

(Signed) W H BOALTH,
Assistant Surgeon, in medical charge

THE prevailing diseases have been fevers and venereal affections Until within the last fortnight or three weeks the fevers were all more or less of a mild form, the greater number having come in from the neighbouring villages, and as far as treatment, but few required more than a purgative and some saline, the others doing equally well with the addition of a few doses of quinine But I regret to say that this disease is now very prevalent all over the district, especially in the Peddapoor, Ramachendrapoor, and Narsapoor Talooks

* * *

The district has been free from cholera or other epidemic, but the mortality from the malarious fever which is now so prevalent will, I am afraid, be found to exceed even that from the "great disease" when it makes its appearance

COCANADA,
29th November 1869.

(Signed) C DOIG,
Acting Civil Surgeon

(True Extracts)

(Signed) J. FRASER,
Collector.

Exd T. Cartledge

From J. A C BOSWELL, Esq , Officiating Collector of the Kistna District, to the Acting Secretary to the Board of Revenue, dated Masulipatam, 10th March 1870, No 1,003.

WITH reference to the Board's Proceedings, dated 18th December 1869, No. 9,294, circulating to all Collectors for their opinion, a letter from Dr. Sutherland, with regard to the predisposing causes of fever, and its increase with the extension of irrigation, unless drainage be secured, I have the honour to state that there are no Returns of Deaths prior to 1865, and, therefore, I am not able to furnish any statistics to show whether or not there has been any increase of fever in this district in connection with the extended irrigation that has been introduced throughout the delta I enclose, however, a Statement showing the number of deaths reported from fever in each talook in each year since July 1865 to December 1869, from which it appears that the ravages of fever are most fatal in the upland talooks of Palnad and Nandegama and the Zemindary Division of Nuzividu The fevers are most prevalent in the cold season after the rains, that is, in December and January, and in some villages there is scarcely a house where there is not some one or more of the inmates prostrated with fever The native system of treatment consists of *Lankhanams* or fasts, extending from 5 up to 21 days, and this practice which exhausts all the strength of the patient, too often leads to fatal results from sheer exhaustion I have published a notice in the *District Gazette* warning the people against this course of treatment, and pointing out its prejudicial effects, but what is wanted is to train the Native Doctors who practice in the villages, and through them introduce a more enlightened system of dealing with these epidemic fevers

2 The Superintending Engineer whom I have consulted writes "The drainage of the increased area irrigated is far from complete, but from my own knowledge I can assert that the drainage is much better than it was in 1854 to 56, when the Kistna could sweep over the country, and lay in pools, etc , for months after "

"The Surveys now in progress will remedy any shortcomings in the delta, but I cannot find any grounds of complaint on the score of want of drainage in Palnad and Nandegama where the permeable soil and rapid fall of the country carry off the water speedily "

"The subject of fever is very little understood by even Medical authorities, and I fear I can throw very little light on the causes of its prevalence. Light clothing when exposed to rain and cold dry wind, the filthy condition of nearly every village and house are doubtless among them It would be interesting and doubtless instructive to watch the effects of sanitary action in the towns of Masulipatam, Guntoor, etc , as to the decrease of fever."

3. I beg to enclose copies of letters from the Civil Surgeons of Masulipatam and Guntoor, describing the results of their observations in regard to the malarial intermittent and remittent fevers of this district.

ENCLOSURE No 1.

From W E WRIGHT, Esq , Acting Zillah Surgeon, Guntoor, to the Officiating Collector of the Kistna District, dated 27th January 1870, No. 6 —

I HAVE the honour to acknowledge the receipt of your Communication, No 189, dated January 1870, and with it a Circular containing a copy of Doctor Sutherland's letter to the Under Secretary of State for India on the subject of malarial fever in the irrigated districts of Bengal In answer to your request, I now offer the following remarks on the nature and causes of the fever now prevailing in the district, at least so far as I have had an opportunity of observing it

2. The fever which prevails about Guntoor and the neighbouring talooks is a malarial fever, and is characterized by that general feature which is almost peculiar to fever of malarial origin,

viz, a periodicity in its symptoms, an intermission or remission in the febrile symptoms, and this again followed by a recurrence of the fever at a certain definite period which varies with the type of the fever.

3. The cases that have presented themselves at the Civil Dispensary, Police and Jail Hospitals, have almost all been cases of intermittent* or remittent† fever of various degrees of severity, but all referable to the class of malarial fevers

4. The fever prevailing in the immediate talooks do not appear to have caused much mortality, and it yields readily to treatment and particularly to the use of quinine, another and a therapeutic test of its malarial origin, but it often leaves the subject of its attack weak and debilitated for a longer or shorter period, and often necessitates a change from the locality where the disease was contracted

5 It is not in any way contagious or infectious.

6. The direct cause of this fever, I believe to be, exposure to exhalations resulting from the drying of damp and marshy soils, and particularly those soils that contain organic matter in excess, and this is the opinion of the profession as regards the cause of all malarial fevers

Many cases result from exposure to the night and early morning winds from such quarters, more especially when the exposed persons are imperfectly clad ‡

7 As to predisposing causes, I am of opinion that general debility and insufficient food render the system more liable to be attacked by and less able to resist the poisonous miasm

The worst cases of fever that I have seen have been among half-starved beggars and travellers

Men in the prime of life, and the young appear more susceptible of the poison than the aged.

8 During the few days following, a slight rain-fall at the beginning of the present month, there was a sudden influx of cases into the Jail Hospital, and at the same time there was an increase of cases in the town

More recently there has been a heavier rain-fall, but the fever does not appear to have increased

9. I am not sufficiently acquainted either with the topography or the sanitary history of our district, to give any opinion as to whether the fever now prevailing in different parts is in any way due to the system of irrigation as now carried out, but I consider the subject of great importance and that it deserves the serious attention of all officers who are interested in the district

10 It appears to me that a special report on the subject would be desirable and I believe that information on the following questions would lead to valuable results —

(a) In what talooks of the Kistna District has the fever most prevailed?
(b) Have such talooks a system of Canal irrigation?
(c) If so, how long have they had it? and have they been more subject to fever since such a system has been carried out?
(d) Has the fever prevailed equally in all the talooks so irrigated?
(e.) What are the geological and topographical peculiarities of the affected and non-affected talooks? The nature of crops, etc, presence or absence of trees?
(f) What is the character of the previous season, as regards temperature, prevailing winds, rain-fall, etc?

11. It is quite possible that irrigation on certain soils and under certain conditions may be injurious and a study of these conditions would be a guide for the future

12. The present subject I think should be viewed rather in an inquiring and sanitary aspect, than a medical, and for this reason I have purposely abstained from entering into any medical details respectively, this fever such as its symptoms, treatment, etc, or I have only barely alluded to them.

If, however, you would like to be further informed on these points, I shall be happy to give you the result of my observations

(True Copy)

(Signed) J. A. C. BOSWELL,
Officiating Collector.

ENCLOSURE No 2

From Assistant Surgeon F M RICKARD, Zillah Surgeon, to the Officiating Collector of the Kistna District, dated Masulipatam, 17th February 1870, No 13.

I HAVE the honour to acknowledge the receipt of your Memorandum, No 188, calling for a report upon the character of the fevers most prevalent in this district and the predisposing causes

2 In forwarding the accompanying observations, I do so, with the conviction that the information will be meagre, and I am of opinion that a satisfactory result cannot be obtained without a special inquiry into the subject.

3 The cases of fever that present themselves at the Dispensary, are all malarial, and of the pure intermittent type (which I need not more particularly characterize, as these remarks will appear before medical men) and which, after running an indefinite and variable course, terminate without proving fatal. The patient, however, becomes much weakened, and a length of time must elapse, before he regains his former condition and strength.

4. During last year, one death took place from intermittent fever.

5 There are several cases also of remittent fever, the generality of which are amenable to treatment

6. During last year, one death took place from remittent fever

7. Taking into consideration the general swampy and low condition of the country around here, it is curious that no more cases have occurred the whole of the cases seem to have been confined to the out-stations, but, whether they were caused or aggravated by irrigation, I cannot venture to state From the small opportunity I have had of examining any portion of our district, irrigated or non-irrigated, it would be unwise on my part, to give an opinion on so serious subject as that contained in Doctor Sutherland's communication

8. I am bound to state that, with regard to the more immediate vicinity of this town, surrounded as it is by water, swamps, back-water, etc., that irrigation can only have one effect, and that a beneficial one, and I believe if the abovementioned swamps, etc., could be more perfectly drained and otherwise reduced, that a great cause of the existing fever, though small, would be removed.

9 The worst cases of fever that I have had to attend have been those, from a Station 120 miles from here, where there is no irrigation, and where the ground is high and well drained.

10 I shall be glad to give you more information on any subject, if you will point out the deficiency.

(True Copy.)

(Signed) J. A C BOSWELL,
Officiating Collector.

---

* It may be as well to offer a few words in explanation of these terms as applied to fever

In intermittent fever, the symptoms after a time abate entirely, leaving the patient in comparative health or comfort until they recur, which is usually after a stated interval, either next day or the day after Common ague is a fever of this kind.

† In remittent fever the symptoms are more continuous and generally more severe, they do not entirely abate, but simply remit or are less marked for a time, after which the fever again returns, with more or less severity The fevers known as jungle fever or by local names are frequently of this class

‡ On this point, I have been informed that most officers who have occasion to travel in the district find it greatly to their advantage to supply their servants with Cumblies, Blankets, or other clothing as the native if exposed to cold at night, is very liable to fever

ENCLOSURE No. 3.

Abstract Statement of Deaths by Fever in the District of Kistna from 1st *July* 1865 *to* 31st *December* 1869

Names of Talooks.	From 1st July 1865 to 30th June 1866	From 1st July 1866 to 30th June 1867	From 1st July 1867 to 30th June 1868	From 1st July 1868 to 30th June 1869.	Total	FROM 1ST JULY 1869 TO 31ST DECEMBER 1869.							Grand Total.	Remarks
						July.	August	September	October	November.	December.	Total.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Repalli	248	174	188	165	775	17	19	23	13	31	24	127	902	
2 Bapatla	254	334	254	189	1,031	17	25	15	34	31	46	168	1,199	
3 Guntoor .	188	225	227	208	848	15	35	18	24	33	47	172	1,020	
4 Palnad	301	647	762	367	2,077	42	34	32	36	64	183	391	2,468	
5 Rajapeta ...	204	289	279	192	964	13	15	24	18	38	67	175	1,139	
6 Gudiwada	68	82	117	107	374	9	6	17	17	39	30	118	492	
7 Krosur .	118	165	191	98	572	14	27	3	7	12	65	128	700	
8. Bandar ...	121	140	190	227	678	11	23	15	16	50	30	145	823	
9 Nandegama	255	467	338	183	1,243	13	22	18	18	84	198	353	1,596	
10. Bezwada ...	103	260	306	113	782	10	15	11	19	69	91	215	997	
11 Vinukonda... .	115	166	169	95	545	11	10	12	15	16	38	102	647	
12 Vissannapeta ..	176	360	260	110	906	5	11	13	4	71	163	267	1,173	
13. Nuzividu	159	242	554	151	1,106	11	15	10	21	78	87	222	1,328	
Total	2,310	3,551	3,835	2,205	11,901	188	257	211	242	616	1,069	2,583	14,484	

MASULIPATAM,
10th March 1870.

(Signed) J. A. C. BOSWELL,
Officiating Collector

From C G MASTER, Esq , Officiating Collector of Nellore, to the Acting Secretary to the Board of Revenue, dated 16th February 1870, No 285

IN acknowledging the receipt of Board's Proceedings, dated 7th December 1869, No. 13, calling on Collectors for their opinion on the subject of the arrest and prevention of fever in this Presidency, I have the honour to state that neither the Divisional Officers in this district, nor I myself, have had sufficient opportunities of forming any judgment on the matter.

Exd. G. A. Turton.

From J H MASTER, Esq, Acting Collector of Bellary, to the Acting Secretary to the Board of Revenue, dated Dharmaveram, 17th February 1870, No 38

I HAVE the honour to acknowledge the Board's Proceedings, No 9,294, dated 18th December 1869

2 With reference to fever appearing in conjunction with new irrigation, I am not in a position to speak, no new schemes of irrigation having been commenced in this district

3 I may mention, however, that the fever which was *supposed* to have broken out in Kurnool in consequence of the irrigation works spread over many talooks of this district far distant from those works, this fever, I believe, hung about for some years, during all of which the seasons were more or less unfavourable It has now disappeared.

4 Irrigation generally, of course, should not be, and is not carried out without due regard to the drainage of the neighbouring villages No more are railroads or roads made without attending to the great want of drainage, as far as I can learn nowhere in this district have the former obstructed the natural drainage of the country, it being to the interest of the Company to provide sufficient water-way. With regard to the latter too the officer who has the formation of them is only too anxious not to have them washed away and leaves ample water-way

5 This district is naturally the very opposite to those alluded to by Dr Sutherland, and would only be too glad of all the water it could get

Exd. J. Tulloch.

From G. VANS AGNEW, Esq , Collector of Cuddapah, to the Secretary to the Board of Revenue, dated Guvalchervoo, 26th March 1870, No 54.

ADVERTING to the Proceedings of the Board, dated 18th December 1869, No 9,294, I have the honour to subjoin letters on the subject from three of my Divisional Officers

2 Cuddapah is about the driest district in the Presidency, the rainfall being under twenty inches in the year. It is an exceedingly feverish district in comparison with eight others with which I am acquainted, and it may safely be asserted that the ordinary prevalence of fever has here no connection whatever with obstruction of the natural drainage of the country by any public works, although no doubt the railway may have, and the canal may, when completed, contribute in certain localities to some extraordinary increase in the disease

3 My Deputy Collector, who had experience in Kurnool, fully anticipates that the same result will follow the opening of the canal in this district, and in the last paragraph of his letter he makes certain suggestions on the subject, to which I beg to request the attention of the Board.

4. I am at a loss to give any opinion as to what the real causes are that produce so much fever throughout almost all parts of this extensive district, whether on the more elevated plateau comprised in the sub-division, or in the lower lying talooks of the principal division . Dr. Sutherland mentions the silting up of rivers and lakes as an important agency. No doubt, in respect to many tanks, this process has here reached a very perceptible point If the use of quantities of vegetable manure in wet cultivation is calculated to produce malaria, that would, in this district, be another very active agency, and would, coupled with the defective draining power of the Boogga river, referred to in Mr Boyle's letter, and with the stagnation of water on both sides of the line of railway, per haps account for the exceeding feverishness of the head-quarter station of Cuddapah

5 Certainly the cause of the fever in the town and suburbs of Cuddapah cannot be laid to defective conservancy, for, in this respect, the Municipal Commissioners have done their duty with very considerable success.

6. I think the Railway Company should be authoritatively called upon to drain off the water which they have caused to constantly stagnate along the sides of the line

7. The Board will observe that Mr Storr is under the impression that a good deal of the fever in the sub-division is more of a typhoid than a malarious type, but at the same time he states that the sites of the villages are, as a rule, necessarily fixed in the localities most subject to malaria

8 There is no question but that the condition of our villages is horribly foul, and very probably typhoid fever is generated in them, but, on the whole, I am decidedly of belief that throughout the district the malarious is the prevalent type of fever

---

From E. STORR, Esq , Acting Sub-Collector, to the Collector of Cuddapah, dated Kadiri, 20th January 1870, No. 17.

WITH reference to your footnote No 5, requesting me to submit any observations that might be suggested on Proceedings of the Board, No. 9,294, dated December 18th, 1869, regarding the arrest and prevention of endemic diseases in connection with new irrigation or other works, I have the honour to state that I do not believe that in any case the construction of roads in the sub-division has impeded the natural drainage of the country, or that fever has been more prevalent than usual of late years.

2 There are no railroads, and but few irrigation works of any size.

3 The whole of the sub-division however is generally considered feverish, and many villages annually suffer from ague and jungle fever, especially those lying at the foot of the ghauts

4 During last year, fever was especially prevalent in the Kalri and parts of the Madanapally Talook Medical aid was afforded to each talook In the former, the fever was typhoid in its nature, and was, I believe, rightly attributed by the Medical subordinate, who visited the affected villages, to their filthy condition Generally every available open space in a village is turned into a repository for manure, the backyards of the houses are used for the same purpose, and the only wonder is that people living in the midst of such reeking masses of filth exist at all.

5. I believe that if it were absolutely forbidden to stack manure, etc, within a reasonable distance of a village, the health of the people would be much benefited There would be no hardship in such a regulation, for the manure has eventually to be carried to the ryots' fields, nor do I think there would be much difficulty in enforcing it

6 As regards ague, I cannot suggest anything as a preventive The villages, nearly all of them, have been built in hollows on account of water being easily obtainable, and, as a matter of course, suffer from their damp position During the months of December and January ague is specially prevalent

---

From J A BOYLE, Esq, Assistant Collector, to the Collector of Cuddapah, dated Cuddapah, 20th January 1870, No 23

WHETHER or no Dr. Sutherland's idea* is correct of malaria being propagated by the existence of undrained areas, it would seem to be corroborated by the circumstances of this town There is a very general belief that the unhealthiness of Cuddapah is greater now than it once was, and at the same time it is highly probable that the town and neighbourhood owe most of their unhealthiness to the quantity of semi-stagnant water in the tanks, paddy-fields, and the river-bed which surround us This extent has been extended at no very distant date by the construction of the Dongalacheruvu tank, to which is probably due much of the unhealthiness of the eastern hamlets

2 That water is the cause of Cuddapah fever is almost proved by the fact that May is a healthy, July a very feverish, month, and it is generally admitted that as a green winter makes a fat churchyard in England, so in Cuddapah heavy rains bring with them prevalent fevers

3 No doubt tanks and paddy-fields are a necessity, not to say a blessing, but if Dr. Sutherland is to be our guide in improving the town, two principal measures would seem to demand attention The first is a general system of main drainage embracing the town and all its adjacent hamlets, a scheme which would require much time both to elaborate in design and to execute The second is the *deepening the channel* of the Boogga river, so as to carry off the water which now almost stagnates in the pools above the town and renders the river-channel the repository of filth of every description close to the centre of population

4 The former scheme has, I believe, been mooted, if not seriously taken up, by the Municipality, and I merely take this opportunity of expressing my sense of its importance The second has not as yet been considered, but would seem to me to promise most valuable results By it the river could be utilized as a main drain, it is now only a sink of refuse, and when we think that a large portion of the inhabitants of Cuddapah drink its water, serious sickness does not seem to be so very mysterious in its origin.

---

* Vide Board's Procs, dated 18th Dec 1869, No. 9,294

From A. SUDARSHANA ROW, Deputy Collector, to the Collector of Cuddapah, dated Jammalamadgoo, 21st March 1870, No. 61.

WITH reference to footnote to Proceedings of the Board of Revenue, dated 18th December 1869, No 9,294, I beg to submit the following observations regarding the supposed capabilities of canals wherever irrigation system has been carried out to produce endemic fever and the mischief done by the disease to physical well-being of the people.

