

Public (1899) Department.

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[Despatch Abstract.]

Recording letter from the S. G. forwarding
a memorandum compiled by the Sanitary-
commissioner, Madras, on the subject of mor-
tality in the central jail, Rajahmundry.

MEMORANDUM.

Subject:—Beri-beri epidemic in the Rajahmundry Central Jail.

1. It will be understood that the paragraphs referred to in the following are those of Captain Fearnside's pamphlet:—

Paragraphs 1, 2 and 3.—Captain Fearnside throws doubt upon the crucial point of the existence of endemic beri-beri in the Northern Circars. In the last paragraph of the pamphlet, he attempts to strengthen this doubt by the inevitable conclusion that, if it really existed at all, seeing that men are constantly received into the jail in his charge from all parts of the area, it must have been recognized by him; but obviously this is a *non sequitur*, and cannot reasonably lend strength to the doubt. In short, whilst on the one hand hesitating to affirm positively it does not exist, he not only has stated it does not do so, according to his own experience—limited to the four walls of his jail—but proceeds to stultify the evidence on record obtained outside these limits. The admirable original work of Assistant Surgeon Malcomson is put aside with contempt as unworthy of trust in the present day, in that “it can no longer, in view of the great progress of medical knowledge and researches since 1835, be considered to be possessed of authority.” Malcomson would not have known a “brassy” body—as to the importance of which Captain Fearnside has much to say—from a “niblick” in the blood, but he was undoubtedly an accurate clinical and pathological observer, and even in these days of the “boom” of the microscope, this qualification cannot be safely despised. His work presents a classical description of true beri-beri, and it is to the honour of that great man's name that he was the first to point out the real nature of beri-beri as a disease of the nervous system. I do not think Captain Fearnside would have ventured upon several of the extraordinary generalizations under cover of which his whole arguments are set forth—more especially as to the correct place of cardiac trouble in beri-beri—were he to have read this ancient but nevertheless trustworthy book. As to the lay description of the disease by Mr. Morris, it is not my purpose to defend it. In fact, the disease has been misnamed by him. It is not known as “Ubbu-vayuvu” but “Nānu”. However, evidence of the existence of beri-beri does not depend solely upon these two authors. It has ever since the days of Malcomson been recognized by all medical officers attached to the Northern Circars as a disease absolutely distinct from either rheumatism or fevers of malarial origin. Since the receipt of Captain Fearnside's denial of its existence, I have questioned medical officers of the present day, who have served in these areas, and have received from them positive statements as to its existence.*

2. Further, since receipt of Captain Fearnside's pamphlet, I have made personal inquiries in Masulipatam, Amalapuram and Rajahmundry, and have examined numbers of cases having the usual symptoms of beri-beri. As to the severity of symptoms, I found they undoubtedly differ not only with the individual but the locality, apparently in respect to the natural configuration and nature of soil as affecting surface and sub-soil drainage (the alluvial soil of the delta being certainly the most favourable) and the sanitary conditions under which the population is

* Since writing the above, the occurrence of a small outbreak in the Madras Infantry Regiment, now stationed at Vizagapatam, has been notified to me by Captain Giffard, I.M.S., District Medical and Sanitary Officer, Vizagapatam. Captain Grant, I.M.S. (Assistant Physician, General Hospital, and Professor of Hygiene), has reported a typical case from near Arkonam as a rare matter, but testifies to the existence of beri-beri in the area between the Krishna and Godavari rivers from examination of patients arriving from that tract.

placed. In respect to blood characteristics, all well marked cases were examined microscopically by me. Not only were all symptoms of splenic enlargement—the most frequent concomitant of severe malarial poisoning—completely absent, but the malarial parasite was found but rarely, and then only in the benign tertian form. I never saw in any case presenting solely the symptoms of beri-beri, the distressingly malignant type of malarial “infection” described by Captain Fearnside distinguished by crescents and “brassy bodies”, although obviously beri-beri intoxication can exist side by side with malaria. I should be very sorry to add to the fearfully large number of mere guesses resulting from microscopical examination as to what the real micro-organism of beri-beri is, but with all diffidence as to referring to incomplete work, I may mention, while recognizing the numerous micrococci spoken of as a general feature by most authorities, I feel inclined to believe—subject to further investigation—that characteristic appearances can be secured in that disease.

3. Captain Fearnside points out that in 1887 there occurred the amalgamation of the District and Central jails, and would describe this as “the sanitary event of the year,” and not the admission of 22 Burmese prisoners suffering from beri-beri, of whom 18 died. I have no doubt the admission of short-term prisoners into the jail in numbers greater than heretofore was, with reference to beri-beri, an event of more importance than Captain Fearnside is likely to credit, especially having regard to the fact that the available cubic space in the buildings has been uniformly miscalculated, as has been pointed out by me; but whilst glad to acknowledge that such an event would be full of significance in a jail *already infected with beri-beri*, I certainly am not disposed to accept his generalization that because the mortality amongst short-term prisoners is always appreciably higher than among long-term convicts, the amalgamation, in this special case, brought about greater mortality, owing to this blending of dissimilar populations. Captain Fearnside should not have contented himself with this bald theory; he should have proved his contention by expressing the result in figures. His table No. 1 shows that he actually was in possession of statistics that could have been exhibited to show this result, had it been possible. When compiled, as might be expected, they show wide fluctuation as a result of calculating deaths upon a small population. Instead of attempting this, however, he very dexterously combines the mortality of the two jails not from date of amalgamation but from 1877, when he knew they were separate—thus effectually hiding from himself the simple fact that for two years prior to the amalgamation the short-term convicts were remarkably healthy, the mortality being *nil*, and that although in 1884 there were seven deaths in a strength of 115, in 1882 and 1883 the total death-rate was but 12·6 and 7·5, respectively. He then proceeds to assert, in the most careless manner, that it was affirmed by the Surgeon-General and myself in our Conjoint Report that the first introduction of beri-beri into the jail at Rajahmundry was ascribed to the batch of beri-beri prisoners coming from Burma. As a matter of fact, we took particular trouble to show that this suggestion is baseless. What we claimed was that their arrival *accentuated* the chances of propagation of a disease *already existing in the jail*, as specifically stated in our Conjoint Report (*vide Appendix A*) as follows:—

“Paragraph 14 (*final sentences*).—* * * The sanitary incident of that year was undoubtedly the admission of a gang of convicts from Burma amongst whom there were 22 cases of beri-beri, of which no less than thirteen died of it in Rajahmundry and five subsequent to the transfer to Vellore. It may be added that the Inspector-General remarks that it was a “curious coincidence” that beri-beri appeared amongst an old batch of Burma prisoners in the Vellore jail on the very day those affected with beri-beri arrived from Rajahmundry. In a subsequent annual report, the Inspector-General, in remarking upon the existence of beri-beri in this jail, points out that importation was first due to these convicts. *But the medical returns show that one case of beri-beri was admitted in 1887 previous to the arrival of the Burma convicts. Further, it will be observed that the Statement given above shows admissions to the extent of 3·3 per mille in the year 1882 for this disease.*” [Italics not in the original.]

4. Having regard to the fact that our report claims that the area is endemic, and Captain Fearnside pleads his own inability to prove that this is not the case, it certainly was not legitimately open to him to regard it a matter of no importance that a number

of most severe cases of beri-beri had been introduced into the jail. The following quotations at least show that standard authorities do not regard concentration of beri-beri cases lightly:—

“From these observations, and from the clinical histories of the cases related in this thesis, I am of opinion that it is a cumulative poison adhering to walls of buildings, &c. Where many sick are together or have been treated in a building, the poison is in an intensified form and the disease easier contracted.”—(*Bentley*). “Another reason why beri-beri is so frequently met with in jails, in schools, and such like communities, is that the soil and surroundings are in such circumstances exceedingly liable to inoculation from without owing to the continual influx of fresh individuals. Some of these may bring in their clothes, in their food or in their bodies germ from other beri-beri centres, which falling on suitable media may germinate and cause an outbreak of disease. The liability to the introduction of the beri-beri germ in any given place is proportionate to the number of people coming into it and to the number of different centres from which new comers are derived; and the liability of any individual, in any given place, to catch beri-beri is in direct ratio to these circumstances; the greater the numbers, the greater the risk of some one carrying with him the germ of the disease and the greater the risk of an individual.”—(*Manson*)

5. It may be here stated that it is recorded of the District jail that beri-beri existed in it both amongst convicted and under-trial prisoners from 1829 to 1839, and that the percentage of deaths to admissions was heavy. Later years, however, brought better health. Hence, the amalgamation might have had a significance greater than Captain Fearnside apparently has realized. Had Captain Fearnside entered into the history of the District jail prior to the amalgamation, he would have found that there was a period preceding this when mortality was very heavy—406 per mille. He would have learnt that this period of mortality was not due to the importation of “crescents”, but to a remarkable condition existing *within* the jail.