2 In my opinion the canals are harmless when they are at some distance from the inhabited villages. In the Kurnool District, the town of Kurnool has indeed suffered much some four year ago by fever, which is supposed to have been created by the branch channels excavated from the canal of the Irrigation and Canal Company throughout the streets of the town for the town supply by the Municipality These channels fall into the Toombudra river after passing through the town just by the sides of the walls of the houses, and filling several cisterns in their way Even in the hot weather, the flooring in, and walls of, the houses were very damp or moist This state of things naturally gave rise to endemic fever The main canal which runs at some distance from the town did no harm to it

3 The main canal never failed to produce endemic fever in the villages by which it is running.

4 In this district also the main canal runs by several of the villages For some years at least endemic fever will prevail in this district from the dampness which the canal will produce when the Toombudra will flow into it

5 In my humble opinion the Company should make necessary arrangements to drain well the leakage water of the canal and the surplus water of the fields cultivated under it, and to afford medical aid to the people suffering from fever in the villages situated in the vicinity of the canal

(True Copies)

(Signed) J A BOYLE,
Assistant Collector, for Collector

Exd E C. Shunker

From T. A. N. CHASE, Esq , Collector of Kurnool, to the Acting Secretary to the Board of Revenue, dated 27th January 1870, No 34.

Proceedings of Board, No 2,381, dated 15th April 1867
Do. do No 2,837, dated 8th May 1867
Communicating Government Order, No 1,547, dated 29th April 1867, Military Department
Proceedings of Board, No 4,566, dated 19th July 1867.
Do. do No 5,067, dated 7th August 1867
Do of Government, dated 24th April 1868, No 609, Public Department.

WITH reference to Proceedings of the Board, dated 18th December 1869, No 9,294, I have the honour to call your attention to the correspondence noted in the margin, as regards the cultivation at and near the town of Kurnool, and particularly to paragraph 2 of Government Order, No 1,547, dated 29th April 1867, in which the Government expressed the opinion that cultivation of this description (wet) is not considered prejudicial to health In paragraph 17 of Dr Andrews' Annual Report of the Dispensary, communicated under the last Proceedings of Government entered in the margin, he says —" It is difficult to assign a reason for the great increase of fever in this district during the past two years, it is certain that the means of irrigation provided by the canal has not been the cause, for the disease has prevailed in many places quite beyond its influence." In addition to this, though fever was very bad in the town of Kurnool during the end of 1866 and the beginning of 1867, and all over the district, in some places at least 50 miles from the canal, it has not been bad since, although the irrigation has been continued, and the soil if damp then must have become more saturated since.

2. I do not believe that the irrigation has been the cause of fever in this district, and I do not think, judging from my experience in the Godavery and Kistna Districts, that the irrigation there caused fever I believe it is when water is stagnant that it is most malarious, but that when it is drained off that it is not liable to produce fever As regards this canal there is good drainage everywhere, first into the Tungabudra, then into the Hindry, after that into the Kistna, the Kali, and the Kunder.

3 I have no doubt that the plan of digging tanks in marshy land as recommended would be a means of keeping off fever in such localities, but I do not think it would be necessary to do so anywhere in the vicinity of this irrigation canal.

Exd. J. Tulloch

From W. T BLAIR, Esq, Acting Collector of the Madras District, to the Acting Secretary to the Board of Revenue, dated Trivellore, 14th February 1870, No 45

WITH reference to the Proceedings of the Board of Revenue, dated 18th December 1869, No. 9,294, I have the honour to enclose copy of a letter to my address from the Acting Sub-Collector of the district, to whom the above Proceedings were referred for report, and to state that in regard to the principal division, my experience as to the causes of fever coincides with Mr. Crole's

---

ENCLOSURE No. 1.

From C S. CROLE, Esq, Acting Sub-Collector, to the Acting Collector of the Madras District, dated Carangull, 8th February 1870, No 49

IN reply to your docket on Board's Proceedings, dated 18th December 1869, and numbered 9,294, I have the honour to report that fever has not appeared in the sub-division, in conjunction with new irrigations, and that on the occasions on which cases are now and then reported (chiefly in towns and crowded villages), the cause seems to be filthy habits and imperfect ventilation rather than any superabundance of water stagnant or otherwise.

(True Copy.) (Signed) W. T BLAIR,
Acting Collector.

Exd G. A. Turton.

From C. N. POCHIN, Esq , Collector of Salem, to the Acting Secretary to the Board of Revenue, dated 28th January 1870, No 20.

I HAVE to acknowledge the receipt of the Board's Proceedings, No. 9,294, dated 18th December 1869, and on perusal of Dr Sutherland's letter, 10th June 1869, to the Under-Secretary of State for India, I would make a few remarks, but of course do so with diffidence, as I cannot, for a moment, consider myself qualified, as he is, to report on the cause of subjects which he must so thoroughly understand

2 It would appear that Dr. Sutherland proposes that in low-lying swamps, the drainage should be chiefly attended to, and the greatest care should be given to avoid throwing back any current of water so as to cause its stagnation in places previously dry. The proposal to dig deep tanks in the swamps and raise the surrounding ground by the excavated earth, might render the locality more healthy, but it strikes me that for Government to undertake such a matter on its own responsibility, is more than should be fairly expected At any rate, I would advise that such projects should only be attempted in the vicinity of important towns, where there is more chance of the undertaking not being entirely unremunerative Experience might then show what may be expected by the extension of such a system into the less populated provinces.

3. It must be remembered that during what are called prosperous seasons, the whole country, where paddy cultivation is carried on, in every way presents the appearance of what might be called a swamp, and this for many months, and that, further, these lands are manured every year, until it is discovered how it is possible to do away with wet cultivation and its requisites, manure and flooding, it is difficult to understand how any proposals can meet with success which stand in direct opposition to the admitted necessities of the country Rice must be provided for the people, and its cultivation encouraged. It cannot be forgotten that scarcity of famine brings with it an amount of evil and suffering far more terrible than the endemic fever, which is now engrossing so much attention. I can hardly understand how Dr. Sutherland can apparently agree in the opinion of the natives, that too much attention is paid to the cleansing of towns, drains, etc,, and that the people are partly justified in considering themselves unnecessarily harrassed with the precautions of Government.

Exd. T. Cartledge.

From J. D. ROBINSON, Esq., Collector of North Arcot, to the Acting Secretary to the Board of Revenue, dated Chendragherry, 27th January 1870, No 28

I HAVE the honour, with reference to the Proceedings of the Board, dated 18th December 1869, No. 9,294, to forward, for their information, copy of a letter* from my General-Deputy on the subject

2. My own impression is, that the remarks contained in these Proceedings do not apply to any part of this district, as, owing to its natural configuration and the intersection of the country by rocky hill-ridges, the drainage is only too rapid into the valleys, where it is either caught by tanks or carried off in the rivers and streams which run eastwards to the sea The surface drainage of the country has not, in my opinion, been obstructed or pent up on the lines of railway or net work of roads.

---

* Dated 20th January 1870, No. 18.

ENCLOSURE No. 1.

From P. IYALOO NAIDOO, Deputy-Collector on General duties, to the Collector of North Arcot, dated Gudiallum, 20th January 1870, No 18

I HAVE the honour to acknowledge the receipt of a copy of the Proceedings of the Board of Revenue, No 9,294, dated 18th December 1869, embodying the letter of Dr. Sutherland, of the Bengal Army, on the causes of fever, and to state that a perusal of the letter reminds me of the complaints people made of Denkencottah, a village on the bank of the Bhavanee river, near the foot of the Neilgherries. About 30 or 40 years ago an anicut was thrown across the river and a tank was built near that small town. Fever broke out afterwards and has gradually depopulated the town which has been entirely deserted by its inhabitants, and is now in ruins, people in the neighbourhood attribute the fever to dampness introduced by the new tank and anicut

2. In 1860, I had to visit some villages on the banks of the channels newly made from the Godavery anicut, and have heard some of their inhabitants attribute the fever, then prevalent in their villages, to dampness brought in by the new channels.

(True Copy.)

(Signed) **J. D. ROBINSON,**
Collector.

Exd. T. Cartledge.

From W. H. COMYN, Esq , Acting Sub-Collector, to the Collector of North Arcot, dated Wandawash, 19th February 1870, No 54

WITH reference to your footnote to the Proceedings of the Board of Revenue, dated 18th December 1869, No 9,294, I have the honour to state, that as far as I am aware, there are no grounds for attributing the outbreaks of ordinary fever in the districts of this Presidency to extensive irrigation

2 I have not any papers by me showing the relative prevalence of fever in this district for a long term of years, but I am under the impression that during the last few years which have been characterized by excessive drought, the mortality from fever has not sensibly diminished

3 In the Board's report, however, on the sanitary condition of this Presidency for Fusly 1278, there is a Statement showing the deaths from fever in each district, for that and the previous fusly Fever prevailed in all the districts more or less, but it does not seem to have been more prevalent in the districts which are extensively irrigated, than in those which are comparatively dry.

4 Take for instance this district in comparison with Tanjore There is no district in the Presidency so extensively irrigated as the latter In fact it may be briefly described as one immense paddy-field watered by a thousand channels from the never failing Cauvery. North Arcot, on the other hand, is for the most part a dry district, its wet cultivation being dependent on a precarious local rain-fall, aided by rivers which seldom or never flow

5 Fuslies 1277 and 1278 were, I believe in Tanjore, average good years, but in this district there was excessive drought In both fuslies, however, especially in the former, the mortality from fever in this district was largely in excess of that in Tanjore

6 From this it is clear, that whatever may have been the cause of fever in this district, it was not excess of moisture, and that if the deaths from fever in Tanjore can be fairly ascribed to that cause, the death-rate is considerably lower than in a dry district, of which the population exceeds by a very small figure that of Tanjore. I notice also that in the Kistna and Trichinopoly Districts, where there is a good deal of channel irrigation, the mortality from fever is not by any means high, and that as might be expected, the greatest number of deaths resulted in the districts of Malabar and South Canara and Vizagapatam, which abound in jungles, or in which the rain-fall is comparatively heavy

---

No. 73.

True copy forwarded to the Board of Revenue, in continuation of Collector's letter, dated 27th January 1870, No. 28½

(Signed) J. D. ROBINSON,
Collector.

CHITTOOR,
22nd February 1870.

To the Acting Secretary to the Board of Revenue.

Exd. G. A. Turton.

From W. M. CADELL, Esq, Acting Collector of Trichinopoly, to the Acting Secretary to the Board of Revenue, dated Kulitallai, 6th April 1870, No. 73.

I HAVE the honour to reply to the Board's Proceedings, dated 18th December 1869, No 9,294, and to state that so far as this district is concerned, I am not of opinion that the prevalence of fever can be traced to any work of Irrigation, nor as far as my experience goes, in any of the extensive tract of country watered by the Cauvery and its branches, in this and Tanjore Districts

2. In some far villages, like the one in which I am now encamped, a low fever is prevalent at times, but I think this is owing partly to the nature of the soil (and which is largely impregnated with saltpetre) and partly, doubtless owing to the state of the town, which is anything but clean. In the village of Needamungalum, in the Tanjore District, a similar fever prevails, but this is I think attributable to the low and swampy position in which the town itself has been built, and which renders the question of drainage a very difficult one I may add, that in the talook of Woodiarpolliem, but which is for the most part a dry one, fever has during the past cold season been unusually prevalent and fatal. The monsoon was unusually heavy, but there can be no doubt that the fever was most prevalent when the villages were dirty and drainage altogether neglected.

Exd. G. A. Turton.

From J R ABRUTHNOTT, Esq , Officiating Collector of Madura, to the Acting Secretary to the Board of Revenue, dated 17th February 1870, No. 54

WITH reference to the Proceedings of the Board of Revenue, No. 9,294, dated 18th December last, I have the honour to report that no new irrigation works on a large scale have been lately carried out in this district

2 I further venture to express an opinion that though moisture in the ground and atmosphere may produce fever in certain localities it is not the main cause of the various types of fever, malarious and other, from which different parts of this district suffer, for it is a well known fact that March and April, the driest months in the year, constitute the season when the several kinds of fever prevail most extensively.

Exd J. Tulloch.

From C T LONGLEY, Esq, Acting Collector of Tinnevelly, to the Acting Secretary to the Board of Revenue, dated Tiruchendur, 25th May 1870, No. 221

I HAVE the honour to reply to the Board's Proceedings of the 18th December last, calling for an opinion in regard to the causes of fever as described by Dr Sutherland

2 No fever of the type described by that officer does exist in Tinnevelly. The towns of Palamcottah, Shermadevi, Kalladakurichi, Ambasamudram and Strivycuntam, situated in the Tambrapurney Valley, are surrounded by Paddy cultivation, and the lands for several miles around, are a swamp for certainly 9 months of the year These towns are, however, singularly free from fever during the swampy season It is only in the dry and hot months, March, April, and May, that fever prevails on the hills, and in the towns and villages at foot of them, the soil of which is dry, red and gravelly

3 From my experience in the north, when stationed at Narsipatam, I should say that the fever, always more or less prevalent from October to January, (healthy months on the hills in Tinnevelly) was certainly increased when the lands about Narsipatam were brought under wet cultivation from the Gubbada anicut, situated near the foot of the hills, and some 4 miles from the town of Narsipatam

4 The natives had a theory, that it was not the land being changed from dry to wet that increased the fever, but the *quality* of the water distributed, the Gubbada river rising high up in the mountains and running down to the plains through malarious jungles I do not know how far this theory will bear the test of scientific enquiry It is, however, the fact that though our Tinnevelly fields are watered from the Tambrapurni, which also runs through jungles many miles before the water reaches our fields, it has not the reputation of causing malaria, a property which the natives in the north attributed to the Gubbada water

5 I only forward the opinions expressed by Dr Thompson and the Sub-Collector, replies not having been received from the other division officers, and I am unwilling longer to detain this report.

ENCLOSURE No 1

Extract from a letter from J. B. Pennington, Esq, Sub-Collector of Tinnevelly, No 88, dated 9th April 1870

* * * * * *

3 I am not aware from my own experience that fever has ever appeared in conjunction with new irrigation, and I have had no experience of the effects of Railway embankments or gigantic public works of any kind *Our roads* unfortunately offer only too little obstruction to the flow of the drainage I have always found that the hot beds of fever were the dry *uncultivated Jungles* at the foot of the Ghauts, and it is notorious that in this district, (and in most others, I believe,) the *hot* months are always the feverish months This is probably a different type of fever from that described by Dr Sutherland, and in point of fact, it is not unlikely that our dry, hot, and generally well-drained gravelly plains are free altogether from the malaria he speaks of

4 Even the delta formation at the mouth of our rivers, is probably very different from that of the Hooghly, and the atmosphere instead of being moist and stagnant as there is with us generally very *dry*, and is freshened by almost continuous winds from one-quarter or another

5 It is not for me to attempt to draw any conclusion from a comparison on the health statistics of each district, even if I had the means at my disposal, and I will only add that Dr Sutherland's suggestion in paragraph 13 appears to me a most admirable one, and one well calculated to benefit the country generally in a very material degree The difficulty in this district would be to find any such pools and swamps which are not private property, and the *improvement* of which, would not be persistently opposed by injunctions and suits in every Court in the country

(Signed) J. B. PENNINGTON,
Sub-Collector.

(Signed) C. T. LONGLEY,
Acting Collector.

ENCLOSURE No. 2.

From D R. THOMPSON, Esq., M. D Acting Zillah Surgeon, to the Collector of Tinnevelly, dated Palamcottah, 18th April 1870, No. 62

IN reply to your letter, No. 281, relative to the Proceedings of the Board of Revenue, dated 18th December 1869, I have the honour to state, that to my knowledge, fever of an Intermittent or Remittant type, caused by irrigation, does not prevail in this district

2 I have not seen much of the district, but I think no part of it can be more completely under irrigation, than the lands immediately surrounding the Towns of Palamcottah and Tinnevelly

3. These towns, however, are singularly free from fever of the types spoken of by Dr. Sutherland

4 The lands surrounding these towns, are under water for nearly nine months in the year, and at first sight, might well be taken for wide spread marshes, but from certain physical conditions, and other circumstances, they are prevented from being so

5 As soon as they become wet, which is generally in the month of June, they are sown with paddy, which grows rapidly and prevents noxious emanation being given off from the soil

6 Again, they are irrigated by rain water, which coming down in broad streams from the surrounding hills, does not stagnate in the fields, and contribute to the formation of marshy vapours

7. Then again the rapid and strong current of air which passes over them, known as the "Courtallam winds," would carry away any effluvium which may arise from the Rice fields

8 And lastly, at the time when the flow from the hills ceases, and the crops are cleared away, the "hot weather" has, as a rule, quite set in, surface moisture is rapidly carried off by the heat of the sun, and the underlying humidity is drawn down by the porous nature of the soil below

9 So that, I do not think that in these places at least, except when the rain-fall is unusually large, and the country around becomes flooded, that fevers of the kind alluded to, need be feared, will prevail.

10 The towns themselves are high and the natural drainage is so complete, that the production of the causes of any epidemic disease in them, does not depend upon the accumulation of moisture.

(True Copies)

(Signed) C. T. LONGLEY,
Acting Collector.

Exd. G. A. Turton.

From H. E SULLIVAN, Esq., Acting Collector of Coimbatore, to the Acting Secretary to the Board of Revenue, dated 15th January 1870, No. 8

I HAVE the honour, in reply to the Proceedings of the Board, dated 18th ultimo, No 9,294, circulating a letter from the Deputy-Inspector-General of Hospitals, Presidency Circle, Bengal, on the subject of the spread of fever throughout the country, to state, that my experience does not bear out Dr. Sutherland's theory that the extension of Irrigation and Railway communication engenders and keeps alive the disease. Dr Sutherland produces no statistical evidence in support of the idea, and the large increase in the population during the past half century would seem entirely to refute it. The large irrigation channel taken off the Cauvery and known as the Wyacoondan, goes right through the centre of Trichinopoly, the healthiest Military Station in the Presidency When I was employed there some 17 or 18 years ago, the Artillery Barracks stood within a very short distance of its banks on one side, and the lines of a Native Regiment on the other, and I never heard of fever appearing there or in the vicinity of any other large Irrigation channel as an epidemic Of all the districts I have served in, I have never known fever so rife or so fatal in its effects as in Bellary, a province, the great want of which is water, and where irrigation on a large scale has only been talked about. A reference to the Mortuary Returns of that district will support what I have stated

2 Dr Sutherland asserts that "by saturating the sub-soil to excess, bringing the water in "wells to near the surface, would be to convert a dry and healthy into a damp and fever-breathing "district". In refutation of this I would again refer to Trichinopoly which is closely surrounded with paddy cultivation, and to those portions of Tanjore which within the last forty years have been brought under irrigation by the anicuts across the Cauvery and Coleroon.

Exd. T. Cartledge.

(M2305/50.
Trans. Augt/70 L 2112 A.
~~Rev 1779/70.~~

Enclosure in Bd's Pro to Govt R.D. d/1 June 70 No 3733.

[illegible] 949/70

No. 9,294.

PROCEEDINGS OF THE BOARD OF REVENUE, dated 18th December 1869.

Read the following Proceedings of the Madras Government, dated 7th December 1869, No 13, Revenue Department —

Read the following Proceedings of the Madras Government, dated 22nd November 1869, No 3,716, Public Works Department

No. 434. Read the following Circular from the Government of India, Public Works Department, (Civil Works—Miscellaneous,) dated Simla, 6th September 1869, No 75.

Dr Sutherland's suggestions for the arrest and prevention of endemic disease in Lower Bengal

Read the following Despatch —
From the Secretary of State for India, to the Government of India, dated 15th July 1869, No 28

I FORWARD, herewith, copy of a letter* by Dr Sutherland of the Bengal Army, on the causes of fever in Bengal, with some suggestions for the arrest and prevention of endemic disease in that Presidency.

2. I feel assured that the subject of this communication will receive the careful attention of your Excellency in Council and of the Lieutenant-Governor of Bengal, and I shall be glad to be favoured, in some detail, with the views of your Excellency's Government on the subject of a calamity which has, as I learn incidentally from the Proceedings of the Government of Bengal, assumed such proportions as to occasion considerable anxiety.

* Dated 10th June 1869

From the Deputy Inspector-General of Hospitals, Presidency Circle, Bengal, to the Under Secretary of State for India, dated Edinburgh, 10th June 1869.

THE latest newspapers from Bengal, report the great prevalence of malarious fever in the lower part of that Province, particularly in the districts on both banks of the Hooghly, and it is understood that the occurrence is one that is at present occupying the attention of the Bengal and the Supreme Governments Under these circumstances, as I have given considerable attention to the subject, and have lately visited the localities where the epidemic is now raging, I trust that a few observations regarding the prevailing fever may be of use in enabling the authorities both in this country and in India to form a correct opinion of the nature of the epidemic, and of the means to be adopted to arrest its progress

2 The frequent occurrence and great fatality of the fever of late years have begun to have a serious effect on the average longivity and physical well-being of the people, nor is the moral effect of such a calamity to be disregarded The question naturally occurs to the Native mind—what good have the English done to us? Have not some of their boasted improvements resulted in the physical, if not moral, deterioration of the people in the localities where their most magnificent works exist? Has not the railroad obstructed the natural drainage of the country and converted some previously healthy localities into unhealthy and deadly hot-beds of malarious fever? Have not our canals created, wherever the irrigation system has been carried out, a deadly miasmatic atmosphere which has destroyed as many lives as would have been lost by the casual famines which swept over these districts? The answer to such statements must be, that there is much truth in them. Imperfect drainage, consequent on our great public works, has been by no means an unfrequent occurrence, and has produced a degree of dampness favourable for the production of malaria, a result that might have been anticipated from our previous knowledge of the conditions under which malarious poisons are generated But it may be said that in the portions of Bengal, where epidemic fever is most rife, there have been no great public works to obstruct the

drainage, for example, in Jessore and portions of Nuddea. But this merely shows that there are other important agencies at work, and the chief of these is the silting up of rivers and lakes in the delta of the Ganges and other places; examples of this have come under my own observation in various districts in Upper and Lower Bengal, Nuddea, Jessore, and Rungpoor

3. There can be no doubt that the deposits brought down by the Ganges and its tributaries on their way towards the sea are gradually filling up large low-lying tracts of country and river channels that will remain for a considerable time in the condition of a malaria-producing swamp, this is the state of many tracts in Lower Bengal at present

The causes which produce these results existed many years before the British held possession of the country, but it is only of late years that their continuous action, through an indetermined period of time, has given them sufficient intensity to produce the wide-spread epidemic at present devastating these districts.

4. One of the effects of the silting up of rivers in Lower Bengal is the extension of the flood-line in the inundations taking place in the rainy season; it is obvious that the more shallow the bed of a river becomes, the greater will be the area over which the water will spread during a flood, and the larger the quantity left to stagnate over the lower ground where it has flowed

5. The means which we have adopted to facilitate intercourse, the construction of raised roads passable at all seasons, have, in some cases, doubtless disturbed, the natural drainage of the country, and left water to stagnate in places which were formerly comparatively dry

6 Should any one doubt the power of causes similar in all respects to those mentioned to produce such disastrous results, a reference to a report made to the Government of India in 1846, by a Committee, of which Colonel W. E. Baker of the Bengal Engineers was President, will afford a convincing proof of the fact, the Members of the Committee travelled over 1,400 miles of country irrigated by the Delhi Canal, etc, and inspected all the towns and villages in any way affected by canal irrigation, and they found everywhere unequivocal evidence that, wherever the sub-soil had been rendered excessively damp, there malarious fevers were rife, in dry localities there was little or no spleen disease (for this was the test used by Dr. Dempster, the Medical Member of the Committee, to prove the existence of malarious fever).

7. In a paper read before the National Association for the Promotion of Social Science, in 1861, this officer states that "canal irrigation, carried on in the North-West Provinces of the Bengal Presidency, under certain unfavourable conditions, is uniformly productive of endemic disease, which from time to time assumes the form of wide-spread and often fatal epidemics"

8 The great prevalence of fever in the Burdwan and Nuddea Districts in the years 1861 and 1862, led the Government of Bengal to appoint a Committee to examine and report on the epidemic Dr. Elliot, the Civil Surgeon of Hooghly, furnished in the following year an able report on the nature of the fever, and of the state of the towns and villages in which it was prevalent On a consideration of all the subjects, I am now of opinion that too much weight was assigned to the condition of the affected localities as regards cleanliness, and that probably, too little importance was attributed to the drainage and state of dampness of the soil of the towns and villages, and places in their neighbourhood, in this report, the conclusions arrived at were very different from those of Dr. Dempster, the latter attributed the great prevalence of the fever in irrigated districts to a soil made artificially damp with canal water Dr Elliot, on the other hand, was of opinion, that the Nuddea epidemic was caused chiefly by bad conservancy, by the foul state of the tanks in the towns or villages, by the presence of organic impurities, obstructed circulation of air by jungle growing up all round the habitations of the people, and by their filthy habits, etc

9 In a question of this nature, the general laws that govern the production of epidemic disease will come to our aid. The fever of the Nuddea District was certainly not of the character of typhus or typhoid fever, it was a disease of an intermittent or remittent type, and such as we knew from experience is usually caused by the emanations from marshy soils, even if the disease was occasionally contagious, this would not invalidate the proof that its cause was marsh effluvium

Fevers of the continued type, typhus and typhoid, are unquestionably associated with organic impurities, and originate from causes in which animal excreta and other similar agencies (entirely different from the emanations of a swampy soil) play the principal part Dr Dempster was, therefore, I think, right in assigning the prevalence of the fatal epidemic fever to causes entirely independent of the sewage and filth accumulated in towns, the foul water in tanks, or bad conservancy, etc

10 Having stated my views regarding the course of the prevailing epidemic or rather endemic, for the latter is the correct term to apply to a fever strictly confined to a limited locality, and produced by causes existing only within the space where it at present prevails (the disease having apparently no power to travel into any district in which this moist condition of the sub-soil is wanting,) I will here only further observe, that a fever similar in all respects to the epidemic now raging on both banks of the Hooghly, began in Jessore in 1824 or 1825, and gradually extended itself to the districts further west, but it is to be recollected that these districts have a striking similarity one to another as regards drainage, sub-soil, water, and general physical condition, and that the endemic having exhausted itself in one locality by carrying off all the more susceptible, would naturally progress into other districts where it would find fresh and predisposed victims, and all the physical conditions necessary for its spread. Contagion in such a case, it is well known, has no share in the propagation of the disease, although the fever might, under favourable circumstances, attack a few persons in this way who had been much exposed to the noxious emanations of the sick in confined and badly ventilated huts or houses Such seizures, I believe, occasionally take place, but this was not the way in which the fever progressed.

11. Having considered the cause of the generation of the disease, I shall now proceed to point out the means for averting future outbreaks of the endemic fever.

The Natives, with some justice, I think, complain that we have assigned too much importance to jungle, rank vegetation in tanks, and local impurities in their towns and villages, they have been dismayed by our cutting down more of their trees than they liked, and by our harassing them by sanitary measures which they do not see produce any salutary result. It is evident to them that the cause of the endemic lies deeper, and in this opinion they are probably right. If the disease we had to combat was cholera, or typhus, no doubt the sanitary measures referred to would have had the best result, but the fever is the effect of a marsh poison, and to remedy this, we must carefully attend to the conditions under which it is produced.

12. I am of opinion that the drainage of the country demands our chief attention if the evils complained of are to be remedied Much might be done by carefully executed lines of drains, and by greater attention to the water-shed, by avoiding most carefully the throwing back of any current of water so as to cause its stagnation in places formerly dry

13 Wherever roads have been carried through a district, great care should be taken to find if they have not acted as artificial dams, and held back water seeking a lower level, culverts should be constructed in all such cases Along the line of railway, I do not doubt that the necessity for a greater number of such passages for the free flow of water is greatly required, and the partial destruction of some railway bridges by floods in Bengal, prove that this was not sufficiently attended to, but when all this is done, there will still remain much swampy and ill-drained land, and for this, there is another remedy, which I am not aware has ever been brought to the notice of the Government of India—that is, the digging of deep tanks in all swampy or marshy localities at or near a town or village, from the earth so obtained, the surrounding swamps would be raised till it became comparatively high ground, into these tanks all the drainage would flow, they should be of considerable depth, and drains should be carried into them in all directions

14 That collections of pure water, although of considerable extent, are not (*per se*) injurious to health or productive of malaria, is a proposition to which all medical men and others who have given attention to the subject will readily assent, it is only when these artificial reservoirs (tanks) receive sewage or other impurities, or are allowed to be overrun with rank acquatic vegetation, that they become sources of disease A swamp reclaimed in the way I have proposed, would form arable land of a peculiarly rich and productive character, and in any locality where the experiment is carried out of digging tanks in marshy ground, I do not doubt that the result will be a great improvement in the general health of the residents (if the tanks are dug so deep that they will never be dried up in the hot season.)

15. If it is objected that digging tanks in marshy land is too expensive for general adoption I reply that it has not been tried, that the value of land so reclaimed in certain localities, near towns especially, would be so enhanced as to pay a considerable part of the expense of the excavation

16 The utility of tanks as a means of improving the sanitary condition of a town or district is no new theory, places like the Civil Station of Burdwan, in Lower Bengal, formed out of rice fields, owe their comparative salubrity, in my opinion, to the number of tanks they contain.

17 When I visited Kishnagur in Bengal on a professional tour of inspection in 1865, I found the inhabitants of one of the suburbs, Baripara, suffering in an intense degree from malarious fever, the ancient, but now silted up bed of a river bounded the locality to windward By the advice of the medical officer of the Station, tanks were dug in this swamp, the general level of the marsh was raised by earth obtained in carrying out the excavation, before this was done, the suburb which contained 8,000 inhabitants, had lost 1,000 by deaths, 5,000 had left the place, only 2,000 remained, and the majority of these were in an extremely sickly condition I again visited the station in 1866, a year after the tanks were dug, and I found that the place had become comparatively healthy, it was no longer necessary to keep up a Dispensary which had been established by Government on account of the prevalence of fever at Baripara

18 Several stations in Bengal, Jessore, Rungpoor, etc, are so malarious that few of the residents, European or Native, escape the endemic fever. To render such places healthy by the means I have proposed, would be an incalculable boon to the unfortunate Civil officers who have to reside there, they or their families are often prostrated by malarious poison, which it takes years to eradicate (in some cases, even when the affected persons leave the district, and are sent to Europe for change.)

19 In estimating the effect of obstructed drainage in causing endemic fever in Lower Bengal, it should be recollected that the whole district is formed of sedimentary deposit, everywhere in the delta of the Ganges the superficial surface soil (generally about ten feet in depth) overlies a bed of clay which is nearly impermeable to water Dr. McClelland, in his "Topography of Bengal," states that "without the surface soil, Lower Bengal would be a swamp, without the underlying clay, it would be a desert."

20 The Government of India are about to carry out canal irrigation to an extent hitherto unknown in India, but if great care is not taken, the scheme may prove a perilous gift, for, while it protects the inhabitants from absolute want in the event of the failure of the periodical rain, it may destroy their health, leave them the victims of malarious fever, diseased and wretched, helplessly infirm, to die early, and to leave a weak and debilitated progeny to suffer from the means that was intended to be a benefit and a boon to their country.

Such calamities can only be avoided in irrigated districts by carefully regulating the supply of water, by preventing the sub-soil from becoming permanently under the influence of excessive moisture, and by taking care to preserve the permanent water level in wells, in the dry season, some feet from the surface It is well known that in some places in the North-West Provinces, water is found at a depth of more than a hundred feet, to swamp such localities by saturating the sub-soil to excess, bringing the water in wells to near the surface, would be to convert a dry and healthy, into a damp and fever-breathing district.

There is, I believe, no insuperable difficulty in carrying out canal irrigation in such a way as will not seriously deteriorate the health of the people; by care, it may be productive of infinite good, by neglect, it will certainly prove an evil greater than the one it was intended to remedy

Governments of Madras, Bombay, Bengal, the North Western Provinces, and the Punjab
Chief Commissioner of Oudh, Central Provinces, British Burmah, Mysore and Coorg
Resident at Hyderabad
Agents to the Governor General for Central India and Rajpootana.

ORDER —Ordered that a copy of this Despatch be forwarded to the Local Governments and Administrations marginally noted, for information, and for an expression of opinion, with remark, that the Government of India considers the subject to be one worthy of the closest attention.

(Signed) R. STRACHEY, Colonel, R E,
Offg Secy to the Govt. of India.

To the Secretary to the Government of Madras, Public Works Department

---

ORDER THEREON, 22nd November 1869, No. 3,716.

No. 435

CIVIL WORKS, No. 53

ORDERED to be communicated to all Officers of the Medical and Revenue Departments and to the Members of the Public Works Department for information, and for any remarks they may think fit to offer.

2 It does not appear, as far as Government are aware, that fever has appeared in conjunction with new irrigation anywhere in this Presidency, except at Kurnool, but the contingency is one which might occur and it requires to be watched.

(True Extract.)
(Signed) CHARLES A ORR, Colonel, R E,
Secretary to Government.

ORDER THEREON, 7th December 1869, No 13

FORWARDED to the Board of Revenue for communication to all Collectors.

(True Extract)
(Signed) H WELLESLEY,
Acting Under Secy. to Govt.

To the Board of Revenue

CIRCULATED to all Collectors for their opinion of the important subject discussed by Dr. Sutherland.

(True Extracts.)
(Signed) A. MACGREGOR,
Acting Secretary

(True Copy)
(Signed) J. T. MAYNE,
First Assistant

To all Collectors

Exd G. A Turton.

1869.

Board of Revenue,

MADRAS.

PROCEEDINGS, 18TH DECEMBER 1869, No 9,294

Encl

Received

DECEMBER.

No 9,294

Fever—in Bengal —Proceedings of Government forwarding Despatch of Secretary of State for India, transmitting a letter from Dr Sutherland of Bengal Army on causes of—, with some suggestions for arrest and prevention of endemic disease in that Presidency, communicated to all Collectors for their opinion.

From G ELLIS, Esq , Acting Collector of Ganjam, to the Acting Secretary to the Board of Revenue, dated Russelcondah, 29th January 1870, No 49.

WITH reference to the Board's Proceedings, No. 9,294, dated the 18th ultimo, I have the honour to state that no fever has appeared in conjunction with the excavation of the Chilka canal, the only one in this district, nor are there any works of irrigation in this district of sufficient size to justify me in venturing any opinion as to whether endemic disease is to be attributed to their construction.

Exd. J. Tulloch.

From R. J. MELVILLE, Esq , Acting Collector of Vizagapatam, to the Acting Secretary to the Board of Revenue, dated Jeypore, 18th February 1870, No 133

I HAVE the honour to reply to the Proceedings of the Board of Revenue, dated 18th December 1869, No 9,294, calling for my opinion on the subject of fever

2 I have received reports on the subject from the Acting Principal Assistant and from the Acting Junior Assistant in charge of Jeypore The opinion of the latter officer is entitled to much weight owing to his having served so long in a country so notoriously feverish as Jeypore

3 The Acting Principal Assistant reports that it is the received opinion among natives in the Golgonda Talook that fever has become more prevalent since the construction of the Gubbada anicut and the canals in connection with it, and the consequent increase of wet cultivation He also observes that the year after an unusually copious monsoon there have been many more deaths from fever in the Sub-division than there were in last year, which was very dry

4. Mr. Turner observes that the theory set forth by Dr Sutherland is not supported by his experience in Jeypore. He mentions as an instance the town of Jeypore, which has two or three tanks, which receive the drainage of the surrounding country, and which are seldom known to be dry, yet it is well known to be the most unhealthy spot of a not very healthy district On the other hand Nowrungapore, though surrounded by paddy-fields and with two or three tanks, is a comparatively healthy place.

5. Nundapore is a high tract with jungly downs, no paddy swamps, and good drainage, yet it is notoriously unhealthy Koraput, my present camp, is an open breezy place with hardly a tree about it, and it is in Mr. Turner's opinion less subject to fever than any place in Jeypore

6 Mr. Turner, while expressing himself unwilling to express a decided opinion, states that one of the conditions necessary for fever is plenty of jungle.

7. I quite agree with Mr. Turner as to the difficulty of laying down any positive rule. From my experience of feverish places I am of opinion that the conditions most favourable to fever are plenty of low under-growth and a want of circulation of air

8 I do not believe that the vicinity of trees is at all conducive to fever, provided the air can circulate Much harm has been done by the indiscriminate felling of trees in stations under the impression that it was a sanitary measure.

Exd. J. Tulloch.

From J. FRASER, Esq, Collector of the Godavery District, to the Acting Secretary to the Board of Revenue, dated Cocanada, 25th April 1870, No 110

WITH reference to the Proceedings of the Board, No. 9,294, of 18th December 1869, and their order thereon, I have the honour to state as follows —

2. A fever which seems very much to resemble that reported on by Dr Sutherland, only perhaps not so deadly when properly treated, is very prevalent in this district during the cold weather months, or November, December, January, and February I send a statement taken from the records of my office showing the deaths from this case from Fusly 1261 to end of February in Fusly 1279

3 The information prior to Fusly 1275, when the Death Registration Returns were first commenced, is taken from the Jummahbundy reports, and cannot be much depended on That from Fusly 1275 is from the Death Registration Returns, and gives the deaths from fever alone in the delta and upland talooks separately, and, bad as the upland talooks are from this cause, this return shows that the mortality in the delta talooks exceeds that in the upland ones

4 The fever I believe to be one that readily succumbs to proper treatment if taken in time, but the native mode of treatment is by lankanams, meaning thereby with entire starvation as regards food, and very little to drink, for as many as eleven and twelve days Of course this mode of treatment kills its thousands I append extracts from the annual reports of Messrs. Boalth and Doig, showing their opinion of the fever.