This is what the reporting Medical officer of the District jail for the year 1865–66 states:—

“On assuming charge I found the mortality so great and the taint in the walls so evident that I obtained the permission of the Inspector-General of Jails to have 60 of the prisoners transferred to the Central jail, [evidently therefore 1887 was not the first time large transfers had occurred to the Central from the District jail] and I had the plaster and whitewash which had evidently accumulated for years removed. It was about 2 inches thick, and now the bricks are exposed and the taint apparently removed, as there has been a most marked improvement in the health of the prisoners since this has been done. During the year the average strength has been 118. The number of admissions to hospital has been 320 and the death have been 51. This great mortality I attribute principally to the tainted state of the walls already referred to as removed. There were 36 cases of *diarrhoea* and five deaths. *Anasarca*, two remained from last year—44 admitted and 26 died, which usually proved fatal by effusion into the chest and pericardium. Since the plaster has been removed from the walls both *diarrhoea* and *anasarca* have entirely disappeared.”

6. Now this disinfecting of the walls of the buildings would have had little effect had the prevailing disease been malaria, but it certainly would have been a judicious proceeding had the “*anasarca*” that ended in death by effusion into the chest and pericardium been due to beri-beri! The next year, instead of 51 deaths, only ten took place; and in the following years the actuals, excluding cholera and small-pox, were as follows:—

1870	..	..	..	..	..	..	..	..	..	..	1
1871	..	..	..	..	..	..	..	..	..	..	1
1872	..	..	..	..	..	..	..	..	..	..	1
1873	..	..	..	..	..	..	..	..	..	..	1

That the persistence of beri-beri poison after introduction to buildings is no new theory has been proved up to the hilt; but I think the case of the ship *Lodestar* is one likely to produce conviction in most minds. This ship, in December 1896, arrived from Rangoon at Falmouth, after a long voyage of 195 days. The whole of the crew

were reported to have been attacked with beri-beri. Three sailors died and were buried at sea, whilst several were suffering from the malady on arrival at Falmouth—[*British Medical Journal*, December 1896, page 1791]. This ship was sold to a German firm, and was re-named the *Steinbek*. On June 16th, 1898, she arrived at Amsterdam from Java with a cargo of raw sugar. All the crew, except one man and a boy, were down with beri-beri. On this voyage, she had a completely fresh crew, none of whom had before suffered from beri-beri—[*British Medical Journal*, November 5th, 1898, page 1227].

7. *Reference paragraph 4.*—This paragraph exhibits a tendency to confuse events in a manner that should not have been forthcoming in a pamphlet where the sole object of the writer is that of the "attainment of the truth." Whilst allowing the reader throughout to believe that he criticizes the Conjoint Report of the Surgeon-General and myself, he permits it to be understood that this report covers the period of the ghastly mortality and sickness which occurred when the jail was under his charge in the end of 1897 and 1898. It must be carefully held in mind that this is not the case. Captain Fearnside's whole effort concentrates itself upon the attempt to show that hill-men admitted during the famine period introduced into the jail a highly malignant infective malarial germ (see his Conclusion No. X, paragraph 26). The fact is that the Conjoint Report refers solely to the period of jail history up to 30th April 1897. A perusal of that report (appendix B) will show that it was not necessary to wait until the arrival of a famine-stricken population, or a population derived from malarious hill-tracts, three months subsequently, to cause the mortality to be exceedingly heavy. The state of the jail had caused grave anxiety to the Inspector-General of Jails long before this period (*vide* my letter No. 2014-S., dated 27th October 1896, appendix A).

8. The history of the jail is carefully divided by Captain Fearnside into two periods, before and after 1887. Then, very inconsequently, the year 1880 is picked out and compared with 1887. It is hastily assumed that the increase of fever in 1880 is shrouded in mystery, and that this cause was not ascertained till the "brassy bodies" were duly discovered in the blood of prisoners in 1898. Necessarily, the reader infers from Captain Fearnside's silence on the subject, this year represented normal conditions. But information was available to the Superintendent that in 1880 the population was absolutely abnormal, and could not be compared to that existing at the time the Conjoint Report was written, or the intervening period. This abnormal population was due to the importation into the jail of prisoners from the malarious tracts of Rumpu during the rebellion that, probably, outnumbered and, certainly, had actual residence in jail to a degree that could have no comparison (as will be afterwards seen) with the residence of "crescent" bearing hill-men, admitted after July 1897.

9. In short, no one would think of attempting to arrive at a solution of the conditions underlying the general health of a jail by looking to periods when admittedly abnormal circumstances, or abnormal populations, were involved. Should it be proved that under normal conditions a population is subject to certain peculiarities of sickness and mortality, it may happen that on the occurrence of abnormal factors these may be accentuated, or it may be that entirely a different class of sickness and mortality may be evoked, and be in special evidence during their continuance. But, it seems to me obvious that the only way to gauge facts would be first to attempt to eliminate the extraordinary circumstances and ascertain their causation, and then come to a decision as to ordinary circumstances and their results.

10. Following such a line of argument, therefore, Captain Fearnside has no ground upon which to assume that the abnormal fever incidence of 1880 cannot be accounted for, and thereupon by lumping together normal and abnormal periods to pursue his argument that for 21 years this jail has been the victim of malaria of a malignant infective type! As a fact, though admissions for fever that year were heavy (as might reasonably be expected when the jail had received a disproportionate number of convicts from notoriously malarious tracts), only three deaths on a daily average strength of 956.17 occurred under the head of "ague" or of any other type of "malarial fever" during the year. It is noteworthy in a jail that, according to Captain Fearnside, is likely to have conditions such as to favour "crescents" brought in by hill-men (and the men from Rumpu were essentially hill-men) being distributed so as to produce an infective form of malarial fever, that during this year, according to the Administration Report for 1880, "among the female prisoners there was hardly

any sickness." Now, one could hardly imagine that within the confined precincts of a jail, where the "crescents" of the hill-men can be carried hither and thither by mosquitoes, these would have been so discriminating as to have spared the other sex in this striking manner. There is only one disease credited with sparing the "fair sex", namely, beri-beri; although, personally, I should think factors such as modes of labour have more to do with this result than the finding by the germ of beri-beri unsuitable soil in the female. The following shows how the Inspector-General of Jails regarded the increased sickness of the Rajahmundry jail during the year 1880:—

"The greatest number of deaths (52) occurred in the Central jail at Rajahmundry, where the sickness and mortality amongst the rebel prisoners of the hill tribes of Rumpu were distressingly great. These hill-men bear confinement very badly, and no doubt suffer from great bodily and mental depressions. It signifies little whether the malady that destroys them is termed anæmia or nostalgia, the fact remains that the complete revolution of their daily life and habits crushes them mentally and physically, and the tighter the bonds of discipline are drawn, the more these prisoners languish and fall into an unhealthy condition of body; this change taking its real origin in mental depression and despair."

11. I hold that the occurrence of famine and admission of convicts from the malarious tracts of Rumpu in abnormal numbers, are conditions that must be reasonably eliminated before discussing the question as to whether this jail is healthy or not, and what is the real cause if it be not healthy.

12. Captain Fearnside then proceeds to show that the Rajahmundry jail is remarkable for its admissions for malarial fever, and to illustrate this fact introduces a table showing actuals (his Table No. II). Now, such a mode is absolutely unreliable for statistical reasons. Obviously, any deduction on this point should be drawn from rates upon respective populations of the jails treated. But, accepting his method, it will be seen from the following table (No. A) that it might with equal justice be assumed that Rajahmundry was distinguished for "dysentery and diarrhoea" * when compared with other jails, and that this was the main source of death and sickness (Table A); of the total admissions in seven Central jails under these heads, Rajahmundry enjoyed 21.8 per cent:—

TABLE A.

Dysentery and Diarrhoea.

Years.							Rajahmundry jail.	All Central jails.
1880	..	..	..	..	..	..	243	744
1881	..	..	..	..	..	..	137	801
1882	..	..	..	..	..	..	131	745
1883	..	..	..	..	..	..	125	475
1884	..	..	..	..	..	..	90	457
1885	..	..	..	..	..	..	50	324
1886	..	..	..	..	..	..	38	326
1887	..	..	..	..	..	..	71	331
1888	..	..	..	..	..	..	129	611
1889	..	..	..	..	..	..	199	904
1890	..	..	..	..	..	..	144	914
1891	..	..	..	..	..	..	276	1,357
1892	..	..	..	..	..	..	240	1,480
1893	..	..	..	..	..	..	52	731
1894	..	..	..	..	..	..	122	615
1895	..	..	..	..	..	..	175	644
1896	..	..	..	..	..	..	238	857
1897	..	..	..	..	..	..	349	1,007

Table No. A (2) and paragraph 14 will show that Rajahmundry has ever been distinguished not only for its malarial fever, but its admission rate for diarrhoea and dysentery.

* Returns do not allow of these diseases being separated.

TABLE No. A (2).

COMPARISON of admissions from Dysentery and Diarrhoea in the Rajahmundry and all other Central Jails.