ENCLOSURE No 1.

Statement showing the deaths from Fever from Fusly 1261 to end of February in Fusly 1279, in the Godavery District

	No of deaths from Fever.	
Fusly 1261	6,357	
,, 1262	894	
,, 1263	2,492	From Fusly 1263, anicut irrigation extended.
,, 1264	5,469	
,, 1265	4,203	
,, 1266	4,546	
,, 1267	3,062	
,, 1268	2,782	
,, 1269	4,236	
,, 1270	3,587	
,, 1271	3,470	
,, 1272	3,782	
,, 1273	4,085	
,, 1274	3,343	
,, 1275	7,302	
,, 1276	10,005	
,, 1277	15,209	
,, 1278	6,955	
,, 1279 up to February 1870.	17,173	

(Signed) J. FRASER,
Collector

COCANADA,
25th April 1870

ENCLOSURE No 2

Statement showing deaths from Fever in the delta and upland talooks in the Godavery District from Fusly 1275.

Fusly.	In delta talooks	In upland talooks	Total.
1275	3,448	3,854	7,302
1276	4,760	5,245	10,005
1277	9,821	5,388	15,209
1278	3,805	3,150	6,955
1279 to end of February 1870	10,560	6,613	17,173
Total	32,394	24,250	56,644

COCANADA,
25th April 1870

(Signed) J FRASER
Collector

ENCLOSURE No 3

Extracts from the Annual Medical Report for the year 1869

DURING the past year a remarkable freedom from cholera was enjoyed by the inhabitants of the joined towns of Jagannaikpoorum and Cocanada, in fact the district at large was to a certain extent free from that dire disease Small-pox has also not been as severe as the year previous, but fever which is more or less prevalent during the cold season has been unusually severe, and the number of fatal cases reported very high The towns of Jagannaikpoorum and Cocanada were to a great extent free from the fever, but it was the district that suffered so severely The fever, of which a few cases come under treatment, was of a malarious nature, and susceptible to treatment when taken on hand early I have no doubt that the plan of starving the patients so commonly adopted by the people here has much to answer for the number of deaths Supplies of medicines on several occasions have been forwarded to the district on the requisition of the Collector, and distributed to the people with good result I believe.

COCANADA,
1st January 1870

(Signed) W H LOALTH,
Assistant Surgeon, in medical charge.

THE prevailing diseases have been fevers and venereal affections Until within the last fortnight or three weeks the fevers were all more or less of a mild form the greater number having come in from the neighbouring villages, and as far as treatment, but few required more than a purgative and some saline, the others doing equally well with the addition of a few doses of quinine. But I regret to say that this disease is now very prevalent all over the district, especially in the Peddapoor, Ramachendrapoor, and Narsapoor Talooks

The district has been free from cholera or other epidemic, but the mortality from the malarious fever which is now so prevalent will, I am afraid, be found to exceed even that from the "great disease" when it makes its appearance

COCANADA,
29th November 1869

(Signed) C DOIG,
Acting Civil Surgeon

(True Extracts)

(Signed) J FRASER,
Collector

Exd T Cartledge

From J A C. BOSWELL, Esq , Officiating Collector of the Kistna District, to the Acting Secretary to the Board of Revenue, dated Masulipatam, 10th March 1870, No 1,003

WITH reference to the Board's Proceedings, dated 18th December 1869, No. 9,294, circulating to all Collectors for their opinion, a letter from Dr Sutherland, with regard to the predisposing causes of fever, and its increase with the extension of irrigation, unless drainage be secured, I have the honour to state that there are no Returns of Deaths prior to 1865, and, therefore, I am not able to furnish any statistics to show whether or not there has been any increase of fever in this district in connection with the extended irrigation that has been introduced throughout the delta I enclose, however, a Statement showing the number of deaths reported from fever in each talook in each year since July 1865 to December 1869, from which it appears that the ravages of fever are most fatal in the upland talooks of Palnad and Nandegama and the Zemindary Division of Nuzividu. The fevers are most prevalent in the cold season after the rains, that is, in December and January, and in some villages there is scarcely a house where there is not some one or more of the inmates prostrated with fever The native system of treatment consists of *Lankhanams* or fasts, extending from 5 up to 21 days, and this practice which exhausts all the strength of the patient, too often leads to fatal results from sheer exhaustion I have published a notice in the *District Gazette* warning the people against this course of treatment, and pointing out its prejudicial effects, but what is wanted is to train the Native Doctors who practice in the villages, and through them introduce a more enlightened system of dealing with these epidemic fevers

2 The Superintending Engineer whom I have consulted writes "The drainage of the increased area irrigated is far from complete, but from my own knowledge I can assert that the drainage is much better than it was in 1854 to 56, when the Kistna could sweep over the country, and lay in pools, etc , for months after "

"The Surveys now in progress will remedy any shortcomings in the delta, but I cannot find any grounds of complaint on the score of want of drainage in Palnad and Nandegama where the permeable soil and rapid fall of the country carry off the water speedily."

"The subject of fever is very little understood by even Medical authorities, and I fear I can throw very little light on the causes of its prevalence. Light clothing when exposed to rain and cold dry wind, the filthy condition of nearly every village and house are doubtless among them. It would be interesting and doubtless instructive to watch the effects of sanitary action in the towns of Masulipatam, Guntoor, etc , as to the decrease of fever."

3. I beg to enclose copies of letters from the Civil Surgeons of Masulipatam and Guntoor, describing the results of their observations in regard to the malarial intermittent and remittent fevers of this district

ENCLOSURE No 1.

From W. E. WRIGHT, Esq , Acting Zillah Surgeon, Guntoor, to the Officiating Collector of the Kistna District, dated 27th January 1870, No. 6.—

I HAVE the honour to acknowledge the receipt of your Communication, No 189, dated January 1870, and with it a Circular containing a copy of Doctor Sutherland's letter to the Under Secretary of State for India on the subject of malarial fever in the irrigated districts of Bengal In answer to your request, I now offer the following remarks on the nature and causes of the fever now prevailing in the district, at least so far as I have had an opportunity of observing it

2. The fever which prevails about Guntoor and the neighbouring talooks is a malarial fever, and is characterized by that general feature which is almost peculiar to fever of malarial origin,

viz, a periodicity in its symptoms, an intermission or remission in the febrile symptoms, and this again followed by a recurrence of the fever at a certain definite period which varies with the type of the fever.

3. The cases that have presented themselves at the Civil Dispensary, Police and Jail Hospitals, have almost all been cases of intermittent* or remittent† fever of various degrees of severity, but all referable to the class of malarial fevers

4. The fever prevailing in the immediate talooks do not appear to have caused much mortality, and it yields readily to treatment and particularly to the use of quinine, another and a therapeutic test of its malarial origin, but it often leaves the subject of its attack weak and debilitated for a longer or shorter period, and often necessitates a change from the locality where the disease was contracted

5 It is not in any way contagious or infectious

6. The direct cause of this fever, I believe to be, exposure to exhalations resulting from the drying of damp and marshy soils, and particularly those soils that contain organic matter in excess, and this is the opinion of the profession as regards the cause of all malarial fevers

Many cases result from exposure to the night and early morning winds from such quarters, more especially when the exposed persons are imperfectly clad ‡

7 As to predisposing causes, I am of opinion that general debility and insufficient food render the system more liable to be attacked by and less able to resist the poisonous miasm

The worst cases of fever that I have seen have been among half-starved beggars and travellers

Men in the prime of life, and the young appear more susceptible of the poison than the aged

8. During the few days following, a slight rain-fall at the beginning of the present month, there was a sudden influx of cases into the Jail Hospital, and at the same time there was an increase of cases in the town

More recently there has been a heavier rain-fall, but the fever does not appear to have increased

9. I am not sufficiently acquainted either with the topography or the sanitary history of our district, to give any opinion as to whether the fever now prevailing in different parts is in any way due to the system of irrigation as now carried out, but I consider the subject of great importance and that it deserves the serious attention of all officers who are interested in the district

10 It appears to me that a special report on the subject would be desirable and I believe that information on the following questions would lead to valuable results —

(a) In what talooks of the Kistna District has the fever most prevailed?
(b) Have such talooks a system of Canal irrigation?
(c) If so, how long have they had it? and have they been more subject to fever since such a system has been carried out?
(d.) Has the fever prevailed equally in all the talooks so irrigated?
(e.) What are the geological and topographical peculiarities of the affected and non-affected talooks? The nature of crops, etc., presence or absence of trees?
(f) What is the character of the previous season, as regards temperature, prevailing winds, rain-fall, etc?

11. It is quite possible that irrigation on certain soils and under certain conditions may be injurious and a study of these conditions would be a guide for the future.

---

* It may be as well to offer a few words in explanation of these terms as applied to fever

In intermittent fever, the symptoms after a time abate entirely, leaving the patient in comparative health or comfort until they recur, which is usually after a stated interval, either next day or the day after Common ague is a fever of this kind

† In remittent fever the symptoms are more continuous and generally more severe, they do not entirely abate, but simply remit or are less marked for a time, after which the fever again returns, with more or less severity The fevers known as jungle fever or by local names are frequently of this class.

‡ On this point, I have been informed that most officers who have occasion to travel in the district find it greatly to their advantage to supply their servants with Cumblies, Blankets, or other clothing as the native if exposed to cold at night, is very liable to fever

12. The present subject I think should be viewed rather in an inquiring and sanitary aspect, than a medical, and for this reason I have purposely abstained from entering into any medical details respectively, this fever such as its symptoms, treatment, etc., or I have only barely alluded to them

If, however, you would like to be further informed on these points, I shall be happy to give you the result of my observations

(True Copy)

(Signed) J A C. BOSWELL,
Officiating Collector.

ENCLOSURE No 2

From Assistant Surgeon F. M RICKARD, Zillah Surgeon, to the Officiating Collector of the Kistna District, dated Masulipatam, 17th February 1870, No 13.

I HAVE the honour to acknowledge the receipt of your Memorandum, No 188, calling for a report upon the character of the fevers most prevalent in this district and the predisposing causes

2 In forwarding the accompanying observations, I do so, with the conviction that the information will be meagre, and I am of opinion that a satisfactory result cannot be obtained without a special inquiry into the subject

3 The cases of fever that present themselves at the Dispensary, are all malarial, and of the pure intermittent type (which I need not more particularly characterize, as these remarks will appear before medical men) and which, after running an indefinite and variable course, terminate without proving fatal. The patient, however, becomes much weakened, and a length of time must elapse, before he regains his former condition and strength.

4. During last year, one death took place from intermittent fever

5 There are several cases also of remittent fever, the generality of which are amenable to treatment.

6. During last year, one death took place from remittent fever

7. Taking into consideration the general swampy and low condition of the country around here, it is curious that no more cases have occurred the whole of the cases seem to have been confined to the out-stations, but, whether they were caused or aggravated by irrigation, I cannot venture to state From the small opportunity I have had of examining any portion of our district, irrigated or non-irrigated, it would be unwise on my part, to give an opinion on so serious subject as that contained in Doctor Sutherland's communication

8 I am bound to state that, with regard to the more immediate vicinity of this town, surrounded as it is by water, swamps, back-water, etc., that irrigation can only have one effect, and that a beneficial one, and I believe if the abovementioned swamps, etc, could be more perfectly drained and otherwise reduced, that a great cause of the existing fever, though small, would be removed

9. The worst cases of fever that I have had to attend have been those, from a Station 120 miles from here, where there is no irrigation, and where the ground is high and well drained.

10 I shall be glad to give you more information on any subject, if you will point out the deficiency.

(True Copy.)

(Signed) J. A. C. BOSWELL,
Officiating Collector.

ENCLOSURE No 3

Abstract Statement of Deaths by Fever in the District of Kistna from 1st July 1865 to 31st December 1869.

Names of Talooks	From 1st July 1865 to 30th June 1866.	From 1st July 1866 to 30th June 1867.	From 1st July 1867 to 30th June 1868	From 1st July 1868 to 30th June 1869	Total	FROM 1ST JULY 1869 TO 31ST DECEMBER 1869							Grand Total.	Remarks
						July.	August	September	October	November.	December.	Total.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Repalli	248	174	188	165	775	17	19	23	13	31	24	127	902	
2 Bapatla	254	334	254	189	1,031	17	25	15	34	31	46	168	1,199	
3 Guntoor .	188	225	227	208	848	15	35	18	24	33	47	172	1,020	
4 Palnad	301	647	762	367	2,077	42	34	32	36	64	183	391	2,468	
5 Rajapeta ...	204	289	279	192	964	13	15	24	18	38	67	175	1,139	
6. Gudiwada .	68	82	117	107	374	9	6	17	17	39	30	118	492	
7 Krosur . . .	118	165	191	98	572	14	27	3	7	12	65	128	700	
8. Bandar	121	140	190	227	678	11	23	15	16	50	30	145	823	
9 Nandegama	255	467	338	183	1,213	13	22	18	18	84	198	353	1,596	
10. Bezwada .	103	260	306	113	782	10	15	11	19	69	91	215	997	
11 Vinukonda... .	115	166	169	95	545	11	10	12	15	16	38	102	647	
12 Vissannapeta ...	176	360	260	110	906	5	11	13	4	71	163	267	1,173	
13. Nuzividu	159	242	554	151	1,106	11	15	10	21	78	87	222	1,328	
Total	2,310	3,551	3,835	2,205	11,901	188	257	211	242	616	1,069	2,583	14,484	

MASULIPATAM,
10th March 1870

(Signed) C. BOSWELL,
Officiating Collector.

From C G MASTER, Esq , Officiating Collector of Nellore, to the Acting Secretary to the Board of Revenue, dated 16th February 1870, No. 285

IN acknowledging the receipt of Board's Proceedings, dated 7th December 1869, No 13, calling on Collectors for their opinion on the subject of the arrest and prevention of fever in this Presidency, I have the honour to state that neither the Divisional Officers in this district, nor I myself, have had sufficient opportunities of forming any judgment on the matter.

Exd. G. A. Turton.

From J H MASTER, Esq , Acting Collector of Bellary, to the Acting Secretary to the Board of Revenue, dated Dharmaveram, 17th February 1870, No 38

I HAVE the honour to acknowledge the Board's Proceedings, No 9,294, dated 18th December 1869

2 With reference to fever appearing in conjunction with new irrigation, I am not in a position to speak, no new schemes of irrigation having been commenced in this district.

3 I may mention, however, that the fever which was *supposed* to have broken out in Kurnool in consequence of the irrigation works spread over many talooks of this district far distant from those works, this fever, I believe, hung about for some years, during all of which the seasons were more or less unfavourable It has now disappeared.

4 Irrigation generally, of course, should not be, and is not carried out without due regard to the drainage of the neighbouring villages No more are railroads or roads made without attending to the great want of drainage , as far as I can learn nowhere in this district have the former obstructed the natural drainage of the country, it being to the interest of the Company to provide sufficient water-way. With regard to the latter too the officer who has the formation of them is only too anxious not to have them washed away and leaves ample water-way

5. This district is naturally the very opposite to those alluded to by Dr Sutherland, and would only be too glad of all the water it could get.

Exd. J. Tulloch

From G VANSAGNEW, Esq , Collector of Cuddapah, to the Secretary to the Board of Revenue, dated Guvalchervoo, 26th March 1870, No 54

ADVERTING to the Proceedings of the Board, dated 18th December 1869, No 9,294, I have the honour to subjoin letters on the subject from three of my Divisional Officers

2 Cuddapah is about the driest district in the Presidency, the rainfall being under twenty inches in the year. It is an exceedingly feverish district in comparison with eight others with which I am acquainted, and it may safely be asserted that the ordinary prevalence of fever has here no connection whatever with obstruction of the natural drainage of the country by any public works, although no doubt the railway may have, and the canal may, when completed, contribute in certain localities to some extraordinary increase in the disease.

3 My Deputy Collector, who had experience in Kurnool, fully anticipates that the same result will follow the opening of the canal in this district, and in the last paragraph of his letter he makes certain suggestions on the subject, to which I beg to request the attention of the Board

4 I am at a loss to give any opinion as to what the real causes are that produce so much fever throughout almost all parts of this extensive district, whether on the more elevated plateau comprised in the sub-division, or in the lower lying talooks of the principal division Dr. Sutherland mentions the silting up of rivers and lakes as an important agency No doubt, in respect to many tanks, this process has here reached a very perceptible point If the use of quantities of vegetable manure in wet cultivation is calculated to produce malaria, that would, in this district, be another very active agency, and would, coupled with the defective draining power of the Boogga river, referred to in Mr. Boyle's letter, and with the stagnation of water on both sides of the line of railway, per haps account for the exceeding feverishness of the head-quarter station of Cuddapah

5 Certainly the cause of the fever in the town and suburbs of Cuddapah cannot be laid to defective conservancy, for, in this respect, the Municipal Commissioners have done their duty with very considerable success.

6 I think the Railway Company should be authoritatively called upon to drain off the water which they have caused to constantly stagnate along the sides of the line

7 The Board will observe that Mr Storr is under the impression that a good deal of the fever in the sub-division is more of a typhoid than a malarious type, but at the same time he states that the sites of the villages are, as a rule, necessarily fixed in the localities most subject to malaria

8 There is no question but that the condition of our villages is horribly foul, and very probably typhoid fever is generated in them, but, on the whole, I am decidedly of belief that throughout the district the malarious is the prevalent type of fever.

From E STORR, Esq , Acting Sub-Collector, to the Collector of Cuddapah, dated Kadiri, 20th January 1870, No 17

WITH reference to your footnote No 5, requesting me to submit any observations that might be suggested on Proceedings of the Board, No. 9,294, dated December 18th, 1869, regarding the arrest and prevention of endemic diseases in connection with new irrigation or other works, I have the honour to state that I do not believe that in any case the construction of roads in the sub-division has impeded the natural drainage of the country, or that fever has been more prevalent than usual of late years.

2 There are no railroads, and but few irrigation works of any size

3 The whole of the sub-division however is generally considered feverish, and many villages annually suffer from ague and jungle fever, especially those lying at the foot of the ghauts

4 During last year, fever was especially prevalent in the Kadiri and parts of the Madanapally Talook Medical aid was afforded to each talook In the former, the fever was typhoid in its nature, and was, I believe, rightly attributed by the Medical subordinate, who visited the affected villages, to their filthy condition Generally every available open space in a village is turned into a repository for manure, the backyards of the houses are used for the same purpose, and the only wonder is that people living in the midst of such reeking masses of filth exist at all

5 I believe that if it were absolutely forbidden to stack manure, etc, within a reasonable distance of a village, the health of the people would be much benefitted There would be no hardship in such a regulation, for the manure has eventually to be carried to the ryots' fields, nor do I think there would be much difficulty in enforcing it

6 As regards ague, I cannot suggest anything as a preventive The villages, nearly all of them, have been built in hollows on account of water being easily obtainable, and, as a matter of course, suffer from their damp position. During the months of December and January ague is specially prevalent

---

From J A BOYLE, Esq, Assistant Collector, to the Collector of Cuddapah, dated Cuddapah, 20th January 1870, No 23

WHETHER or no Dr Sutherland's idea* is correct of malaria being propagated by the existence of undrained areas, it would seem to be corroborated by the circumstances of this town There is a very general belief that the unhealthiness of Cuddapah is greater now than it once was, and at the same time it is highly probable that the town and neighbourhood owe most of their unhealthiness to the quantity of semi-stagnant water in the tanks, paddy-fields, and the river-bed which surround us This extent has been extended at no very distant date by the construction of the Dongalacheruvu tank, to which is probably due much of the unhealthiness of the eastern hamlets

2 That water is the cause of Cuddapah fever is almost proved by the fact that May is a healthy, July a very feverish, month, and it is generally admitted that as a green winter makes a fat churchyard in England, so in Cuddapah heavy rains bring with them prevalent fevers

3 No doubt tanks and paddy-fields are a necessity, not to say a blessing, but if Dr. Sutherland is to be our guide in improving the town, two principal measures would seem to demand attention. The first is a general system of main drainage embracing the town and all its adjacent hamlets, a scheme which would require much time both to elaborate in design and to execute The second is the *deepening the channel* of the Boogga river, so as to carry off the water which now almost stagnates in the pools above the town and renders the river-channel the repository of filth of every description close to the centre of population

4. The former scheme has, I believe, been mooted, if not seriously taken up, by the Municipality, and I merely take this opportunity of expressing my sense of its importance The second has not as yet been considered, but would seem to me to promise most valuable results By it the river could be utilized as a main drain, it is now only a sink of refuse, and when we think that a large portion of the inhabitants of Cuddapah drink its water, serious sickness does not seem to be so very mysterious in its origin

---

* *Vide* Board's Procs, dated 18th Dec 1869, No. 9,294

From A SUDARSHANA ROW, Deputy Collector, to the Collector of Cuddapah, dated Jammalamadgoo, 21st March 1870, No 61

WITH reference to footnote to Proceedings of the Board of Revenue, dated 18th December 1869, No 9,294, I beg to submit the following observations regarding the supposed capabilities of canals wherever irrigation system has been carried out to produce endemic fever and the mischief done by the disease to physical well-being of the people

2. In my opinion the canals are harmless when they are at some distance from the inhabited villages In the Kurnool District, the town of Kurnool has indeed suffered much some four year ago by fever, which is supposed to have been created by the branch channels excavated from the canal of the Irrigation and Canal Company throughout the streets of the town for the town supply by the Municipality These channels fall into the Toombudra river after passing through the town just by the sides of the walls of the houses, and filling several cisterns in their way Even in the hot weather, the flooring in, and walls of, the houses were very damp or moist This state of things naturally gave rise to endemic fever The main canal which runs at some distance from the town did no harm to it

3 The main canal never failed to produce endemic fever in the villages by which it is running

4 In this district also the main canal runs by several of the villages For some years at least endemic fever will prevail in this district from the dampness which the canal will produce when the Toombudra will flow into it.

5 In my humble opinion the Company should make necessary arrangements to drain well the leakage water of the canal and the surplus water of the fields cultivated under it, and to afford medical aid to the people suffering from fever in the villages situated in the vicinity of the canal

(True Copies)

(Signed) J. A BOYLE,
Assistant Collector, for Collector

Exd E C Shunker

From T. A. N. CHASE, Esq., Collector of Kurnool, to the Acting Secretary to the Board of Revenue, dated 27th January 1870, No. 34

Proceedings of Board, No 2,381, dated 15th April 1867
Do do No. 2,837, dated 8th May 1867
Communicating Government Order, No 1,547, dated 29th April 1867, Military Department
Proceedings of Board, No. 4,566, dated 19th July 1867.
Do do No 5,067, dated 7th August 1867
Do. of Government, dated 24th April 1868, No 509, Public Department.

WITH reference to Proceedings of the Board, dated 18th December 1869, No 9,294, I have the honour to call your attention to the correspondence noted in the margin, as regards the cultivation at and near the town of Kurnool, and particularly to paragraph 2 of Government Order, No 1,547, dated 29th April 1867, in which the Government expressed the opinion that cultivation of this description (wet) is not considered prejudicial to health In paragraph 17 of Dr Andrews' Annual Report of the Dispensary, communicated under the last Proceedings of Government entered in the margin, he says —" It is difficult to assign a reason for the great increase of fever in this district during the past two years, it is certain that the means of irrigation provided by the canal has not been the cause, for the disease has prevailed in many places quite beyond its influence." In addition to this, though fever was very bad in the town of Kurnool during the end of 1866 and the beginning of 1867, and all over the district, in some places at least 50 miles from the canal, it has not been bad since, although the irrigation has been continued, and the soil if damp then must have become more saturated since.

2. I do not believe that the irrigation has been the cause of fever in this district, and I do not think, judging from my experience in the Godavery and Kistna Districts, that the irrigation there caused fever I believe it is when water is stagnant that it is most malarious, but that when it is drained off that it is not liable to produce fever As regards this canal there is good drainage everywhere, first into the Tungabudra, then into the Hindry, after that into the Kistna, the Kali, and the Kunder.

3 I have no doubt that the plan of digging tanks in marshy land as recommended would be a means of keeping off fever in such localities, but I do not think it would be necessary to do so anywhere in the vicinity of this irrigation canal.

Exd. J. Tulloch.

From W. T. BLAIR, Esq., Acting Collector of the Madras District, to the Acting Secretary to the Board of Revenue, dated Trivellore, 14th February 1870, No 45

WITH reference to the Proceedings of the Board of Revenue, dated 18th December 1869, No 9,294, I have the honour to enclose copy of a letter to my address from the Acting Sub-Collector of the district, to whom the above Proceedings were referred for report, and to state that in regard to the principal division, my experience as to the causes of fever coincides with Mr. Crole's

---

ENCLOSURE No. 1.

From C. S CROLE, Esq., Acting Sub-Collector, to the Acting Collector of the Madras District, dated Caranguli, 8th February 1870, No 49

IN reply to your docket on Board's Proceedings, dated 18th December 1869, and numbered 9,294, I have the honour to report that fever has not appeared in the sub-division, in conjunction with new irrigations, and that on the occasions on which cases are now and then reported (chiefly in towns and crowded villages), the cause seems to be filthy habits and imperfect ventilation rather than any superabundance of water stagnant or otherwise

(True Copy)

(Signed) W. T. BLAIR,
Acting Collector.

Exd. G A. Turton.

From C N. POCHIN, Esq., Collector of Salem, to the Acting Secretary to the Board of Revenue, dated 28th January 1870, No. 20

I HAVE to acknowledge the receipt of the Board's Proceedings, No. 9,204, dated 18th December 1869, and on perusal of Dr. Sutherland's letter, 10th June 1869, to the Under-Secretary of State for India, I would make a few remarks, but of course do so with diffidence, as I cannot, for a moment, consider myself qualified, as he is, to report on the cause of subjects which he must so thoroughly understand.

2 It would appear that Dr. Sutherland proposes that in low-lying swamps, the drainage should be chiefly attended to, and the greatest care should be given to avoid throwing back any current of water so as to cause its stagnation in places previously dry The proposal to dig deep tanks in the swamps and raise the surrounding ground by the excavated earth, might render the locality more healthy, but it strikes me that for Government to undertake such a matter on its own responsibility, is more than should be fairly expected At any rate, I would advise that such projects should only be attempted in the vicinity of important towns, where there is more chance of the undertaking not being entirely unremunerative Experience might then show what may be expected by the extension of such a system into the less populated provinces

3. It must be remembered that during what are called prosperous seasons, the whole country, where paddy cultivation is carried on, in every way presents the appearance of what might be called a swamp, and this for many months, and that, further, these lands are manured every year, until it is discovered how it is possible to do away with wet cultivation and its requisites, manure and flooding, it is difficult to understand how any proposals can meet with success which stand in direct opposition to the admitted necessities of the country Rice must be provided for the people, and its cultivation encouraged. It cannot be forgotten that scarcity of famine brings with it an amount of evil and suffering far more terrible than the endemic fever, which is now engrossing so much attention. I can hardly understand how Dr. Sutherland can apparently agree in the opinion of the natives, that too much attention is paid to the cleansing of towns, drains, etc,, and that the people are partly justified in considering themselves unnecessarily harrassed with the precautions of Government.

Exd. T. Cartledge.

From J. D. ROBINSON, Esq., Collector of North Arcot, to the Acting Secretary to the Board of Revenue, dated Chendiagherry, 27th January 1870, No. 28.

I HAVE the honour, with reference to the Proceedings of the Board, dated 18th December 1869, No 9,294, to forward, for their information, copy of a letter* from my General-Deputy on the subject

2 My own impression is, that the remarks contained in these Proceedings do not apply to any part of this district, as, owing to its natural configuration and the intersection of the country by rocky hill-ridges, the drainage is only too rapid into the valleys, where it is either caught by tanks or carried off in the rivers and streams which run eastwards to the sea. The surface drainage of the country has not, in my opinion, been obstructed or pent up on the lines of railway or net work of roads.

* Dated 20th January 1870, No 18

ENCLOSURE No. 1.

From P. IYALOO NAIDOO, Deputy-Collector on General duties, to the Collector of North Arcot, dated Gudiallum, 20th January 1870, No 18

I HAVE the honour to acknowledge the receipt of a copy of the Proceedings of the Board of Revenue, No. 9,291, dated 18th December 1869, embodying the letter of Dr. Sutherland, of the Bengal Army, on the causes of fever, and to state that a perusal of the letter reminds me of the complaints people made of Denkencottah, a village on the bank of the Bhavanee river, near the foot of the Neilgherries. About 30 or 40 years ago an anicut was thrown across the river and a tank was built near that small town. Fever broke out afterwards and has gradually depopulated the town which has been entirely deserted by its inhabitants, and is now in ruins, people in the neighbourhood attribute the fever to dampness introduced by the new tank and anicut.

2. In 1860, I had to visit some villages on the banks of the channels newly made from the Godavery anicut, and have heard some of their inhabitants attribute the fever, then prevalent in their villages, to dampness brought in by the new channels.

(True Copy)

(Signed) J. D. ROBINSON,
Collector.

Exd. T. Cartledge.

From W. H. COMYN, Esq., Acting Sub-Collector, to the Collector of North Arcot, dated Wandawash, 19th February 1870, No. 54.

WITH reference to your footnote to the Proceedings of the Board of Revenue, dated 18th December 1869, No 9,294, I have the honour to state, that as far as I am aware, there are no grounds for attributing the outbreaks of ordinary fever in the districts of this Presidency to extensive irrigation.

2. I have not any papers by me showing the relative prevalence of fever in this district for a long term of years, but I am under the impression that during the last few years which have been characterized by excessive drought, the mortality from fever has not sensibly diminished

3 In the Board's report, however, on the sanitary condition of this Presidency for Fusly 1278, there is a Statement showing the deaths from fever in each district, for that and the previous fusly Fever prevailed in all the districts more or less, but it does not seem to have been more prevalent in the districts which are extensively irrigated, than in those which are comparatively dry.

4 Take for instance this district in comparison with Tanjore. There is no district in the Presidency so extensively irrigated as the latter. In fact it may be briefly described as one immense paddy-field watered by a thousand channels from the never failing Cauvery. North Arcot, on the other hand, is for the most part a dry district, its wet cultivation being dependent on a precarious local rain-fall, aided by rivers which seldom or never flow.

5 Fuslies 1277 and 1278 were, I believe in Tanjore, average good years, but in this district there was excessive drought. In both fuslies, however, especially in the former, the mortality from fever in this district was largely in excess of that in Tanjore.

6 From this it is clear, that whatever may have been the cause of fever in this district, it was not excess of moisture, and that if the deaths from fever in Tanjore can be fairly ascribed to that cause, the death-rate is considerably lower than in a dry district, of which the population exceeds by a very small figure that of Tanjore. I notice also that in the Kistna and Trichinopoly Districts, where there is a good deal of channel irrigation, the mortality from fever is not by any means high, and that as might be expected, the greatest number of deaths resulted in the districts of Malabar and South Canara and Vizagapatam, which abound in jungles, or in which the rain-fall is comparatively heavy

---

No. 73.

True copy forwarded to the Board of Revenue, in continuation of Collector's letter, dated 27th January 1870, No. 28½.

(Signed) **J. D. ROBINSON,**
Collector.

CHITTOOR,
22nd February 1870.

To the Acting Secretary to the Board of Revenue.

Exd. G. A. Turton.

From W. M. CADELL, Esq, Acting Collector of Trichinopoly, to the Acting Secretary to the Board of Revenue, dated Kulitallai, 6th April 1870, No. 73.

I HAVE the honour to reply to the Board's Proceedings, dated 18th December 1869, No 9,294, and to state that so far as this district is concerned, I am not of opinion that the prevalence of fever can be traced to any work of Irrigation, nor as far as my experience goes, in any of the extensive tract of country watered by the Cauvery and its branches, in this and Tanjore Districts

2. In some far villages, like the one in which I am now encamped, a low fever is prevalent at times, but I think this is owing partly to the nature of the soil (and which is largely impregnated with saltpetre) and partly, doubtless owing to the state of the town, which is anything but clean. In the village of Needamungalum, in the Tanjore District, a similar fever prevails, but this is I think attributable to the low and swampy position in which the town itself has been built, and which renders the question of drainage a very difficult one I may add, that in the talook of Woodiarpolliem, but which is for the most part a dry one, fever has during the past cold season been unusually prevalent and fatal. The monsoon was unusually heavy, but there can be no doubt that the fever was most prevalent when the villages were dirty and drainage altogether neglected.

Exd. G. A. Turton.

From J R ABRUTHNOTT, Esq , Officiating Collector of Madura, to the Acting Secretary to the Board of Revenue, dated 17th February 1870, No. 54

With reference to the Proceedings of the Board of Revenue, No. 9,294, dated 18th December last, I have the honour to report that no new irrigation works on a large scale have been lately carried out in this district

2 I further venture to express an opinion that though moisture in the ground and atmosphere may produce fever in certain localities it is not the main cause of the various types of fever, malarious and other, from which different parts of this district suffer, for it is a well known fact that March and April, the driest months in the year, constitute the season when the several kinds of fever prevail most extensively.

Exd J. Tulloch.

From **C T. LONGLEY**, Esq , Acting Collector of Tinnevelly, to the Acting Secretary to the Board of Revenue, dated Trichendur, 25th May 1870, No. 221.

I HAVE the honour to reply to the Board's Proceedings of the 18th December last, calling for an opinion in regard to the causes of fever as described by Dr Sutherland

2. No fever of the type described by that officer does exist in Tinnevelly. The towns of Palamcottah, Shermadevi, Kalladakurichi, Ambasamudram and Strivycuntam, situated in the Tambrapurney Valley, are surrounded by Paddy cultivation, and the lands for several miles around, are a swamp for certainly 9 months of the year These towns are, however, singularly free from fever during the swampy season It is only in the dry and hot months, March, April, and May, that fever prevails on the hills, and in the towns and villages at foot of them, the soil of which is dry, red and gravelly.

3 From my experience in the north, when stationed at Narsipatam, I should say that the fever, always more or less prevalent from October to January, (healthy months on the hills in Tinnevelly) was certainly increased when the lands about Narsipatam were brought under wet cultivation from the Gubbada anicut, situated near the foot of the hills, and some 4 miles from the town of Narsipatam.

4 The natives had a theory, that it was not the land being changed from dry to wet that increased the fever, but the *quality* of the water distributed, the Gubbada river rising high up in the mountains and running down to the plains through malarious jungles I do not know how far this theory will bear the test of scientific enquiry. It is, however, the fact that though our Tinnevelly fields are watered from the Tambrapurni, which also runs through jungles many miles before the water reaches our fields, it has not the reputation of causing malaria, a property, which the natives in the north attributed to the Gubbada water

5. I only forward the opinions expressed by Dr. Thompson and the Sub-Collector, replies not having been received from the other division officers, and I am unwilling longer to detain this report.

ENCLOSURE No. 1.

Extract from a letter from J. B. Pennington, Esq., Sub-Collector of Tinnevelly, No 83, *dated 9th April* 1870.

* * * * * *

3. I am not aware from my own experience that fever has ever appeared in conjunction with new irrigation, and I have had no experience of the effects of Railway embankments or gigantic public works of any kind *Our roads* unfortunately offer only too little obstruction to the flow of the drainage I have always found that the hot beds of fever were the dry *uncultivated Jungles* at the foot of the Ghauts, and it is notorious that in this district, (and in most others, I believe,) the *hot* months are always the feverish months This is probably a different type of fever from that described by Dr Sutherland, and in point of fact, it is not unlikely that our dry, hot, and generally well-drained gravelly plains are free altogether from the malaria he speaks of

4 Even the delta formation at the mouth of our rivers, is probably very different from that of the Hooghly, and the atmosphere instead of being moist and stagnant as there is with us generally very *dry*, and is freshened by almost continuous winds from one-quarter or another

5 It is not for me to attempt to draw any conclusion from a comparison on the health statistics of each district, even if I had the means at my disposal, and I will only add that Dr Sutherland's suggestion in paragraph 13 appears to me a most admirable one, and one well calculated to benefit the country generally in a very material degree. The difficulty in this district would be to find any such pools and swamps which are not private property, and the *improvement* of which, would not be persistently opposed by injunctions and suits in every Court in the country

(Signed) **J. B. PENNINGTON,**
Sub-Collector.

(Signed) **C. T. LONGLEY,**
Acting Collector.

Enclosure No. 2.

From D. R THOMPSON, Esq., M. D Acting Zillah Surgeon, to the Collector of Tinnevelly, dated Palamcottah, 18th April 1870, No 62.

In reply to your letter, No 281, relative to the Proceedings of the Board of Revenue, dated 18th December 1869, I have the honour to state, that to my knowledge, fever of an Intermittent or Remittant type, caused by irrigation, does not prevail in this district

2. I have not seen much of the district; but I think no part of it can be more completely under irrigation, than the lands immediately surrounding the Towns of Palamcottah and Tinnevelly

3. These towns, however, are singularly free from fever of the types spoken of by Dr Sutherland

4. The lands surrounding these towns, are under water for nearly nine months in the year, and at first sight, might well be taken for wide spread marshes, but from certain physical conditions, and other circumstances, they are prevented from being so.

5 As soon as they become wet, which is generally in the month of June, they are sown with paddy, which grows rapidly and prevents noxious emanation being given off from the soil.

6 Again, they are irrigated by rain water, which coming down in broad streams from the surrounding hills, does not stagnate in the fields, and contribute to the formation of marshy vapours

7. Then again the rapid and strong current of air which passes over them, known as the "Courtallam winds," would carry away any effluvium which may arise from the Rice fields

8. And lastly, at the time when the flow from the hills ceases, and the crops are cleared away, the "hot weather" has, as a rule, quite set in, surface moisture is rapidly carried off by the heat of the sun, and the underlying humidity is drawn down by the porous nature of the soil below

9 So that, I do not think that in these places at least, except when the rain-fall is unusually large, and the country around becomes flooded, that fevers of the kind alluded to, need be feared, will prevail.