Years.								Ratio per mille of average strength.	
								Rajahmundry Central Jail.	Other Central Jails.
1880	..	..	..	..	..	..	..	254.06	96.9
1881	..	..	..	..	..	..	..	142.9	131.2
1882	..	..	..	..	..	..	..	146.2	136.4
1883	..	..	..	..	..	..	..	167.4	91.1
1884	..	..	..	..	..	..	..	142.2	105.6
1885	..	..	..	..	..	..	..	86.9	86.3
1886	..	..	..	..	..	..	..	68.4	84.3
1887	..	..	..	..	..	..	..	129.8	77.4
1888	..	..	..	..	..	..	..	241.7	130.8
1889	..	..	..	..	..	..	..	382.1	183.7
1890	..	..	..	..	..	..	..	271.5	176.2
1891	..	..	..	..	..	..	..	507.8	224.8
1892	..	..	..	..	..	..	..	371.7	223.7
1893	..	..	..	..	..	..	..	82.9	123.4
1894	..	..	..	..	..	..	..	153.5	96.5
1895	..	..	..	..	..	..	..	229.5	95.7
1896	..	..	..	..	..	..	..	27.4	123.8
1897	..	..	..	..	..	..	..	343.6	137.7
1898	..	..	..	..	..	..	..	481.9	92.3

It will be seen further (table C paragraph 46) that with few exceptions, the death-rate from fever has been trivial and in nine events out of nineteen has been less than other jails—thus showing that Captain Fearnside's malignant infective Rajahmundry jail malarial germ is capable of doing little enough to prove its malignancy.

13. But, Captain Fearnside felt that he had the excessive prevalence of other diseases to account for beyond malaria, and the following happy combination of ideas is expressed by him:—"Malaria is predisposing cause to pneumonia, dysentery, phthisis, &c." Yet, equally well is predisposition afforded by evil conservancy, ill-ventilated wards, over-work, unnecessary exposure to weather, and faulty diet. Each of the three diseases he mentions is a specific disease, and must have depended upon the existence of specific causes. When, therefore, he proceeds to say that "*this is well illustrated by the fact that in 293 necropsies (1887-96) tubercle of the lung was found in 61 cases and ulceration of the bowel in 116*", it seems to me the connection between his premiss and his conclusions is undiscoverable. Reversed, his statement implies that proof of the existence of malaria is forthcoming from the presence of such diseases—a most unwarrantable deduction. That by ensuring a weakened condition either malaria (or beri-beri) would predispose to certain diseases can well be imagined, but to proceed to proof of existence of malaria therefrom is quite another matter. Taking the bare facts as stated by Captain Fearnside as to the great amount of tubercle and bowel ulceration and pneumonia found, most would feel far more inclined to hold that in the special prevalence of these diseases, there was more reason to believe that there existed serious errors of hygiene as to jail buildings, the controlling of infection, and management of the prisoners than that malaria tainted the population. But not only are we asked to accept the existence of specific disease as in itself proof of the presence of malaria, but, when it is declared absent, we are required to regard the diagnosis made by previous medical officers as unreliable in a wholesale manner. Yet, it would be quite as logical when dealing with the jail records, to demand that when these officers regarded cases as due to malarial fever the diagnosis was erroneous as "the other way about". Captain Fearnside evidently feels such an argument wants support; hence, in reference to influenza from 1890-92, Pfeiffer's bacillus is literally dragged like a herring across the scent. I knew personally all the medical officers who were in charge of the jail during the periods referred to by Captain Fearnside, and consider the assumption of incorrect diagnosis 258 times as to influenza cannot for a moment be entertained—notwithstanding the non-demonstration (with the $\frac{1}{4}$ inch objectives supplied by Government) of that bacillus. I

presume that both Pfeiffer and Captain Fearnside would have been content to recognize influenza by clinical symptoms up to 1892, as it was not till then the former *savant* discovered the bacillus.

14. If, then, it be conceded that there is no difficulty in accounting for the excess of fever in the year 1880—in that the population of the jail at the time was abnormally constituted—it at once becomes possible to abandon Captain Fearnside's rough method of lumping up the abnormal and normal periods together, when the statistics and the arguments used in the Conjoint Report, relating to conditions found up to April become tenable. These were as follows:—

TABLE B.

Years.	Ratio of admissions per mille per annum of the daily average strength.					Ratio of deaths per mille per annum of the daily average strength.				
	Daily average strength.	Diarrhoea.	Dysentery.	Beri-beri.	Fever.	Total admissions from all causes.	Total admissions from all causes excluding those from epidemics.	Dysentery and diarrhoea.	Beri-beri.	Fever.
1875	950.41	178.9	..	..	269.4	855.4	855.4	7.2	..	1.1
1876	915.49	179.2	..	..	380.2	1,094.8	1,094.8	2.2	..	1.1
1877	1,036.62	134.1	..	..	469.0	1,605.9	1,605.9	1.9	..	2.9
1878	1,192.60	150.1	..	..	299.3	862.8	862.8	6.7	..	1.7
1879	967.73	388.7	..	..	676.2	1,573.5	1,573.5	25.8	..	3.1
1880	956.17	65.7	186.7	..	2,256.4	2,997.0	2,997.0	37.5	..	3.1
1881	957.88	21.9	121.0	..	1,371.7	1,830.0	1,770.5	5.2	..	25.12
1882	895.78	52.2	93.2	3.3	1,487.3	1,893.6	1,893.6	2.2	..	19.98
1883	746.31	162.3	63.8	..	1,125.3	1,716.5	1,716.5	4.0	..	19.94
1884	632.78	97.7	41.9	..	741.4	1,327.7	1,327.7	1.6	..	17.06
1885	575.39	50.4	36.5	..	668.4	1,192.7	1,192.7	..	..	17.10
1886	555.59	27.0	41.1	..	1,016.9	1,363.1	1,363.1	..	..	12.60
1887	516.92	60.3	68.8	40.2	1,409.7	1,857.9	1,848.5	7.3	10.9	74.97
1888	527.10	159.4	85.4	3.8	1,552.9	2,111.6	2,111.6	3.8	..	20.87
1889	520.75	272.7	109.5	28.8	723.9	1,478.6	1,478.6	..	5.8	21.12
1890	530.33	173.4	98.1	28.3	354.5	1,272.8	1,270.9	1.9	9.4	28.28
1891	513.52	386.4	121.4	123.3	360.6	1,155.4	1,155.4	31.3	13.9	64.39
1892	645.66	193.6	178.1	65.1	218.4	1,054.7	986.6	35.6	6.3	99.16
1893	627.01	25.5	57.4	35.1	129.2	401.9	401.9	4.8	5.9	19.14
1894	794.63	127.1	28.9	10.1	208.9	625.5	624.2	3.8	..	18.88
1895	762.40	141.7	89.2	17.1	322.7	843.4	840.8	5.2	1.2	24.92
1896	849.39	151.9	127.2	7.1	175.4	811.2	809.9	8.2	..	47.09
1897	1,015.46	..	289.5	31.5	601.7	2,922.8	2,644.4	3.9	..	46.3
1898	502.22	213.69	278.82	91.59	1,050.15	2,814.64	2,810.57	47.79	..	191.31

* Delayed influence of famine.

† Rumpu rebellion prisoners.

‡ Beri-beri outbreak. Annual Sanitary Report for 1887, paragraph 8.—Twenty-one cases of beri-beri occurred during the second half of the year, of which 13 died; the first case occurred in March, the last in October. In addition to indubitable cases of beri-beri, "general dropsy" was also found accompanied by anchylostoma (Assistant Surgeon Hadden, October return) cases of beri-beri amongst Burmese convicts in July, transferred to Vellore in August. Dysentery and diarrhoea show increase in September 1887.

§ Only two cases of beri-beri, not transferred; but suspicious cases occurred showing it was not got rid of.

|| Ragi substituted for cholam in May. Dysentery and diarrhoea, increase in June and July, 34 cases. Beri-beri appeared at intervals in year especially towards close, but only two transfers. Increase of diarrhoea attracts attention.

¶ Beri-beri began to wax towards end of year, six transfers.

** Increase of beri-beri without prompt transfer. Medical officer remarks that diarrhoea often preceded beri-beri and sometimes followed it.

†† Increase of dysentery and diarrhoea side by side with inefficient removal of beri-beri.

‡‡ All beri-beri cases promptly transferred until the end of first quarter 1896. During nine months of 1896 new Medical officer declared no beri-beri existed.

Note.—The figures for 1897 and 1898 in square brackets were not quoted in the original report, as it solely related to events up to April 1896. They are inserted now with the object of showing results up to date.

"Opinions and recommendations founded thereon.—Taking the whole of the facts above brought together into consideration, it is evident that if the unfavourable years of famine and Rumpu rebellion be excluded, the population of this jail, on the whole, enjoyed fair health up to the year 1887. In that year, the Inspector-General in his annual administration report states that the Rajahmundry jail, 'from being a healthy jail, is now one of the most unhealthy.' Further on, he describes this change as having taken place 'within the last few years'; but a consultation of the statistics of the preceding years does not bear out this assertion. On the opposite, the change was sudden and marked, and, moreover, if the succeeding years' statistical results be regarded, it will be found that although the health state has fluctuated within wide limits so as to hold out hopes of permanent mitigation, years of high mortality have repeatedly occurred to an extent unknown before 1887, and that even the most favourable results have not equalled those preceding 1887. In that year, there was neither

extremities was not bilateral, thus pointing decidedly to deranged nervous control and not to a blood condition; slight œdema over the tibia was also evident in men not obviously anæmic. In one case the patellar reflex on both sides and in another on one side was found impaired; in others, certain of the reflexes was exaggerated. Every effort was made to prevent the prisoners understanding the subjective symptoms of beri-beri; yet, the feeling of precordial tightness, of burnings in the hands and feet, twitchings of the muscles, and palpitation of the heart were complained of in various instances. In this connection, it must be remembered that 28 cases which were regarded as most resembling beri-beri had, previous to my inspection, been transferred to Vellore by the Superintendent."

20. Each one of the 59 cases above referred to was examined in the presence of Captain Fearnside and the Inspector-General of Prisons. Captain Fearnside was by no means disposed to be a silent spectator, and when objection was possible, objected. His views were purposely always yielded to, and not a single case was noted as anæmic* or free from anæmia, or as exhibiting disturbed "reflexes," unless he acquiesced! But, in any case, it is evident that the "malarial neuritis" claimed to exist by Captain Fearnside does not coincide with the standard descriptions of that disease, for he has specifically attempted to show that in the very numerous cases attacked, the neurotic symptoms were caused by œdema producing pressure (paragraph 10 of the pamphlet), whereas, in the malarial variety of neuritis, œdema† is obviously rare; whilst I have shown (in the quotation above given) it certainly did not require anæmia to produce the œdema. Moreover, in such a statement, he ignores the simple fact that the burning, tingling, and numbness complained of by the patients did not only exist in the legs where œdema was present, but also in palms of the hands and arms where no œdema was apparent. This is what Doctor Patrick Manson says on the subject of "malarial neuritis"; it is obvious that he regards the disease as sufficiently rare not to consider it necessary to discuss it in the role of an epidemic:—

"*Erroneous diagnoses.*—The novice in tropical medicine will be greatly puzzled for a time over these cases. I have seen them diagnosed as many kinds of diseases, and, until I had little experience, have so diagnosed them myself. I have seen them called cardiac disease, locomotor ataxia, muscular rheumatism, progressive muscular atrophy, ascending spinal paralysis, and have over and over again seen them relegated to that refuge for ignorance—malaria, and called 'malarial rheumatism', or 'malarial paralysis', or more pedantically, 'malarial paraplegia', or 'malarial neuritis'."†

21. With reference to Captain Fearnside's statement as to "absence of paralytic symptoms, just as in the case of the Rajahmundry jail," I enclose the photographs of Nos. 3270-R-559-V and 3271-R-600-V who were transferred from Rajahmundry to Vellore. They are now suffering from paraplegia. The usual degeneration of the anterior muscles of the legs following "dry beri-beri" is readily discernible, though the photographs are not very clear. Both these convicts had been over three years in the Rajahmundry jail. In the case of the first-named, there was an admission for malarial fever of only four days' duration in February 1898, and for anchylostoma of twelve days, in October 1897; and in the case of the latter, but one admission from chronic bronchitis for sixteen days during the whole of the period (October 1897). They were transferred to the Vellore jail on the 1st April 1898.

22. Owing, that officer states, to press of work, no "transfer notes" were sent by Captain Fearnside with these cases; hence, it is not possible to secure reasons for transfer, but, presumably, as in all other cases, the transfer was made on account of beri-beri symptoms with reference to withdrawal from the endemic area. After admission to Vellore jail, No. 3270-559 had a single admission to hospital, 7th June 1898, when his temperature never rose above 100·6 and this only for a single day. He complained of pain in the splenic region, owing, he stated, to violence of a fellow convict. He was discharged on the 15th January. He had no further rise of temperature at the time or since. He is not anæmic. There is, therefore, no reason whatsoever to believe that this man suffered from malaria, judging by his history. In the other case, however, as already stated, there was one admission for fever of four

days during his residence in Rajahmundry. By the 27th June (twenty days later than the other case) he entered hospital with ague, and was discharged on the 7th July. He had a second admission for ague in March 16th, 1898. No enlargement of the spleen is noted in the case books, although in case No. 3270-559 the medical officer says, demi-officially, that the spleen was "enlarged". There is, however, no enlargement at the present time. By the 12th January 1899, they were in the condition given in the following notes. They state that failure of sensation and loss of power of their lower extremities was noticed by them about one month previous to that date; so that paralysis set in from eight to nine months after removal from Rajahmundry—by no means too long a period to trace a connection.

23. In one of these cases, therefore, there is no history of malaria exhibiting itself (at least in an active form), whilst, in the other, the symptoms have been of the very slightest character. Nevertheless, both exhibit the symptoms of paraplegia with atrophy of the anterior tibial muscles, such as usually follows dry beri-beri. Their modes of progressing are well seen in the photographs—one by pushing himself along the ground by the aid of his arms, and the other by the aid of a mechanical contrivance. The following is from my notes on the state of No. 600 in February of this year: "Patellar reflex exaggerated on both sides. Clonus very marked and easily excited. No sensation below the knee, normal above." In the case of No. 559, I have recorded that, "the patellar reflex exaggerated on both sides; ankle clonus is marked on the left side. The skin of the lower extremities is hyperæsthetic." The following are notes from the medical officer's case book, Vellore, describing the condition on the 12th January 1899: "There is partial anesthesia on the anterior surface of both thighs and well marked on both the legs below the knees, also on dorsum of both feet. Muscular sense impaired. Knee jerks exaggerated, gait slow and unsteady. Lower limbs tremulous and are thrown about in a most irregular way, and he appears to have no power to control their movements, feels no pain in the limbs and can be pinched with impunity. No œdema present anywhere." No. 3270-559: "There is partial anesthesia on the anterior surface of both thighs, well marked on both the legs below the knee, also on dorsum of both feet. Muscular sense impaired, knee jerks exaggerated, gait slow and unsteady, lower limbs tremulous, and are thrown about in a most irregular way and he appears to have no control over their movements, feels no pain in the limbs and can be pinched with impunity. No œdema present anywhere." These cases are brothers—one with and one without a history of malaria. It would be legitimate to suppose that the beriberi toxin had found in this family a nervous system susceptible to an amount that in other cases had produced more trivial symptoms, or had affected other points of the body more readily. Dr. Costello (a Civil Medical officer for plague duty in charge of the jail) was particularly asked by me to examine as to signs of syphilis. He reports that there is no reason to think they have suffered from this disease. They certainly cannot have been in receipt of alcohol in poisonous amounts during their three years' stay in Rajahmundry jail.

24. (Vellore) No. 627, also a transfer from Rajahmundry, was admitted with what was held to be (by the Senior Medical Subordinate) rheumatic fever with "somewhat swollen knee joints." This convict has been released, but, according to the Superintendent who remembered the man, he was for a long period before his release incapable of walking without a stick and dragged the toes so as to excoriate them.

25. I do not contend that judged individually the preceding cases are not open to criticism, but I certainly consider they at least refute the broad generalization there was "no paralysis." Transferred as the prisoners were, as soon as presumably beri-beri symptoms appeared, to a non-endemic locality, where all medical and hygienic attention was bestowed on their condition, it seems to me extremely unlikely that the sequelæ of either paralysis or "enormously dilated" hearts should have been often found. But that a less grade of affection of both the nervous system and heart should naturally have been looked for, including disturbance of sensation and reflexes, palpitation and dyspnoea. Indeed, if the teaching of Manson, of Bentley—and, with all due deference to Captain Fearnside—Malcomson—and of Pekelharing be held in mind as to the great variability of influence upon individuals of the poison of beri-beri, there will be found in the following further notes no absence of symptoms of disturbance of the nervous and muscular systems and of the heart. It will be seen that beri-beri symptoms were present with or without the appearance of albuminuria, which Captain Fearnside has declared to be so prominent a symptom; numbness existed without œdema as well as with it, and œdema with and without anæmia, and

* Appendix A, paragraph 3, will show that, in 1896, 1·8 per cent. only were regarded as anæmic.
† In James' case, *British Medical Journal*, May 8, 1897, there is no mention of a fever with the neuritis. (Practitioner, 1897, p. 477) a form of multiple peripheral neuritis which he calls "malarial". The disease is endemic and very common in Java. It differs from beri-beri, inasmuch as it is not attended with œdema, is frequently complicated with inflammation of the cranial nerves, and is rarely fatal.

cholera, small-pox, nor influenza; yet the mortality reached the high figure of 74.9, whilst in 1891, 1892 and 1896 (excluding also epidemic diseases) the mortality was 64.39, 68.15 and 47.09 per mille, respectively. In other words, in the twelve years previous to 1887, whilst excessive mortality occurred but twice, and this was fully accounted for by the condition of Rumpa prisoners and the legacy of the famine, subsequent to that year excessive mortality has occurred four times in ten years, and this notwithstanding the advance of medical and sanitary science made in the interval. Put in another way, if the two years fully accounted for by the famine and the Rumpa rebellion be excluded, the average mortality from 1875 to 1886 on an average strength of 815.93 was 20.28 per mille excluding common epidemic diseases, and from and including 1887 to 1896 it was 38.79 per mille, on an average strength of 634.77."

* * * * *

"Having regard then to the peculiar behaviour of beri-beri, it is not difficult to conceive that granted the disease existed in the Rajahmundry jail prior to 1887* on the admission of 22 cases of this disease from Burma, the concentration of the poison became considerable and that, as the medical history has shown, since † the population has been subjected to beri-beri intoxication; there has been exhibited a depression of the general health of the population that has caused it more readily to respond to unfavourable sanitary conditions when superimposed. For example, there is reason to believe that beri-beri intoxication would predispose to bowel affections, which has formed one of the marked causes of admissions since 1887. Thus Manson states: 'I have met with cases in which the development of the symptoms of beri-beri was preceded by an attack of diarrhoea; and this so frequently that it has occurred to me that the relationship may not be altogether one of coincidence merely'; and the medical officer of the jail in 1888 made precisely the same observation, as will be found recorded in the Inspector-General's administration report for that year."