10 The towns themselves are high and the natural drainage is so complete, that the production of the causes of any epidemic disease in them, does not depend upon the accumulation of moisture

(True Copies.)

(Signed) C. T. LONGLEY,
Acting Collector.

Exd. G. A. Turton.

From H E SULLIVAN, Esq, Acting Collector of Coimbatore, to the Acting Secretary to the Board of Revenue, dated 15th January 1870, No. 8

I HAVE the honour, in reply to the Proceedings of the Board, dated 18th ultimo, No 9,294, circulating a letter from the Deputy-Inspector-General of Hospitals, Presidency Circle, Bengal, on the subject of the spread of fever throughout the country, to state, that my experience does not bear out Dr Sutherland's theory that the extension of Irrigation and Railway communication engenders and keeps alive the disease. Dr Sutherland produces no statistical evidence in support of the idea, and the large increase in the population during the past half century would seem entirely to refute it. The large irrigation channel taken off the Cauvery and known as the Wyacoondan, goes right through the centre of Trichinopoly, the healthiest Military Station in the Presidency. When I was employed there some 17 or 18 years ago, the Artillery Barracks stood within a very short distance of its banks on one side, and the lines of a Native Regiment on the other, and I never heard of fever appearing there or in the vicinity of any other large Irrigation channel as an epidemic Of all the districts I have served in, I have never known fever so rife or so fatal in its effects as in Bellary, a province, the great want of which is water, and where irrigation on a large scale has only been talked about. A reference to the Mortuary Returns of that district will support what I have stated

2 Dr. Sutherland asserts that "by saturating the sub-soil to excess, bringing the water in "wells to near the surface, would be to convert a dry and healthy into a damp and fever-breathing "district". In refutation of this I would again refer to Trichinopoly which is closely surrounded with paddy cultivation, and to those portions of Tanjore which within the last forty years have been brought under irrigation by the anicuts across the Cauvery and Coleroon.

Exd. T. Cartledge.

From J. W BREEKS, Esq, Commissioner of the Neilgherries, to the Acting Secretary to the Board of Revenue, dated Ootacamund, 19th January 1870, No 8.

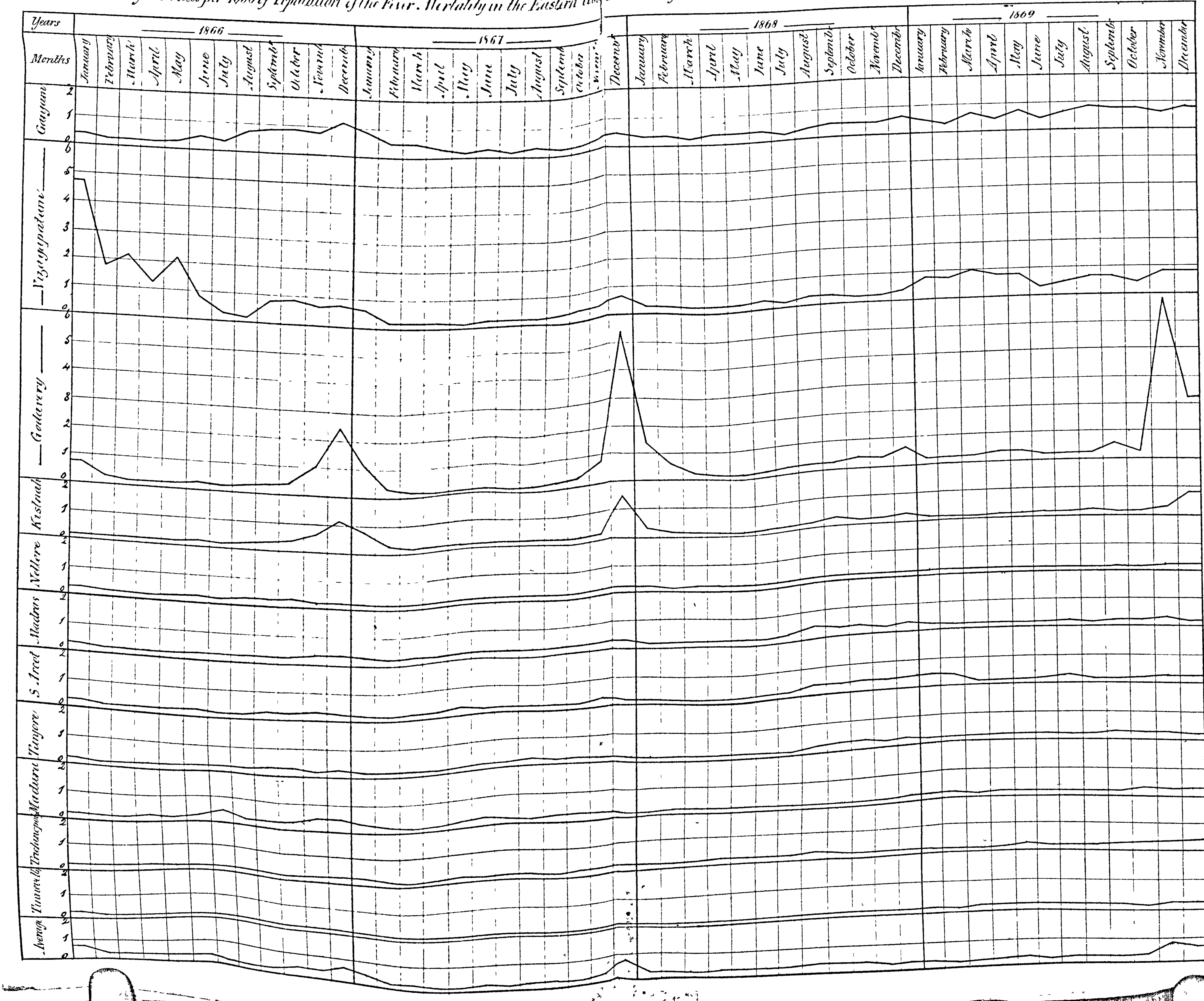
Referring to Board's Proceedings, No. 9,294, dated 18th ultimo, containing Dr Sutherland's letter on the subject of fever in Bengal, and communicated to all Collectors for their report as to whether fever has appeared in conjunction with new irrigation works, I have to inform the Board that no irrigation works of any kind exist in this district.

Exd. J. Tulloch.

3

No. I.

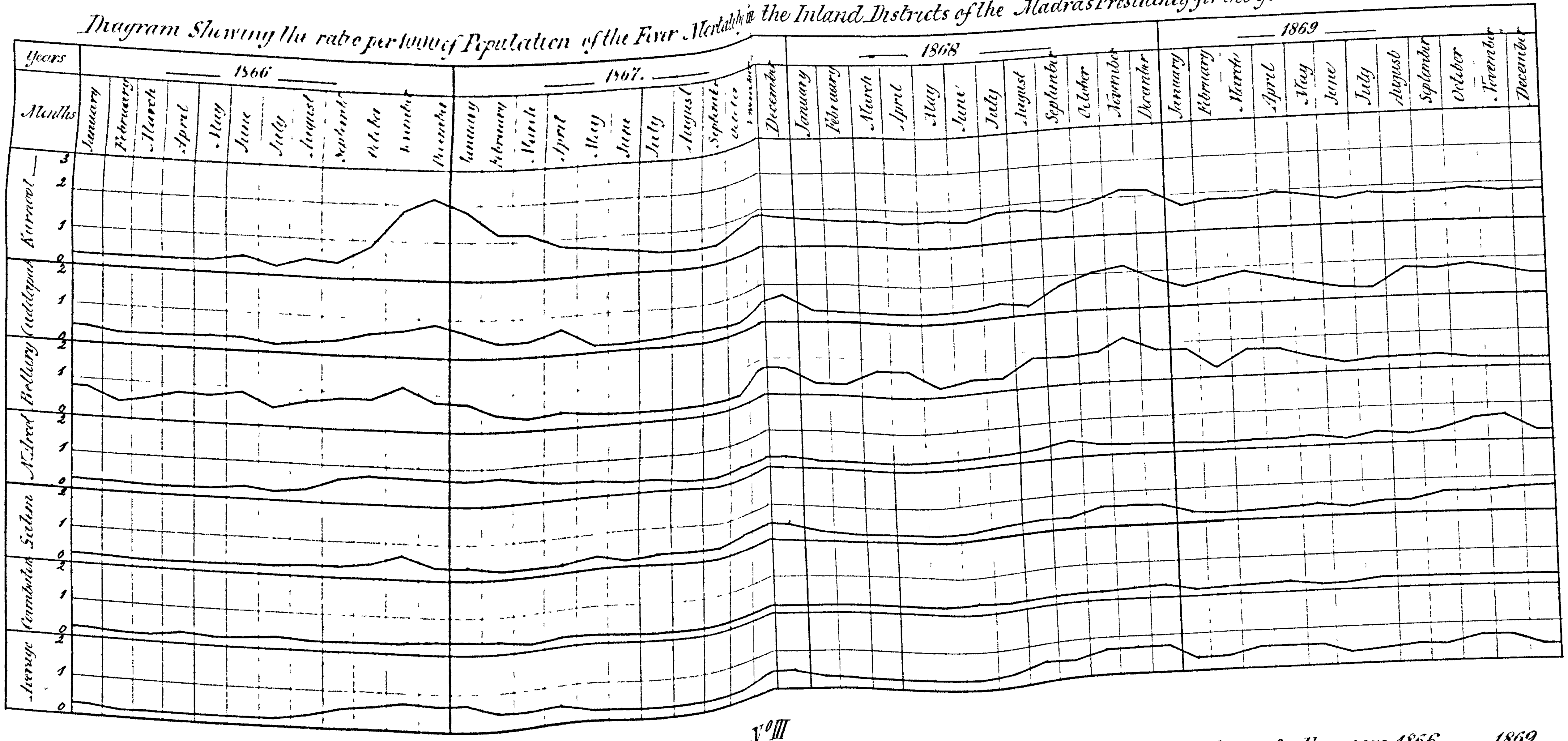
Diagram Shewing the ratio per 1000 of Population of the Fever Mortality in the Eastern Coast Districts of the Madras Presidency, for the years 1866—1869.



No 2343/Gd.
Transd Aug 4/70 to Ld. 103 A

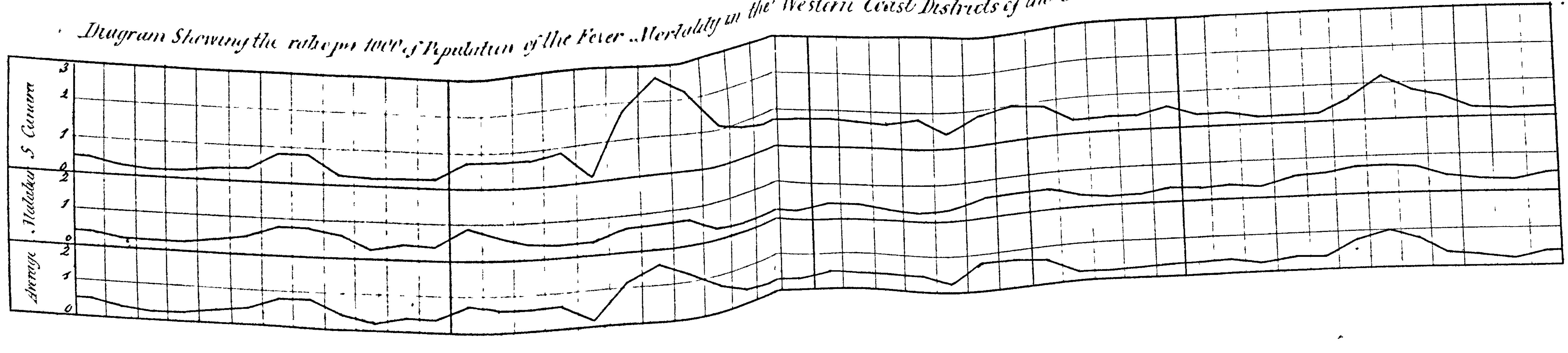
No II

Diagram Showing the rate per 1000 of Population of the Fever Mortality in the Inland Districts of the Madras Presidency for the years 1866 —— 1869 -



No III

Diagram Showing the rate per 1000 of Population of the Fever Mortality in the Western Coast Districts of the Madras Presidency for the years 1866 —— 1869



(B) M 2343/80
Recd. 6 Augt/70 [illegible]

[illegible] 875/70

No 528

Office of Sanitary Commissioner,
Madras, 17th May 1870

From

Sanitary Commissioner for Madras,

To

The Chief Secretary to Government
Public Department.
Fort Saint George

Sir,

No 527 dated 29th April 1870

I have the honor in reply to Proceedings of Govt. as per margin, to state that the letter from Dr Sutherland, Deputy Inspector-General of Bengal, regarding the influence of obstructed lines of drainage in the production of malarious fevers, was recorded in the Proceedings of the Sanitary Commissioner for December last. As Dr Ranking appears to have left no memorandum on record of his own views regarding the letter of Dr Sutherland, I presume he did not understand from the Govt. order No 1658 of the 2nd December 1869 that a special reply was expected of him. I offer this explanation to account for the delay which has occurred in the disposal of the subject.

2. The general questions touched upon by Dr Sutherland are undoubtedly questions of the very highest importance, as regards

Enquiry limited to causes of fever as affecting this Presidency.

the health and prosperity of the people of this country.

That gentleman's experiences and observations refer more especially to the inhabited tracts of the Gangetic delta and as I can say nothing of my own personal knowledge of the physical conditions which have caused the lamentable mortality from fever in late years throughout great areas of Lower Bengal, I shall in the following observations confine myself to the enquiry "whether there is sufficient evidence to warrant the conclusion that, malarious diseases have been increased in the districts subject to the Government of this Presidency" by the obstruction of natural lines of drainage, or by the increased moisture of soil produced by the extension of works of irrigation.

Influence of railway works in obstructing drainage not proved.

3. In the first place I think it may with confidence be asserted, that railways in this Presidency have not obstructed the natural drainage of the country, or converted previously healthy localities into unhealthy and deadly hot beds of malarious fever.

I am tolerably well acquainted with

the section of country traversed by the S.W. Line of the Madras Railway and also its Bangalore branch, and I have no hesitation in saying that these lines offer no obstacles to the natural drainage of the country through which they pass.

Impounding of rainfall in tanks the rule in Madras Presidency.

4. That the "natural drainage" of the country has, from time immemorial, been retarded by the construction in every available spot of reservoirs of water for irrigation is quite true, but that the artificial obstructions of tank bunds have tended to the diminution of the population by malarial poisoning, is certainly not the case. Without these obstructions the whole of the plains and area eastward of the mountain chain, separating the Malabar from the Coromandel coasts, would for long periods be barren, and incapable of furnishing food supplies to the present population.

Alternate saturation and dessication of a soil needed for the production of malaria

5. In a country depending so much for its natural fertility on the impounding of the rainfall in artificial reservoirs, it is certain, that over very wide areas of this Presidency there must be alternate periods

of saturation and desiccation of the soil, conditions which most authorities agree to be essential to the development of the unknown something we provisionally designate as "malaria", when occurring with a high atmospheric temperature.

In certain localities, whether from the nature of the underlying rocks or soil, or from other causes, the effects of the earth-born miasma on human beings is more apparent than in others, and these results may in some instances be due to excessive saturation of the soil with moisture, caused by obstruction to the normal drainage of the country.

System of irrigation in Madras not incompatible with health of people

6. But admitting that some evils attend the system of storing water in surface reservoirs, by obstructing artificially its natural outlets, it is clear that if the water derived from the periodical rains was not retained and artificially spread out over the country, the plains of the Carnatic would become a desert tract, incapable of affording food for man and beast. The systems of bunding and storing up the rain waters for use in rice culture, whatever minor evils may flow therefrom, is not incompatible (as all our records prove) with the steady increase of population, such as could not possibly take place, if exhalations from

our tank beds and paddy fields were so powerfully malarious as they would seem to be in some other localities.

Fertility of the inhabitants of irrigated districts not impaired by malaria

7. In the report of Dr Cutliffe who made a sanitary inspection of the districts under canal irrigation in the N. W. Provinces in 1867, I observe that impotency and infertility of the inhabitants of the fever stricken localities are noted as of common occurrence. Such results if they occur at all in this Presidency must be very limited in their operation, considering that irrigation has been practised on a very extensive scale from time immemorial, and that the human population within recent times has more than doubled itself. Malarial fevers do undoubtedly prevail in certain years and seasons, but they do not, as a general rule, interfere with the natural tendency to increase of population, nor is there any evidence showing that physical degeneracy of the people has resulted from malarial poisoning.

Physical changes in the soil influencing water levels.

8. The causes ~~of fever~~ alluded to by Dr Sutherland viz: the silting up of rivers and tanks, and the obstruction of the natural lines of drainage of the

country may or may not be productive of fever. These same causes are going on more or less in every part of the world, and have been in operation since the creation. Old rocks disintegrate and are removed by aqueous currents to be deposited in new places. The valley of the Ganges exhibits these processes of denudation and renewal on a vast scale, but the processes are essentialy the same, whether the silt be deposited at the mouth of a river like the Ganges, or in the bed of the smallest tank.

Malaria a product of any soil that is subjected to moisture and elevation of temperature.

9. Malaria may be given off by any soil submitted to occasional moisture and exposed to a moderately high temperature. Whether that soil be the alluvial of the Ganges, or the hornblendic gneiss of sterile hills on the Mysore plateau, true malarious fever may be one of its natural products.

The silting up of deltas of rivers not always followed by fevers.

10. While accepting as probable the theory that the recent occurrence of fever in lower Bengal may in part be due to certain changes in the water level, it is quite certain that the slow silting up process to which Dr Sutherland is inclined to attribute so much evil may go on in other parts of the country without any marked accession of fever. Thus in the delta of the Cauvery river, many thousand tons of silt are brought from the uplands every year by the flood waters, the bulk of which silt is deposited over the area under cultivation, while nearly the whole of the flood waters of the Cauvery river are taken up by irrigation channels and distributed over the surface of the country. The districts of Tanjore and Trichinopoly which are thus plentifully saturated with water and silt for the cultivation of rice, are remarkable chiefly for their great immunity from malarious fevers and in this respect contrast very markedly with the dry, and comparatively un-irrigated tracts of Bellary, Kurnool and Cuddapah.

Statistics of Fever in Revenue districts

11. In regard to the accompanying table in which the fever mortality for the last four years of the several Revenue districts of this Presidency is compared, it is well to note that the figures are not absolutely reliable. Apart from the difficulties of perfect registration by native agency, there must be admitted the fact that natives are apt to call many diseases "fever" which are not of malarious origin and that some deaths from diarrhoea

and dropsy, but really died to malarious poisoning, are not included amongst the deaths from fever. It must be remembered too, that for every individual who dies of fever some 50 or 60, or even a higher proportion, will suffer from a non-fatal attack of the disease. If we wish to obtain a tolerably correct idea of the prevalence of fever in a district, it will be necessary to multiply the death ratios by 50 or 60.