15. From the above statement, it will be understood that, in the most distinct terms, the Conjoint Report does not ascribe the mortality and sickness in the jail to beri-beri, but warns that in a population in which beri-beri intoxication exists, *any sanitary error* is liable to be rapidly and severely responded to. It held that the actual evil condition of the jail and its population was sufficiently accounted for by errors of commission and omission, and concluded with the statement that were these factors remedied it would be possible to restore the health of the jail (paragraph 27 (a) *et seq* Conjoint Report, appendix). As it happens, its advice unwittingly ran on exactly the same lines as that so successfully adopted in the Rajahmundry District jail in 1871 (*vide* paragraph 5 *supra*). History has repeated itself.

16. *Reference paragraph 6.*—Having now explained the position taken in the Conjoint Report as to beri-beri in the population, it will be possible to consider whether this disease really existed. As the opinions of the Surgeon-General and myself have been put aside by Captain Fearnside, endeavours will be made to confine proof of its presence to testimony offered by himself or others.

In the first place, he attacks the question of œdema over the tibia. This he declares, in definite language, is "certainly a perfectly normal condition". I have not seen Captain Leslie's report to which he refers; but if he spoke, as I understand he did, of œdema existing in apparently healthy individuals within jails affected with beri-beri, such an opinion merely bears out that of Pekelharing, who maintains that pre-tibial œdema and the presence of microcci in the blood (which he considers are evidences of beri-beri intoxication) are to be found in the apparently healthy within the endemic area. This view the Conjoint Report takes strongly, in reference to holding that beri-beri intoxication existed, and so rendered the jail population particularly susceptible to sanitary faults, or any cause producing a weakening influence—under which certainly malaria, in so far as preventible, would be classed. Personally, I venture to affirm that his statement that (outside an area affected with beri-beri) pre-tibial œdema is a "perfectly normal condition" is absolutely untenable. It can only be a result of the accident that the population of the Rajahmundry jail happens to be derived from an area affected with beri-beri that such a state of affairs as depicted

by Captain Fearnside, in his table No. IV, can be advanced. *En passant*, I would observe again that the method of handling statistics pursued by that officer is unsuitable. Table No. IV conveys no information of any value. It is not stated what proportion the figures represent of total examined to total population.

17. In 1899, I was deputed to find a healthy spot for a new head-quarters within the most malarious taluk of this Presidency—Cumlam. I adopted Taylor's practical method of spleen examination of the inhabitants—the *plasmodium malariae* being then not fashionable in India. I examined in this way many hundreds of persons—a very large percentage of whom had enlarged spleens. During the period I served in the Kurnool district, I must have seen cases of malaria by the thousand, but not till anaemia and feeble circulation set in did I find either normally, or as a result of malarial cachexia, pre-tibial œdema; and, as I had long been acquainted with beri-beri, I certainly do not think this peculiarity would have been unnoticed by me. In 1894, I examined about 183 inhabitants of Cuddapah town, 52 per cent. of whom were suffering from splenic enlargement, and again I noticed no such peculiarity. But, "it is never too late to learn," and, in the face of Captain Fearnside's very dogmatic statement, I lately proceeded to Cuddapah as a typical malarious locality, and noted the state of 79 cases. In these 34.2 per cent. had enlargement of the spleen to an extent varying from filling the abdomen one quarter to over one half. Their legs were carefully examined; yet, far from finding pre-tibial œdema, I was struck with their absolutely dry stick-like aspect.

If Captain Fearnside's assertions were correct, it would be physiologically unsound to ascribe such results to "vegetarianism", even if the "continued high temperature of the tropics" had anything to do with it. Were this a normal condition, it would prove that Nature had blundered in her efforts to support healthy life in the tropics, in a way that few would credit.

18. *Reference paragraph 7.*—Here, Captain Fearnside proceeds to differentiate the diagnosis of beri-beri from malarial cachexia. It will be noted that he holds in the comparative statement—Table V—(and I think quite correctly) that when œdema supervenes in malaria, it is due to anaemia—a fact, however, he carefully ignores throughout the remainder of his pamphlet. Hence, this is an important admission. But, when he talks of "malarial neuritis, of anæsthesia, paræsthesia, and atrophy of the muscles"—coupling the last condition purposely, or accidentally, with conditions of the nervous system—he, in my opinion, exaggerates facts. There is no reason to regard the stick-like legs of the malarial subject as due to anything but general mal-nutrition, owing to inimical influence on the blood corpuscles.

19. His usual method of dealing with "numbness" in his case book and transfer notes is either to ascribe it to "malarial" or "alcoholic" neuritis. Now, notwithstanding the very large proportion of persons that drink more alcohol than is physiologically capable of ready disposal—and some of the hill tribes are great hands at hard drinking—it is certain that all the world over "alcoholic neuritis" is not a common affection; otherwise our hospitals would be fairly loaded with such cases. As to this form also, it is well recognized that removal from the poison is early followed by cure. It cannot be conceived that Captain Fearnside allowed his prisoners continued access to alcohol. Similarly as to "malarial neuritis," without disputing its existence—although the malady has been contended for by less than half a dozen members of the profession—such a thing as an epidemic of "malarial neuritis" has never been known. Did such a thing occur, I need not say that in this country where so enormous a proportion of death follows malarial fevers, peripheral neuritis, and all its frightful consequences, would be an every-day occurrence—our streets would be filled with cripples. But not only is this disease decidedly rare and unlikely to prevail extensively throughout a population, but those who uphold its existence declare œdema *rarely* (Higbet and Manson) or *never* (Strachan) accompanies it. Whereas one of the most marked symptoms of the epidemic in the Rajahmundry jail was the existence of extensive œdema. That this was not attended markedly with anaemia may be judged from the following statement in my letter No. 850-S., dated 18th April 1898 (*vide* appendix):—

"An examination of 59 cases failed to establish a connection between anaemia and the œdema. Indeed, at least two cases that were selected as typical for discussion presented no anaemia whatever; they were physically well developed men, and did not suffer from any [organic] disease of the heart. In one of these œdema of the

that enlargement of spleen (the characteristic of malarial cachexia) has no existence as a factor, and that beri-beri symptoms occurred with or without a history of malarial infection. I ask it to be remembered that all interpellations by me are duly shown in square brackets. I am necessarily obliged to deal solely with notes from the "Medical Officers' Case Books" and "transfer notes" by Captain Fearnside himself. When therefore, an exaggerated knee jerk is stated to be "due to weakness," or its absence to "alcoholic neuritis," it will be remembered these opinions are Captain Fearnside's. The italics in these notes are mine:—

26. The following are notes of reflexes and oedematous feet, apparently by Assistant-Surgeon Barteley, as they bear his initials:—

Examined in Jail Camp, 22nd February 1898.

No. 8092, Lillygradu—patella reflex	..	..	present.
" 7963, Masuthiggradu Patella reflex	..	..	absent.
" 8181, Chendriah	"	"	present.
" 7582, Gongolia	"	"	present in left leg only.
" 8589, Kathygaon	"	"	absent.
" 8566, Mahalethigadu	"	"	slight in left, absent in right.
" 8313, Marahmah	"	"	present.
" 8515, B. Chinnia.	"	"	absent.
" 8084, Paryagadu	"	"	present.
" 8255, Maliah	"	"	absent.

(Initd. J.S.B.)

Examined on 8th February 1898.

No. 7977, Venkataramayyagadu	..	..	reflex present.
" 8222, Ramaswamy	..	..	[no remarks.]
" 8325, Gungiah	..	..	reflex present.
" 8495, Limachellavaram	..	..	" absent.
" 7944, Venkataramal	..	..	[no remarks.]

27. I am in receipt of two editions (Nos. A and B) of this man's case from Captain Fearnside; it will be seen that they differ materially, although dated within a month of each other:—

"The case of No. 7828, Venkatachellam, aged 33.—*History.* Admitted for albuminuria on 4th January 1898. Has swelling of the face, abdomen and feet. Intermittent fever at nights. Numbness in arms and legs. *Albumen in urine. Knee jerks diminished.*"

B.

"Examined on 8th February 1898. He belongs to Bhadrachallam where he has had malarial fever. He is anemic, face slightly puffy, feet oedematous. *Urine free from albumen. Patella reflex present.* He is addicted to arrack. *Spleen not enlarged* Has had pneumonia since admission to jail. Pulse 68, heart sounds normal. Has numbness in both feet." [My own notes in this case show that the patella reflex was absent on the right side between the 10th and 11th February.]

"No. 7731, Venkataratnam.—He was examined on the 4th of February 1898. Legs and feet oedematous. Face puffy and *not anemic*; has dysentery. Has suffered from malarial fever about three years ago. *No splenic or hepatic enlargement.* Urine 1015 acid, *no albumen.* Complains of twitching pains in the legs and arms. Pulse 66, slow and weak in character. Heart sounds healthy. *Patella tendon reflex absent.* Ankle clonus absent, gait normal."

"No. 4724, Malliah, aged 24.—Admitted into the hospital 24th April 1897. Is a native of the Jeypore Malliahs.