12. But making due allowances for these sources of error, the figures for the last four years afford us the means of judging of the relative prevalence of fevers in districts which are subjected to irrigation, or in which irrigation is not at all practised or only on a limited scale. Thus the average fever mortality per one thousand of the population in certain districts, noted either for the abundance or scarcity of wet cultivation, has been, for the four years ending 1869 as follows.

		Fever mortality
Districts under artificial irrigation	Godavery	8·7 per mille
	Kistnah	3·2 "
	Tanjore	3·4 "
	Trichinopoly	2·9 "
Districts in which rice is chiefly grown from natural moisture of the S. W. monsoon	Malabar	6·5 "
	South Canara	8·6 "
Districts in which dry cultivation is chiefly practised	Bellary	6·6 "
	Kurnool	10·1 "
	Cuddapah	6·6 "

Fever mortality 50 per cent higher in three now irrigated districts than in three under wet cultivation

13. The districts under moderate irrigation need not be specially noticed here it is only necessary to direct attention to the fact that in the four years ending 1869 the fever mortality was more than fifty per cent lower in the irrigated districts of Tanjore, Kistnah and Trichinopoly than in the dry uplands of Bellary, Kurnool and Cuddapah

Caution necessary in receiving such figures

14. Facts like these would seem at first sight to be conclusive in regard to the general questions of the effects on human beings of the system of irrigation which the Government in this part of India has done so much to develope and encourage. But — practically the evidence is in contradiction of the experience of northern India and countries in Southern Europe and does not enable us to say conclusively that the saturation of the surface soil with water, and its dessication under a high temperature, may in all situations be practised with impunity even in the Madras Presidency. The facts as they stand seem to show the possibility of factors being at work, other than the swamping and drying of the soil in the production or limitation of fever, and these

other factors are within the province of the Sanitarian to discuss

Influence of sea air in neutralizing the malaria of irrigated districts in Madras.

15. In a report on the causes of death in Madras for the year 1860, I took occasion to discuss the influence of certain winds, that is of winds coming direct from the sea and of winds which had blown over and become contaminated by emanations from the earth – in retarding or diffusing the disease cholera. Now the physical conformation of the peninsula of India is such, as to expose many of the richest and best cultivated of the districts of the Madras Presidency to the direct influence of breezes from the sea, and it will probably be found to hold good of malarious fevers, more they of cholera that, other things being equal, exposure of human beings to pure sea air gives the best results as regards immunity from malarious diseases. As a broad fact it may be confidently stated that the low lying and liberally watered valleys, and deltas of our chief irrigation districts of Tanjore, Tinnevelly, South Arcot, Madras, Nellore, Kistnah, Godavery, Vizagapatam and Ganjam are the parts of the country in which the population is the least affected by malarious influences. The districts within reach of the sea breeze are practically non-malarious districts, during the seasons of the year when the winds from the sea predominate. Thus on the Coromandel coast all malarial affections are at a minimum during the prevalence of southerly and easterly winds which have not blown over land. In the season of the S. W. monsoon and in the cold dewy nights following the rains of the N.E. monsoon malarial fevers are common on some parts of this coast. The inhabitants of the districts on the western coast are usually freest from fevers and other allied diseases during the time when sea breezes prevail.

The S W. monsoon, laden with moisture and attended by a lowering of temperature and continuous rain, ~~and~~ is however a fertile cause of fever amongst the people of the western coast. The cold N E. winds of the dry season, which must traverse the breadth of the peninsula before reaching the western coast districts, invariably bring, or are coincident with the appearance of malarious fevers.

16. The explanation of these local peculiarities would appear to be that there is not any special character of the soil or

Sea air antagonistic to malaria.

water, which prevents the disengagement of malaria in localities near the sea, but that there is something in the sea air itself, when not over saturated with moisture, antagonistic to the miasma given out from the earth's surface, and which in their active condition produce fevers. Practically the malarious fevers which are generated in the interior of a country disappear on removal of the sufferers to the sea coast, and the sea coast fevers of India are usually mild in their symptoms and easy of cure.

Immunity of irrigation districts in Madras Presidency from fever probably due to their geographical position in respect to the sea coast

17. From the above remarks it may be inferred that the comparative immunity of our chief irrigated districts from malarious fevers is due more to the geographical positions of those districts, and to their subjection to certain meteorological influences, than to the absence of the usual causes of malaria in the soil.

The liability of the inhabitants of the coast districts to suffer from fever during the season of the year when land winds blow may be due either to the land winds containing the malaria, or to the inability of the winds to destroy the malaria locally extricated from the soil, or to a combination of these two causes. It is well known that sea air is a powerful oxydiser. We can see the results of its action on a metal like iron and we infer that it possesses a similar power in the oxidation of organic particles floating in the atmosphere which we cannot see. We know from observation also that a wind that has passed over many miles of land loses the property of rapidly corroding an oxidizable metal like iron, and it is but fair to assume that it has lost the power, in some degree, of neutralising the pestilential miasmata, which the earth, amongst its other functions, gives birth to...

Oxydising properties of sea-air.

Virulence of malaria in elevated tracts of country.

18. There is a peculiarity in regard to the miasm which produces fever, that it often appears to be specially virulent in its effects in places which are much elevated above the sea level and far removed from the sea board. The explanation of this circumstance may be that although malaria is extricated in greatest abundance from low grounds and places where the subsoil moisture

is near the surface, it may be wafted by prevailing winds, against the neighbouring hill sides, and in such situations exhibit its effects most markedly. Thus in the Kistnah and Godavery districts it is I believe a well ascertained circumstance that fevers usually prevail with greater force and intensity amongst the people who occupy the uplands talooks, than amongst those who live amidst the irrigated tracts on the sea board.

All elevated tracts of country in South India which are far removed from the sea board, especially the valleys between hill ranges, and about the bases of mountains, are more or less, malarious, at certain seasons.

Malaria in the Hilly districts

19. The actual sources of malaria in the higher lands of the interior of the country, afford a most difficult and complicated problem for study. There are localities in the Mysore territory far removed from marshy lands and decaying vegetation, which are notoriously subjected to fever. The history of the cantonment established a few years ago near Mysore, and subsequently abandoned on account of its unhealthiness, is a case in point /see Annual Report of Sanitary Commissioner for 1866 page 103/.

Periodical accessions of fever.

20 Some of the districts of the Presidency have lately been subjected to cycles of fever prevalence, such as are known to be characteristic of malarious disorders. In the town of Kurnool in the year 1866, fever was so general that it was attributed by local observers to the water flooding of the subsoil of the town from the works of the irrigation company.

Prevalence of fever in Kurnool, Cuddapah and Bellary

But as a matter of fact the same type of fever prevailed simultaneously in many parts of the district, and also in Bellary and Cuddapah. Recently fever has disappeared from the town of Kurnool though no change has taken place in the mode of water supply or of irrigation in the neighbourhood.

Godavery district

In the district of the Godavery, fever has been particularly fatal during the year 1869. From the table it will be observed that 12 per thousand of the people died from fever while the mortality in the former year was only 5.8 per mille. The Godavery district is very largely irrigated by canals leading off from the anicut at Rajahmundry.

The fever mortality both in the Godavery and Kistnah districts is much influenced by seasons it being always highest after the setting in of the N.E. monsoon. Irrigation in these districts begins actively with the "freshes" which result from the filling of the rivers by the rains of the S.W. monsoon. There is no apparent relation between the irrigation season and the fever of these districts. It is worthy of note here that although fever prevailed so extensively in the Godavery district in 1869, it was absolutely free of cholera during this its worst year of fever.

Epidemic influences common over large tracts of country.

21. The general circumstances favoring a development of malarious fevers in various parts of this Presidency as in Ganjam, Godavery, Canara, Kurnool and Bellary have apparently been operative also in the tract of country included in the delta of the Ganges.

The great accession of fever spoken of by Dr Sutherland as now spreading over lower Bengal, is nothing more, I think, than the periodical intensification which is so characteristic of all the common epidemic diseases of India.

A similar intensified form of malarial poisoning in the Bengal districts attracted the attention of the authorities some few years ago, when a medical officer was deputed to visit the affected localities and report upon them. For several years the districts were comparatively healthy, but the time would appear to have again come for a flow of the fever wave to recur.

22 It is, I think, very doubtful whether these periodical accessions of fever, over great tracts of country, are the result of any changes which man in his limited capacity, has been enabled to effect on the earth's surface. The remote causes are probably far beyond human control or influence. The history of ruined cities like Gour in Bengal, shows that man has had to do battle with malaria in the past, as he has in the present, and that he does not always gain the victory. Even within comparatively modern times there are histories of widely spread malarious fevers in India, which must have had their origin in some very generally diffused causes. Orme in his history of India, notes the prevalence of a terrible fever in the Southern provinces of India following upon a general inundation of the country. In 1809-13 the districts of Coimbatore, Madura and Tinnevelly suffered so severely from a malarious fever that the Government of the day appointed a special commission to visit the districts and report on the great mortality of the people. From the report it would seem that the fever was mainly the common intermittent of the localities, intensified in an unusual degree. The abandonment

of Tippoo's great stronghold, Seringapatam, as a station for British and India troops was due to the persistent malaria which haunted the locality. Whether the cultivation of the islands was "wet" or "dry" apparently made but little difference. Both systems were tried and given up, and ultimately the station had to be abandoned by troops, as was the native cantonment of Mysore in still more recent times. The causes of the malaria are still in operation at Seringapatam. The few inhabitants left in the town are sickly, and in a few years time the town will probably suffer the fate of all cities built on highly malarious sites.

Dr Sutherland's suggestions concurred in

24. The practical suggestions in Dr Sutherland's letter in regard to the drainage of swamps and the removal of obstructions to the natural outlets of the rainfall, are no doubt most sound and judicious in reference to the locality he had in mind; but in regard to the malarious fevers which prevail in this Presidency, I do not think his precautionary recommendations are generally applicable. In the construction of irrigation channels it is no doubt of the greatest importance to prevent leakage and the conversion of dry ground into swamps, but the localities are not very numerous in which such a condition of things exists, and the people in this part of India, as a rule, know too well the value of water to waste it unduly. Still the increase of fever during the past year in the Godavery district warns us that canal irrigation requires careful watching especially in reference to the drainage of tracts of country under irrigation.

A higher condition of agriculture, in India essential to the prevention of malaria.

25. In conclusion I must express my conviction that it is to the careful and more general culture of the soil, whether by the help of water from artificial channels and reservoirs or aided only by the natural moisture of the seasons, that we must look for any marked improvement in the diminution of the prevalence of malarious fevers. There are possibly some localities in India, where, from the differences of temperature between the water and the soil to which it is applied, or from other little understood causes, irrigation works can never be generally followed with safety to the health of the people. Such localities however do not exist, so far as I know, in the great irrigation districts of this Presidency. Wet cultivation in these districts entails very careful preparation and tillage of the soil, and is an agricultural operation of a high order.

26. There may be circumstances which might render it politic on the part of a State to refrain

from stimulating unduly the culture of the rice plant, such as the fact that cereals grown without irrigation are more nutritive and better fitted for the sustenance of a hard working people than rice, and the possible danger that a rice feeding people may in time degenerate into a slothful and effeminate race, such as the inhabitants of the fever stricken villages of lower Bengal are to this day; but these are questions somewhat wide of the suggestions of Dr Sutherland in regard to the eradication of malaria from the soil, and need not be referred to on the present occasion.

27. I had intended supporting the views I have taken as to the cause of the exemption of districts on the sea board, by diagrams showing the prevalence of fever in such districts, as compared with those inland, but rather than delay this reply, I shall have the honor of forwarding the diagrams and accompanying explanations, as soon as they can be got ready, in a separate letter.

I have the honor to be,
Sir,
Your most Obedt Servt
W R Cornish F. R. C. S.
Sanitary Commissioner
for Madras.

Pro 29 April/70 Nos 527-
& 2 December/69 — 9-10.

Public 1870 Dept

From
The Sanitary Commr
for Madras

To
The Chief Secy. to Govt.
Public Deptt.
Fort St George

Dated 17 }
Despd " } May 1870
Recd 18 }

No 778 — No 528

Submits remarks on the suggestions of Dr Sutherland relative to the prevention of fever.

P. M 2343/70

Pro - 6 Augt/70 Nos 103 A.

OFFICE OF SANITARY COMMISSIONER,

No 607.
Madras, 31st May 1870

From
Sanitary Commissioner for Madras,

To
The Chief Secretary to Government,
Public Department,
Fort Saint George

Enclosures

Sir,

In reconsidering the question how far works of irrigation in this Presidency may be accountable for the prevalence of fever, I have thought it advisable to examine the monthly registers of deaths from fever for the past four years somewhat minutely, and have now the honor to submit the following observations in continuation of my letter No 528 of the 17th instant.

2 The primary object I have had in view has been to arrive at a clearer and more definite idea as to the influence of climate or meteorology in the causation of malaria, apart from the question whether the intensity of fever in certain localities may or may not be influenced by irrigation works. In the examination of the data for the solution of the former question however, the peculiarities in regard to fever of our chief irrigated districts are brought out so clearly, that the views expressed in my former letter, as to

the comparative exemption of irrigated tracts, are quite corroborated

Diagrams of seasonal prevalence of fever

3. In order to give a clear notion of the influences of season and climate on fever mortality, I have projected diagrams for each district showing the registered deaths in each month of the past four years in proportion to population.

The results I have given in three diagrams

I Districts on the Eastern coast, or not elevated much above the coast, and exposed to influences from the sea.

II Districts inland, and more or less removed from sea influences.

III Districts on the western coast exposed to sea influences, but also to the full force of the rains of the S W. monsoon

4 The period of four years is not long enough to exhibit the duration of cycles of fever prevalence, or of the intervals between them, but some interesting results are brought out, as regards the times of year when the causes of fever mort: abound

Remarks on diagrams

Diagram I
Eastern Coast Dists

5 Ganjam. The fever mortality of this district is apparently influenced by the setting in of the rainy weather as in 1866, 1867, 1868 and 1869, a rise is distinctly evident in July and August continuing until the end of the cold season

There is a tolerable steady fall during the hot dry months and the mortality is greatest during the prevalence of N.E monsoon.

Around the town of Ganjam fever seems to increase early in April and this is no doubt due to some local development of malaria.

6 Vizagapatam. When the registration of deaths was commenced, this district in 1866, had apparently passed through a cycle of fever prevalence. The mortality which was very high in the early months of 1866 and cold seasons of 1865/66, began to rise again in 1869. There is a general depression of the fever curves for March, April and May; and a rise in November and December coincident with the N E monsoon. The coast line along the Vizagapatam district is almost due N. E, so that the N. E winds, for the great area of the district are land winds.

7 Godavery and Kistna. There is a remarkable similarity in the fever curves of these districts the one irrigated by channels from the Godavery and the other from the Kistnah river. In the Godavery district, however, the fever mortality is the highest, and the influences productive of fever prevail with greater force than in the district immediately [illegible] the

south. It will be observed that although a slight increase of fever deaths occurs in September, the mortality springs up with a sudden bound in November and December reaching its highest point in the month of December and then rapidly subsiding. These results have been uniform for each one of the four years, showing the dependence of the fever on some general cause connected with the season of the year. It is interesting to note that although the irrigation channels from the Godavery and Kistnah begin to fill in June, and the whole area of the low lands is soon after under cultivation, there is no accession of fever evident at this season of agricultural activity.

In 1868 when the N.E. monsoon entirely failed, the rise in fever mortality both in the Godavery and Kistnah districts was comparatively insignificant. This would seem to indicate the importance of the *moisture* of the N.E monsoon as an element in the fatality of fevers in this locality. The N.E. winds in these districts are, for the most part *land winds*, and it is during the prevalence of such winds that fever rises so suddenly, and falls so rapidly on their termination.

8. *Nellore*. The seasonal variations of

fever

fever mortality in this district have been too slight to call for any particular notice.

But in connection with the general absence of fever, the geographical position of the district must not be lost sight of. A long narrow strip of country with a sea face of about 180 miles, it catches all the southerly, East and N.E. winds as breezes direct from the sea. A small portion of the northern extremity of the district would have the N.E wind as a land wind; but for the remainder the N.E monsoon would blow over nothing but sea, before striking the coast. This district in fact presents a typical example of the law, that a pure sea air, whether from the N.E. or S. West is antagonistic to malaria.

9. *Madras district including the town*. The fever mortality of this district is never heavy, but it shows a slight tendency to rise in the S.W. monsoon, and again in November and December. The most regular feature is the depression of mortality in March, April and May, the hot dry months of the year when southerly winds prevails.

10 *South Arcot*. The general features of the curves approximate to that of Madras.

11. *Tanjore*. The diagram for this district, where irrigation is so largely practised,

shows almost a straight line, and a very low line, of fever mortality. This district from its geographical position, jutting out into the Indian ocean like a small peninsula, is open fully to influences from the sea, and if my deductions as to the influence of sea air are true, should not exhibit any great seasonal variations in its fever rate, which rate should be as near as possible a minimum rate. The four years record of deaths go to establish the truth of the law.

12. Trichinopoly. I have placed Trichinopoly amongst the eastern sea board districts because although it runs more inland than some others, yet it is open to winds from the sea, and is not elevated far above sea level, and is also an irrigated district. Here again it is most interesting to note, that the sea influences being favorable, irrigation causes no periodical or other accessions of fever mortality.

13. Madura. The district of Madura being partly on the eastern coast has been put in the sea board districts, but for purposes of great accuracy it should be divided into coast and inland districts. The diagram however contains the reduced ratios of fever for the whole population, except of Zemindaries which are near

the sea coast. In this district the fever deaths appear to have been numerous in 1866 and 1867, falling very low in 1868, and commencing to rise again in October 1869. The inland portions of this district suffer from an augmentation of fever with the N.E. monsoon, and the depression of night temperature and heavy dews which mark the cold season. The valleys between the mountain ranges are very malarious in the dry season.

14 Tinnevelly. The Tinnevelly district shows the lowest fever death rate of any part of the country. In 1869 it seems to have been slightly raised during the N.E. monsoon months but at other times to have never risen or fallen beyond a level line.

15. The general results of an examination of the diagrams for the east coast districts bear out the truth of the rule I have laid down in para 15 of my letter No 528. that "exposure of human beings to pure sea air gives the best results as regards general immunity from malarious fevers." This will be seen better when we come to examine diagram No II and to compare it with that for the "coast districts".