"*Present condition.*—Oedema of the lower extremities and abdomen; complains of numbness and burning sensation of soles, feet and legs. Urine healthy. *Has dyspnoea on exertion.*"

"No. 4252, Saradi Naick, aged 29.—*History.* Admitted into hospital 3rd May 1897. He is a native of Ganjam district.

"*Present condition.*—Oedema of lower extremities. Complains of numbness and burning sensations of both feet and palms of the hands. Motions contain large number of ova of anchylostoma duodenale. [In my notes of this case, I find that I state that the cremasteric and epigastric reflexes were absent, but that the patella reflex had increased.]"

"No. 1898, Hamana, aged 30.—Reported by Major Marsden, I.M.S., 4th April 1895. Was recently under treatment for ague and was again re-admitted for oedema on the 4th instant. [A side note by Captain Fearnside states that the man, when under the treatment for ague, was in hospital for 19 days. His admission on this occasion was, therefore, a fortnight subsequent to his discharge. He also draws attention to the fact that, as stated in the case, his temperature was 102.4 on admission.]

"*Present condition.*—Oedema of the whole body most marked in the lower extremities. Heart's action *weak and excited.* Pulse very weak; complains of numbness all over the body and of the burning of palms and soles; *walks stiffly and with a tendency to stagger.*"

"No. 9677, Appanah, aged 38.—[This case was transferred by Captain Fearnside under the diagnosis of beri-beri. As to his diagnosis, I understand from his pamphlet he was influenced by 'official reasons', although certainly no pressure was put on him either by the Surgeon-General or myself. Our directions were simply after having selected for his information a number of 'suspicious cases' that he should himself proceed to their careful and early elimination, if in addition to suspicious symptoms of oedema were added neurotic symptoms, *vide* paragraph 23, and 27 (d) Conjoint Report. Appendix B.]

"This man was admitted on the 20th February 1897 into the hospital. He is a native of the Vizagapatam district. *Present state*—Numbness of both the feet. *Heart's action excited and irritable; appetite impaired; urine healthy.* [Patella reflex was absent on my examination of this case. Captain Fearnside, in a report dated 31st January 1898 admitted this man had a 'truly neurotic gait', but, on his being reminded by me of this, he prefers to consider the truly neurotic gait might have been due to malarial neuritis.]

In his notes on this man Surgeon-Major Sarkies, who gave charge of the case to Captain Fearnside, remarked, "The pulse is fast, 100 per minute, and the apex of the heart is felt at the epigastrium." This officer also states, "Surgeon-Captain Fearnside, who succeeded me in 1897, who is still in charge of the jail, tells me that he believes that the case admitted by me is a typical case of beri-beri, and that he doubts if there are any other similar cases in the jail."

The following is an instance where Captain Fearnside having diagnosed the case as "heart disease," changed it to beri-beri of his own accord. "Official reasons" could hardly have influenced him in this case, as neither of these two cases find a place in the list of prisoners examined by me. *It is noteworthy that, in this case, Captain Fearnside has omitted to take the weight of the heart into account in his table* No. 9; the highest weight shown in the table (No. B) being 16 ounces, whereas this heart weighed 17 ounces, and moreover it is clearly a case of dilatation, the right ventricle and auricle being evidently affected. On the other hand the Medical officer, Vellore, apparently held to the diagnosis of mitral disease made during life:—

Medical History of No. 7171 (by Captain Fearnside).—"He was admitted into the hospital, 20th August 1897, for mitral disease of the heart, and since that time he has been in the hospital without any progress; has oedema of the lower extremities and puffiness of the face. Heart's action and pulse are weak, and at times excited. Skin dry; *urine non-albuminous*; appetite impaired; bowels regular; complains of numbness of hands and feet. *As the disease is suspected as beri-beri, he is transferred for that reason.*

The following are the Vellore *post-mortem* notes, death having occurred seven days after his transfer:—

"Body dropsical; on opening the thorax the lungs were found to be congested. Right lung weighed 1½ lb., the left 1½ oz. Liver slightly nutmeg in appearance and weighed 56 ounces. Gall bladder full. *Heart covered with a spare amount of fat and is very much dilated and as large as a bull's heart*; the cardiac tissue is not firm and the muscular papillares are very much enlarged. The mitral valves are incompetent to close well and obstruct the regurgitating blood. The right ventricle is flabby and tricuspid valves are slightly incompetent. Both the auricles are dilated and

their walls are very thin: *The weight being 17 ounces. Spleen normal* [This remark apparently refers to structure] and weighs 13 ounces. Right kidney normal, weighs 4 ounces; the left weighs 5 ounces.

The following are "transfer notes" by Captain Fearnside:—

"*Convict No. 8312, Jackarama, aged 58 years.*—Has œdema of the feet; *heart's action rapid*; complains of numbness and other neurotic pains; *urine non-albuminous.*"

"*Convict No. 5958, aged 45, Nagalu.*—Has puffiness of the face and œdema of the lower extremities; heart's sounds weak and muffled. *Haemic murmur*; *urine slightly albuminous*; complains of numbness in the limbs."

"*No. 8067, Gooro paranga, aged 22 years.*—Transferred from Vizagapatam Jail in bad health. Has puffiness of the face; *heart's action rapid*. *Ringyng sounds at apex*; *urine non-albuminous*; complains of neurotic pains in the limbs."

"*No. 7823, Venkudu, aged 35.*—Has puffiness of the face and œdema of the feet; complains of numbness and other neurotic pains in the limbs; *urine non-albuminous*. Has *palpitation*."

In reference to the question of age, it will be noticed in the preceding and following cases that Captain Fearnside's attempt to prove that old men predominated is not borne out. Further, it is not likely that in transferring cases had any of them been anemic, or had enlarged spleens, or suffered from organic diseases of the heart, that the fact would not have been noticed.

The following statement of the Acting Medical officer, Vellore, in reference to case, No. 246, is of interest in showing that malaria did not produce the neurotic symptoms in that and similar cases. He shows that malaria may be acquired in other jails, for example, Vizagapatam, but it required special conditions for the production of beri-beri symptoms:—

"In the case of No. 246 there are no facts as to enlarged spleen or of repeated attacks of malaria. He stated that he was subject to ague. No records are provided to show how long the convict remained at Rajahmundry Jail on transfer from Vizagapatam. The statement of the convict is that he remained for one and-a-half years in the Rajahmundry Jail and here developed numbness and anæmia, whereas in Vizagapatam he had been subject to malaria only."

The following is the condition noted in the Medical officer's case-book on admission to Vellore Jail on this case:—

"Patient has a cachectic appearance; says he was subject to ague. He is somewhat anemic; tongue flabby and coated in the middle with a white fur; eyelids œdematous; face puffy. Has œdema of the legs which pit on pressure; *complains of pains in the calves*; skin has a shining appearance and pits slightly on pressure all over the trunk. *Heart cardiac, dulness increased, slightly downwards first and second sounds in mitral area impure*; pulse weak and compressible, and about 94 per minute. *Urine, specific gravity 1018, otherwise normal.* There is no anæsthesia, but there is *hyperæsthesia on deep pressure in the calves*. [This patient, whose condition had it depended upon disease of the heart, or of the kidney, or profound anæmia from any cause, would have been critical in the extreme made an uninterrupted recovery within ten weeks. On no occasion was there any rise of temperature noted, nor any abnormal state of the liver or spleen.]

No. 238, Vellore. Age, 42. Amathaligadu.—"He came from Rajahmundry for beri-beri."

Rajahmundry Transfer Notes (by Captain Fearnside).—"Has several admissions into hospital without any decided improvement in his condition. *Heart's action rapid*; *snoring sounds heard in the axilla and base of left lung*. Has puffiness of face and œdema of lower limbs; complains of numbness in limbs; *urine non-albuminous.*"

(Vellore Notes.) "*Condition on admission.*—Has numbness in the lower limbs and anæsthesia throughout the whole extent of the lower limbs from thighs downwards, in both of the forearms, hands and inner surfaces of the upper arms. Heart's sounds weak; slight œdema of face and feet; somewhat puffy in appearance. There is œdema over the shins but no hyperæsthesia anywhere." [This patient was admitted on the 24th January 1898 and, by 12th March, he had "nothing to complain of." By the 25th of March, he was discharged from hospital. It will be noted in this and in all

other cases where cardiac murmurs have been discovered without express statement of their organic origin, that, under treatment at Vellore, these disappeared. This, I say, not only from record of cases, but of personal inquiry at Vellore, where but one case having a slight halting movement suggestive of presystolic murmur existed of the numerous cases having murmurs when transferred. This is an important point with reference to the cardiac signs of beri-beri.]

No. 819, Chinnaradoo. Age, 26. [No notes concerning this case were furnished by Captain Fearnside on transferring it to Vellore. When asked for details of this case, he replied that "full notes" had been given in his report. This, however, was a mistake as, on asking for the reference, I have been finally informed that no notes were taken of this case. The following notes are derived from Vellore.]

"*May 11th, 1898.* Was received from Rajahmundry last evening and was kept under observation and treatment, and admitted into hospital this day. *No medical history accompanied him.*

Condition on admission.—Partial anæsthesia on the anterior surface of right thigh; also on the lower third of the left well marked on both the legs below the knee; also on dorsum of both feet; *muscular sense impaired*. Pain over both shins complained of.