Diagram II -
Inland districts

16. Kurnool. The district of Kurnool which stretches by its northern borders into the 17 Degree of N. Lat: is the most northern

of the central districts of the Madras Presidency. It is essentially a district in which dry cultivation is practised, the rain fall being light and occurring in the S. W. monsoon. Fever was very prevalent and fatal in the district in the cold dry months of 1866, October, November, and December (the N. E. monsoon does not influence Kurnool). The district had only recently experienced a severe cholera epidemic, when the fever followed in its wake. The mortality fell and continued at a minimum during July, August and September 1867, rising again in the next month (October) and continuing high all through the year 1868, with the usual accession at the end of the year. Fever also has been high throughout 1869, with the seasonal fluctuations less marked. In this district fever apparently begins to exceed its normal limits about September, or after the ending of the S. W. monsoon.

19. Bellary. Bellary to the south west of Kurnool, has exhibited almost the same general rise and fall of fever as Kurnool. The months of November and December in three out of the four years have given high ratios of mortality from fever. Towards the end of the year 1869, the fever cycle to which this district had been subject in 1868

and 1869 was declining.

18. Cuddapah. Cuddapah to the south of Kurnool is influenced by the same seasonal causes as Bellary and Kurnool. The maximum of fever mortality, takes the same months viz. October, November and December, and the minimum corresponds with the period before the S. W. monsoon has become fairly established, viz. June and July. The hot weather fever mortality, March, April, May and June, of this district is comparatively slight.

In all these districts which get their rain fall in the S. W. monsoon it will be observed that the fever death rate increases just at the end of the rains, when moisture in the air and soil is highest. Heavy rain does not usually fall in these districts before August or September. Having no population returns for the inhabitants of the Mysore table land I am unable to give the months of maximum fever mortality, though as regards the more eastern divisions of the Province, I have reason to suppose that the period of maximum prevalence is the same as in Bellary and Cuddapah, and that the same general causes influence all this tract of country.

19. North Arcot. The rise and fall of the fever

The curve in this district does not follow the general outline of the other inland districts. The district is exposed more or less to influences from both monsoons, and some parts of the district are within reach of the diurnal sea breeze, and should therefore have appeared in the diagram of the eastern coast districts. The mortality though rising and falling with monsoon influences, is lower than that of any of the three districts already given.

20 Salem. This district more to the westward is subjected to influences from both monsoons but derives its chief rain fall from the S. West. The fever mortality accordingly begins to rise with the moisture of the S. W. monsoon, in July and attains its maximum about the end of the year, it being prolonged apparently by the setting in of the N.E. monsoon in October. There is a marked decrease of fever deaths during the dry and hot months from February to June.

21. Coimbatore. This is on the whole one of the dryest districts in all India being in great part sheltered from the S. W. monsoon by the mountain chain forming the western Ghats, and by local peculiarities of smaller hill ranges. The chief rain fall is brought up by the N.E. monsoon, the clouds of which are arrested against the mountain barriers of the Neilgherry chain of hills. The rainfall is very capricious and uncertain, except in the few talooks between the Anamally and Neilgherry hills which catch the lighter clouds of the S W monsoon. The fever mortality of the district as shown in the diagram for the past four years has been remarkably low, and apparently subjected to little seasonal variation.

The hill jungles of this district are most notedly malarious, after the end of the S. W. monsoon rains, viz from November until May. This however is a feature common to all jungles in the South of India, that is below 16 degrees N. Lat. All jungles above that line appear to be most malarious during the rainy months of July, August, September and October, and to be comparatively healthy in the dry season of the year.

Diagram III "western coast districts"

22. South Canara An unusual amount of fever seems to have prevailed in this district in 1867. So bad was it in certain localities that the Revenue officials desired an enquiry might be made into its causes. Filthy habits, combined with excessive moisture of the season appears to have aggravated the usual type of malarious fever. The general prevalence of fevers on the western coast is, as the diagram shows,

markedly affected by the rain fall of the S.W. monsoon. On this coast the rainfall varies from 120 to 160 inches and occurs for the most part in June, July, August and September. These are the months it will be seen in which at least the first three of the months the fever mortality rapidly rises

During these monsoon months the common people are exposed to frequent changes from cold and wet to heat and moisture. While the air is saturated with humidity all exhalation from the skin is in abeyance, and the means which nature has provided every one with to get rid of noxious matters from the body, are thus reduced to a limit below what is compatible with healthy functions. The skin is a "second liver" for the inhabitants of warm climates, and when it ceases to work, fever is tolerably certain to ensue.

There are no canals, or tank irrigation in these districts. The natural rainfall is sufficient for the cultivation that is practised. Owing to the great moisture to which the districts are exposed vegetation of all kind is most luxuriant.

23. Malabar. The general progress of fever in Malabar has been the same as in South Canara, though not locally aggravated in June 1867, as in the neighbouring provinces. The influence of the N.E. land winds in November, December and January in raising the general mortality from fever is better seen in this district than in South Canara. The S.W. monsoon influences are perhaps rather more slightly marked.

24. The diagrams, I think bring out very clearly the practical fact that the irrigation districts have not shown any tendency to excess of fever mortality, but, on the other hand, where they have been exposed to healthful breezes from the Indian ocean, the fever mortality has been absolutely lower than in the non-irrigated districts.

The seasonal rises of fever in the Godavery and Kistnah, is not coincident with the time of year in which wet cultivation is most actively pursued, but with the appearances of northerly or north easterly land winds in the cold months of the year.

25. With regard to the exact influence of natural rain fall in the various districts in the production of fever, although the facts in this report seem to establish a connection between the two, I shall report more fully at some future period when I have had an opportunity of examining

and comparing the rain registers of the several districts.

I have the honor to be
Sir
Your most Obedt Servt
W R Cornish. F.R.C.S.
Sanitary Commissioner
for Madras

Office of Inspector General
tment

the

to be

Servt

C.S.

ssioner

From ~~Public 1870 Dept~~

The Sanity Commissioner
for Madras

To

The Chief Secy to Govt
Public Deptt:
Fort St George

Dated 31st
Despd " } May 1870
Recd 1 June "

No 607

No 875 PW 2343/70

Submits further remarks in continuation of letter No 528 of the 17th instant on the suggestions of Dr Sutherland relative to the prevention of fever

Pros. 6th Augt/70 [illegible] 103

157

Office of Inspector General
Indian Medical Department
Fort St George 2nd June 1870

No 131

From

The Inspector-General
Indian Medical Department

To

The Chief Secretary to Government,
Public Department.

Sir

I have the honor to acknowledge receipt of Proceedings of Government, Public Department, and order thereon, No 3716, of 22nd November 1869, & to offer the following remarks on Dr Sutherland's letter regarding endemic fever in India. I have to apologize for the delay that has occurred in forwarding these, as I did not quite understand that any special report from this Presidency was desired, until receipt of Government order, No 527, of 29th April.

2. The Chief questions which Dr Sutherland discusses are as follows:-

a. "Has not the railroad obstructed the natural drainage of the Country & converted some previously healthy localities into unhealthy and deadly hot-beds of malarious fever?"

b. "Have not our Canals created wherever the irrigation system has been carried out, a deadly miasmatic atmosphere, which has destroyed as "many lives as would have been lost by the "casual famines which swept over these districts."? These I shall now consider in so far as they concern this Presidency.

3. As a preliminary it may be well to point out, that some of the most feverish localities in Southern India are those in which dry cultivation is carried on, or which are surrounded by barren rocky ground. In illustration of this I may instance various villages in Western Mysore. It would thus appear that, although malarial influences are usually attributed to the alternate saturation and desiccation of the soil under a warm sun there may be other causes in operation which we have as yet failed to discover.

4 Indeed the whole question is one of great difficulty. Thus in the feverish wooded districts of the Western Ghaut range, the miasm is most abundant in the dry hot spring months, whereas in similar districts in the Northern part of the Presidency, it is most prevalent immediately after the first rains of the monsoon.

5 As regards railroads in this Presidency it does not appear, that they have, in any instance, obstructed the natural drainage of the Country. So far as my observation goes the Railway Companies have, in their own interests, made ample provision for the flow of

of perennial streams, as well as of occasional currents appearing after rain. It must be remarked too, that the lines in Southern India pass for the most part through a dry country in which there is naturally no water near the surface to be dammed up by the weight & slope of a railway embankment, so as to form a swamp. Lands under wet culture are frequently traversed by the lines, but in no case, I believe, have they been allowed to lapse into a swamp; water and ground under its influence being far too valuable to permit of such an issue.

6 I am of opinion, therefore, that railway works have not in this Presidency, in so far as regards drainage, had any prejudicial effects on the public health.

7 Irrigation in Southern India is carried on in two ways, viz. by means of water collected from local receiving surfaces in tanks, and by means of channels from large rivers. The tanks are dependent for their water on the periodical rains and chiefly fed by small streams, dry during the greatest portion of the year. A large number of these reservoirs were in existence prior to the establishment of British rule, and there is absolutely nothing to show, that irrigation by means of them has, during the period of our experience, had any prejudicial

effect on the public health.

8. On the Contrary, these works have converted barren wastes into fruitful districts, and thereby contributed to the increase and general welfare of the population. It is not in general seasons either, when tanks are full and the fields flooded, that the inhabitants of such districts suffer most from endemic & epidemic disease, but in dry years when the water supply is scant, and the land dry and uncultivated.

9. In connection with this it may be mentioned, that prior to the recent terrible outbreak of malarial fever in the Mauritius, there had for some years been a general complaint there of increasing dryness of climate and deficient water supply. These changes have now been traced to the destruction of forests, more especially on the high lands of the island, & an attempt is to be made to replant it, with the view of restoring the wonted salubrity of climate and fertility of the ground.

10. It must also be pointed out with regard to wet cultivation in Southern India, that the fields have but little of the character of a malarial swamp, as the water is never left so long at rest as to permit it to become putrid and offensive. At the same time the growing crops are active purifying agents, appropriating most of, if not all, the gases

that

that may be generated by the action of heat and water on the soil.

11. Practically it is found that fever, when it does occur, is most prevalent just after the cutting of the crops, when the fields are dry. This may however be partly accounted for by the labouring classes being more exposed to the sun and night air, and harder worked at that, than any other season of the year.

12. The other mode of irrigation by means of channels from large rivers - is carried on chiefly in the Southern Division, Northern Division and the Kurnool District. In the first mentioned the system has been in operation for as long period, so that ample time has elapsed for any prejudicial influences to have been developed, and facts as to the actual effects of irrigation on public health there will be of proportional value. The districts of Trichinopoly and Tanjore are the two chiefly irrigated from the Cauvery, and it may be stated generally, that the population in those do not suffer more from malarial fever than the inhabitants of other districts on the Eastern Coast. As the health statistics however of the Civil population are not very complete or reliable, it will be more satisfactory to notice the effects of residence in the Southern

Division on Native troops. During a period of 10 years, viz from 1859-60 to 1868 inclusive, the total strength of troops in the division amounted to 30.247, the total admissions from fever to 3892, & the total deaths from the disease to 19. In the same period the annual percentage of fever cases to strength ranged from 25.91 to 4.15, but the percentage for the total strength and entire term was only 12.87.

13 Fever therefore cannot be said to be a very common disease in the Southern Division, but with the view to a clearer appreciation of this, it may be well to contrast these figures with the fever statistics of Native troops in the Mysore Division. In the latter dry cultivation chiefly obtains, & river irrigation is comparatively rare; at any rate in the neighbourhood of cantonments. During the same 10 years the total strength of the Native Army in Mysore was 56,806, the total admissions from fever 16,632, and the total deaths 62. The percentage of admissions to total strength was no less than 29.28, being more than double that which obtained amid the irrigated lands of the Southern division.

14 In the Kurnool District canal irrigation is of more recent introduction. Fever of a very malignant type prevailed there

in

in 1866 & 1867, but cannot be fairly attributed to wet cultivation, as it was not confined to areas near the canals merely, but appeared indiscriminately all over the District, and also extended to the adjoining Collectorate of Cuddapah. This outbreak of fever therefore can only be regarded as a coincidence, and not a consequence of canal irrigation.

15 In the Northern Division canal irrigation is very extensive, and in the Delta of the Godavery some of those changes alluded to in para 3 of Dr. Sutherland's letter would appear to be taking place. In the lower reaches of the delta, the sedimentary deposits are said to be converting considerable areas into swamps, covered with rank herbaceous vegetation, and at some seasons evolving putrid gases.

16. Throughout the whole of the delta malarious fevers are generally prevalent in the cold season, and in 1867-68 the type was very malignant, cases often proving fatal in from 24 to 36 hours. The most feverish months are November, December and January, in other words fever is contemporaneous with the exclusion of water from and the desiccation of the rice fields. At the same time it must be observed, that the population at that season undergo an

unusual amount of fatigue and exposure to the sun and chill night air, while harvesting and watching their crops. Making allowance for all that, however, it still seems probable, that irrigation in this quarter has to some extent rendered fever more prevalent.

17 Reviewing the whole subject at this stage it would appear that, when the cultivated lands are alluvial and but little above the level of the river, as in Lower Bengal, irrigation does increase fever; whereas in more elevated tracts, having a different soil and Geological structure, no such effects follow to any notable extent.

§18 In para 14 of his letter Dr Sutherland recommends the draining of swamps by the formation of tanks. When from any cause this resource may be inadmissible, it might be well to try the effects of certain trees on marshy localities. In a Woods & Waters Report of the North of France it was pointed out, that a wet tract of land near Valenciennes was in time completely dried on the surface, by planting the *Pinus Sylvestris*. Borings were then sunk, when it was found that a bed of water existed at a depth of 6 feet; its level having been evidently lowered to that

extent

extent by the trees. This effect of such trees has also, it appears, been known for many years and turned to account in Germany; and it is now a very general opinion on the Continent of Europe, that firs and other acicular leafed trees have this action on swamps. It would of course be vain to attempt the culture of any pine on the plains of India; but we have a very good substitute in the Casuarina, which has besides the advantage of growing in brackish water.

19 In conclusion I beg to observe, that in making these remarks, I have in no instance had the desire to controvert the opinions and statements of Dr Sutherland, although the facts brought forward by me may at times appear opposed to his conclusions; this may be explained by the difference in the physical conformation, soil, and climate of the districts regarding which we respectively write.

I have the honor to be
Sir
Your Most Obedt Servt
W. MacKenzie
Inspector General
Ind: Medl Deptt

No Pr. 186 Public Dept
From The Inspector General, Indian Medical Department, Fort Saint George,
To The Chief Secretary to Government, Public Department, Fort Saint George.
Dated 2nd June
Received 6 " —

No. 131.

Pr 900

Submits remarks on Dr Sutherland's letter regarding endemic fever in Delta

M. 2343/5a.

No 1877/1878 – 6 June/70

Public Works Departt.

Proceedings of the Madras Government

Under date the 6th June 1870

No 1877 Read the following.

From.		
The Supg Engineer. 1st Divn	H.E No 3216 of 6th December 1869	
do do 1st do	H.E. No 247 of 21st April 1870	
do do 2nd do	H E No 12 of 23rd do 1870	
do do 3rd do	H E. No 138 of 21st do 1870	
do do 4th do	H E. No 315 of 22nd do 1870	
do do 5th do	H E No 35 of 6th May 1870	
do do 6th do	H E. No 79 of 21st April 1870	
do do 7th do	H E No 16 of 22nd do 1870	
do do 8th do	H E No 199 of 4th May 1870	
Special Exe Engr Wynaad	H E	346 of 9 May 1870
Pro of the Board of Revenue	H E	3733 of 12 June 1870
Pro. Public Deptt	H E	of 15 June 1870

Ordered that these papers be forwarded to the Govt of India.

No 1878.

To
The Secretary to the
Govt of India – P.W.D.

Sir,

With reference to the Circular of the Govt of India under date the 6th September 1869. No 75, Communicating a report by Dr Sutherland, the Deputy Inspector General of Hospitals, Presidency Circle, Bengal, on the causes of fever in

that

I think that some allusion should be made in this letter to the statements made by the authorities who have been consulted regarding the increase of fever in the Delta taluks of the Godavery District.

that Province, with suggestions for the arrest and prevention of endemic disease, and calling upon this Government for an expression of its opinion on the subject, I am directed herewith to forward the papers marginally noted containing respectively the views of the Supg Engineers and the Revenue and Medical Authorities.

The position assumed by Dr. Sutherland is that fevers of an endemic type are generated by the disturbance of the natural drainage of the country which railways, projects of canal irrigation and other great public works cause,

leaving

From the Actg Supg Engr 1st Dn. — No. 3216 d/ 1st Decbr/69
Do. Do. Do. — " 247 – 21st April/70
Do. Do. 2nd Dn. — " 12 – 23d — " —
Do. Do. 3d Do. — " 138 – 21 — " —
Do. Do. 4th Dn. — " 315 – 22d — " —
Do. Do. 5th Dn. — " 35 – 6th May/70
Do. Do. 6th Dn. — " 79 – 21st April/70
Do. Do. 7th Dn. — " 16 – 22d — " —
Do. Do. 8th Do. — " 199 – 4th May/70
Do. Special Ex. Engr, [illegible] — " 346 – 9 — " —
Pro. of the Bd of Revenue — 3733 – 1st June/70
From the Public Dept — " 15th June.

although there was a marked increase last year in the malignity of the malarious fever generally prevalent in the Delta of the Godavery in the cold season, the rate of mortality from fever in the four years ending 1869 was fully 50 per cent

leaving water to stagnate and to create a degree of dampness favorable for the production of malaria.

The experience of the Officers whose opinions have been invited in this Presidency do not appear to confirm the views entertained by Dr. Sutherland, and the statistics furnished by the Sanitary Commissioner show that ~~in the four years ending 1869 the rate of mortality from fever was upwards of 50 per cent~~ lower in the irrigated Districts of Tanjore, Kistna, and Trichinopoly than in the dry Districts of Bellary Kurnool and Cuddapah. In 1866 fever prevailed so greatly in the town of

Kurnool that it was believed to be due to the works of the Irrigation and Canal Company, but it is reported that the same type of fever prevailed simultaneously in many parts of the District as well as in Bellary and Cuddapah and that recently it has disappeared from the town of Kurnool.

The Inspector General of the Indian Medical Depth expresses the opinion that Railways have not in this Presidency had any prejudicial effect on the public health, the Railway Companies having in the construction of

their

their works made ample provision as regards drainage.

The opinions formed by Dr. Sutherland and his suggestions may doubtless be sound and useful so far as they relate to the localities regarding which he writes, but they are believed to be generally inapplicable to the Districts of this Presidency in which the physical conformation, soil and climate are not analogous to those which have come under Dr. Sutherland's observation.

Despd. 9/8/70 with 25 copies of G.O. 1878 of 1870, ~~two~~ copies of two diagrams & a copy of the reports by the Rev. & medical authorities on the subject -

W.B.

144 1705, 1612, 1616, 1819, 1595, 1622
-, 2305 and 2343.

f {1870} Madras.

PUBLIC WORKS.

To Secretary to the Govt of
India (115/

6th August 1877 & 1878

Nos. 98 @ 104 & 105

disease. Papers rela
nearing of Dr Suther
ggestions for the arresting
prevention of the
disease. (115/

ding, with remarks, paper
Dr Sutherland's suggestion
arrest and prevention
disease