Heart sounds weak, numbering 95 per minute. *The first sound is replaced by a bruit audible particularly in the mitral region and conducted towards infra region of scapular. Gait slow. Left lower limb at each step is thrown in jerks forward; knee jerks normal.* Feet at the ankle slightly œdematous. Digestion weak. *Urine has a slight trace of albumen.* Pallor and puffiness of face. [On June 28th this man was discharged from hospital, presumably convalescent and placed on the invalid gang.] He was admitted on September 4th, for the second time, with the above symptoms. [In the endemic area in the Gôdâvari district, these relapses of beri-beri are very common. Otherwise than in severe cases the patient, although suffering from numbness, cramps, &c., in a modified form during the warm months, is not so liable to œdema. By August or September, the symptoms of old cases are aggravated, and fresh cases are most likely to appear.]

September 8th.—No appreciable improvement, œdema continues, digestion weak, disinclined for food.

September 12th.—Bowels inclined to be loose. Tried with Thymol for anchylostoma; none passed. Anæsthesia less marked; appetite improving; in other respects continues the same.

October 6th.—Face continues puffy. Increased œdema of feet extending to both thighs. Abdomen somewhat distended. *Breathing laboured.* Is very weak and restless.

October 23rd.—*Edema of face almost disappeared and that of lower extremities continues slightly.* Bowels regular, appetite fair, looks cheerful.

November 6th.—*Has taken a sudden change for the worse.* Face œdematous, bowels loose, abdomen distended, breathing laboured. Is weak with feeble pulse and anxious expression.

November 10th.—"Died in spite of treatment." [Post-mortem of this case showed no enlargement of heart, nor abnormality of valves. The spleen and kidneys were healthy; the liver weighed 1 lb. 10 oz. and was noted to be slightly congested. The duodenum and jejunum contained a large number of anchylostoma duodenale. This was therefore one of those mixed cases of anchylostomiasis and beri-beri, which are so apt to be interpreted as due entirely to the presence of parasites. The neurotic and inorganic cardiac symptoms pointed distinctly to beri-beri. The existence of anchylostomiasis must have by its weakening influence contributed to the relapse.]

No. 251, Soobryadoo, age, 57; transferred for beri-beri. (Notes by Captain Fearnside.) "Has dropsical symptoms. *Heart's action rapid, dry anæmic click at the apex. Urine non-albuminous.* Complains of tingling sensations in the palms and soles of the feet."

(Vellore notes) *Condition on admission, January 24th 1898.*—The patient is a man of ordinary height, spare in form. There is nothing else very characteristic in the appearance of the patient. Heart's sounds rather feeble and accelerated, otherwise

normal. Cardiac dulness normal. Tongue coated with a dirty white fur and somewhat flabby, stomach somewhat dilated. Bowels frequent and slightly loose. *Patient complains of pain at the limit where the 9th rib joins the costal heart.* [Epigastric pain of beri-beri.] The pain is fixed, dull, and continuous. Hepatic dulness is normal. There is no jaundice, *spleen normal.* There are no hyperæsthetic or anæsthetic patches discoverable. [It will be noted that the dropsical symptoms described by Captain Fearnside had disappeared.] *Urine contains no albumen; no sugar; specific gravity 1018.* [Thymol was administered and motions examined for anchylostoma without apparently their being found, as their presence is not stated.]

February 5th—Improving gradually. Complains of *dull aching pain from the hip downwards on the left side.*

February 28th.—Pains slight; there is marked improvement in the condition of the patient.

March 6th.—Pains almost disappeared; feels lively and stronger.

March 23rd.—Discharged and placed under invalid gang.

Vellore, No 248. *Ungarookathan*, age, 20; transferred for beri-beri. (Transfer notes by Captain Fearnside.) "Has puffiness of the face, *ringing sounds at the apex, probably due to slight dilatation.* *Urine non-albuminous.* Complains of numbness and other neurotic pains in the lower limbs."

(*Vellore notes*) *Condition on admission.*—"First sound of the mitral area is duplicated. The sounds elsewhere are weak. The apex beat is palpable an inch below and half an inch internal to the left nipple, and at this point a short thrill is also palpable. The cardiac dulness is slightly increased. Pulse rate is 85 per minute. Skin slightly œdematous. *His body is bent forward. His walk is peculiar, there being a tendency to the dragging of the toes.* There is no anæsthesia or hyperæsthesia anywhere superficial or deep. *His progression is slow.*

Disease.—Mitral stenosis (beri-beri).

January 28th—Oedema of skin less marked. The patient in other respects continues the same.

February 12th.—Oedema decreasing, there is improvement in the gait of the patient.

March 5th.—Oedema disappeared.

March 13th.—Is steadily improving in all respects.

March 25th.—Discharged. Placed in invalid gang.

[Had this case been a simple one of mitral stenosis, there would be no possibility of accounting for dragging of the toes and neurotic pains of lower limbs, even had œdema with non-albuminous urine appeared. Unusually lucky would the patient be considered who had mitral stenosis to such an extent as to have œdema of the skin and puffiness of the face, who made an uninterrupted recovery within two months, apparently for no better reason than that he was withdrawn from the endemic area of Rajahmundry to the non-endemic area of Vellore; for it is impossible to assume that he met with greater care in the one place than the other. It will be noted in this and in the preceding cases that there was no mention of pyrexia, or enlargement of spleen.]

28. In concluding these notes from the Vellore jail of transfers from beri-beri from the Rajahmundry jail, the following replies, *verbatim*, by Lieutenant-Colonel Lancaster, I.M.S., to queries by Captain Fearnside in his letter No. 37, dated 6th April 1898, are of utility:—

Captain Fearnside's Queries.

1. How many showed ataxic of gait of beri-beri on arrival, and when did it disappear?

Lieut.-Colonel Lancaster's Replies.

1. Two showed the ataxic gait. In one it continued till death and in the other it disappeared under treatment for two months. [These two, with the ataxic gaits, do not include the cases of paraplegia mentioned above—Nos. 3270—559 and 3271—600.]

Captain Fearnside's Queries.

Lieut.-Colonel Lancaster's Replies.

2. How many do you consider had œdema of the lower extremities?

2. Fifteen had œdema of the lower limbs.

3. In the extreme dropsical cases, how long did the albuminuria continue?

3. Only two had general anasarca, and in these there was a trace of albumen until death.

4. Do you consider that the "temer" some complained of might not be due to passive œdema.

4. Very few complained of "temer" [numbness] to any appreciable extent, and in these it could not have been due to the stretching of the skin or pressure on nerve endings, as there was little œdema to speak of.

5. Do you think that any stiffness in the gait might be due to the same cause and effusion in the ankle joint?

5. The stiffness in the gait cannot be attributed to the same cause for the same reason, nor to effusion in the ankle joint as there was none.

6. How many have shown the state described by the Japanese as "Shiyashin" which is a paroxysmal attack of violent dyspnoea, palpitation and vomiting.

6. Two had paroxysmal attacks of dyspnoea and palpitation unaccompanied by vomiting, and in only one case was this pretty well marked.

7. Did any of the fatal cases show this state before death?

7. No.

8. Under what headings were those sent returned in the monthly returns and were any of these diseases subsequently changed, and, if so, how many, and to what disease?

8. No change was made in diagnosis. [Lieut.-Colonel Lancaster was under the impression, owing to correspondence with Captain Fearnside, that his right to alter diagnosis of cases transferred to him was open to question.]

9. In this jail I find that *albuminuria* is common in dysentery and is common in sequelæ. Do you think any of the dropsy might be due to this cause?

9. In no case of typical dysentery was albuminuria found, but in anchylostomiasis with intense anæmia there was albumen in urine (cyclical albuminuria).

[See case No. 819, Chinnavadu, above reported.]

10. Do you think that syphilis, malaria, alcoholism, liver and kidney cirrhosis, dysentery, toxamia (ganja and opium), anchylostoma, singly or combined, explain to some extent the neuritis and dropsy and anæmic symptoms.

10. Yes, I consider that malaria, liver and kidney cirrhosis, dysentery and privation, anchylostomia, both singly or combined, explain to some extent the neuritis, dropsy and anæmic symptoms! [To these extensive articles of faith the fact of Lieut.-Colonel Lancaster politely subscribing in the faltering terms "to some extent," by no means implies that he did not consider that in the transfers from Rajahmundry he had not beri-beri cases to deal with. Doubtless, all were not beri-beri cases; but in reply to a question from the Surgeon-General, he has definitely stated that he had no doubt the "majority of the cases" received from Rajahmundry were genuine beri-beri.]

29. *Paragraph 9.*—There is no evidence to show that beri-beri will not attack persons of any age though, as prolonged residence under good hygienic circumstances secures immunity, the subject of age is liable to be confused with that result. The cases quoted in my paragraph 27 show that it was by no means solely the old that were subjected to attack. In short, there is no evidence to prove that even if the individual

attacked is "usually in good health" that good health is not a protection against beri-beri. All evidence points to the opposite. A well-fed and healthy population can live in an endemic area without more evidence of beri-beri than slight oedema of the legs (Pekekharang). But let such a population be subjected to evil condition depressing the general health and an outbreak at once occurs—a little fact which, in my humble opinion, runs throughout the history of the Rajahmundry jail and is especially applicable, as I hope to show to the final disasters of 1896—98. His statement that "a convict suffering from phthisis during his life which is confirmed by post-mortem cannot possibly [italics not in the original] have died of beri-beri," is a statement in marked contrast with the following opinion by Manson: "I have lately seen two well-marked examples of peripheral neuritis associated with ordinary phthisis in East Indians, who had acquired their diseases on board a class of ships in which beri-beri is not an unfrequent occurrence. Paresis, muscular hyperaesthesia, and Atrophy, and at one time, pretibial oedema, were all, and in both cases, well marked; so that it is fairly safe to conclude that the neuro-muscular element in the cases was of beri-beri origin. Query: Does phthisis render the subject of it specially sensitive to the beri-beri poison?"

30. As to diarrhoea being present "in one-third of the cases," it is worth remembering that for diarrhoea to precede or follow beri-beri is frequent (paragraph 14 *supra*). I have already shown bowel affections are just as great a speciality of Rajahmundry jail as malarial fevers (paragraph 12 *supra*).

31. Paragraph 10.—Captain Fearnside states: "The usual symptoms of beri-beri described in this jail have been as follows:—Anæmia, puffiness of the face and oedema of the feet, difficulty of breathing and oppression of the chest, numbness and burning sensations of the extremities (neuritis) of the extremities". Relying upon this description, he discusses individual symptoms. Now, it is to be noted that, although this statement is placed within inverted commas, he has forgotten to mention whence the quotation is obtained. Certainly, the ordinary reader would imagine that it was from the conjoint report, which is under criticism by Captain Fearnside. Indeed, as showing this would be the impression conveyed, I may state that the Editor of the *Indian Medical Gazette*, in reviewing Captain Fearnside's *ex parte* statement furnished in his pamphlet, assures his readers that the "Sanitary Commissioner, Madras, evidently based his opinion upon the occurrence of anæmia and dropsy."

32. Paragraph 19 *supra* shows that this view is incorrect.* I consider one of the most striking symptoms of beri-beri, in uncomplicated cases, is the peculiarly bright red aspect of the conjunctiva. This symptom is not described in text-books, but is one that I have always supported and taught. I find that I am not the only medical officer upon whose observation this peculiarity has been forced. My present Deputy, Captain Vickers, I.M.S., who long served in Kistna (within the endemic area of beri-beri), arrived independently at the same conclusion.

33. Here it is necessary for me to call attention to another phase of the matter. To read Captain Fearnside's pamphlet results in the impression that he dealt with a jail full of blanched and dropsical malarial cachectics. Instead of taking the trouble to show how many men of these had enlarged spleens—which necessarily by the way, the Surgeon-General and myself, according to Captain Fearnside, failed to detect—he has filled his pamphlet of protest in the interests of "truth" with matter concerning the *plasmodium malarie* that can be obtained in any modern text-book. It required no thesis on the *plasmodium malarie* to prove simple yet important clinical facts. The incidence of oedema was largely acute as shown by his own table No. XI—not the result of the gradual influence of anæmia and of malarial cachexia. Further, my report, (letter No. 880-S, Appendix C), shows that, from enquiries made in the presence of Captain Fearnside, I placed it on record that oedema might, or might not, be preceded by fever.

34. In his table No. XI, the appearance of albumen is made much of; but, it is an extraordinary fact that, in the whole of the number of cases, he notes—so far as his own statement goes—but two in which "numbness" was complained of. Now, it would seem but reasonable that he should have selected none but cases which exhibited the

*The following also occurs in the Conjoint Report (Appendix B), paragraph 17:— "This tendency was further augmented by its being a common professional error, amongst those who have not dealt with this disease clinically, that a leading symptom of beri-beri is anæmia."

so-called beri-beri symptoms. It is a truism that in malarial fever fleeting albuminuria can be obtained,* and I have no doubt whatsoever that very many of the cases *did* suffer from malarial fever. Indeed, this is the argument adopted by me in paragraph 9 of the Report just referred to (at a time he it remembered when Captain Fearnside was inclined to look for "relapsing fever" as the solution). I distinctly pointed out that the convicts were suffering from a mild and ephemeral form of malarial fever, but I held that this was superadded to the condition of "beri-beri intoxication." It was this incidence of malarial fever into the problem to an increased extent that proved the last straw to the condition of the convicts. How this malarial fever was acquired will be discussed, in my final paragraph. In this connection it must be remembered that, as pointed out in paragraph 11 of my Report just referred to, fever is by no means an uncommon introduction of beri-beri; but fever is by no means an *essential* introduction, nor does it take a severe form. But, taking the cases as reported, I find, on appealing to the original register, furnished by Captain Fearnside at my request, that of the total examined (182 cases) of which results have been registered therein, 40.1 per cent. showed no albumen at all. In only 9.3 per cent. it is noted that the urine "was loaded with albumen." In 34.6 per cent. the highly indefinite statement as to albumen being "present" is used, whilst of the total in which albumen was found in *any* degree, in no less than 26.6 per cent. it was held to be simply a "trace." Now, I would invite perusal of my statement in paragraph 8 of the report just mentioned, necessarily written long before I was aware I was to be favoured with a special pamphlet of protest by Captain Fearnside. In this, I stated as follows: "Again, a very large number of examinations of urine negative the connection between the presence of oedema and kidney mischief; indeed, the persistent search for albumen with negative results seems in some measure to account for the absence of sufficient time on the part of medical subordinates for effecting detailed measures in respect to the sick."

35. I have asked for the book containing the rough notes shown me on the day of inspection by the Hospital Assistant, but am told it cannot be found. My impression most certainly was, judging by that record, that the number in whom albumen was found to the number examined was trivial, and that the Hospital Assistant would have been very much more profitably engaged in other duties urgently required. The examination of a few samples should have sufficed for the formation of a correct medical opinion.

Generally, on the subject, I should think that if, as indubitably is frequently the case, beri-beri is introduced by fever, or existing beri-beri intoxication is aggravated by the occurrence of malarial fever, it would be unlikely that the vaso-motor control of the kidneys would not temporarily suffer as well as that of the skin, and that consequently fleeting albuminuria would ensue. But, as the cases quoted by me (paragraph 27) from Captain Fearnside's own case books show, it is by no means *essential* that in cases presenting beri-beri symptoms, either fever, anæmia, or albumen should be present.

36. Reference to Captain Fearnside's table III will show that from 1887 to 1896 in a total of 6,960 admissions to hospital only 0.4 per mille of enlarged spleens were noted, and that these were far from proportionately distributed—no less than 14 of the total of 28 for the decade being found in the year 1896. As to post-mortem examination, according to Captain Fearnside's "organs are described [by his predecessors] as 'enlarged' when they were below normal weight". Hence, even according to Captain Fearnside, such loose statements as "enlarged" must be accepted with care. But taking statements as found, it will be seen that in the analyses of 34 post-mortem examination of cases "said to have died" of beri-beri, eight spleens are noted as "normal," whilst as to six no note is made, showing that the chances therefore are that nothing abnormal was detected; again, as to ten is placed the simple remark "enlarged"; whilst against only three was the extent of the enlargement noted as something extraordinary. It was evidently thought *remarkable* for a man to have a spleen three times larger than normal—and this is noted but twice

* Captain Giffard reports as to the existing epidemic in the regiment at Vizianagram that "phosphaturia" is common. I would add that the greater proportion of examinations for albumen was conducted by Hospital Assistants, and not personally by Captain Fearnside. The registers show, on different pages, seven *don't* be entries—made of course by mistake—on the same dates, in the same cases, giving such statements as "no albumen"—"albumen present", "loaded with albumen"—"a trace of albumen." In fourteen cases, the entry "no albumen" or "nil" has been erased, in favour of "present" or "a trace."

in the whole series of years. Yet, in chronic malarial poisoning, such a record as "three times enlarged" would be looked upon as trivial! Simple enlargement of the spleen and liver is quite compatible with the pathology of beri-beri. Manson states, "I have seen well-marked splenic and hepatic enlargement in beri-beri as part of the disease; and apparently in no way symptomatic of malarial infection". After warning to search the blood in such cases for evidence of malaria, he adds, "even then one could not but be sure there had not been a combination of beri-beri and malaria". The least that can be said of Captain Fearnside's evidence is that it is impossible to regard malaria as possessing the important position in the jail that he would ascribe to it—otherwise than at abnormal periods in its history. There seems no reason to believe that had Captain Fearnside's prisoners been afflicted with the plasmodium malariae in its malignant form, to the extent his generalizations permit it to be believed, its behaviour would have been so different in Rajahmundry to any other part of the globe. A disease attended with anaemia, dropsical symptoms, enlarged spleen, and "malignant" plasmodia, with suspicion of infection conveyable by the mosquito (Captain Fearnside's Conclusion No. X) would represent "kala-azar." Yet no one who has read Ross' description of the anemic sufferers from kala-azar with their pot bellies, containing huge spleens and livers, would for a moment suspect this disease existed in the Rajahmundry jail.

37. *Paragraph 14.*—The question of the causes of "sudden deaths" must necessarily be left undiscussed by me. The impression conveyed by a perusal of the records left both the Surgeon-General and myself with the opinion that "sudden death" formed no inconsiderable feature in the jail history. As to the statement of the absence of beri-beri heart, I do not see that table IX (I or II) can help the contention. It is very easy to attempt to slur over facts by the simple suggestion that "eight were old men and the remainder are explained;" but the explanation offered leaves the widest room for conjectures—and nothing more. The mere use of the terms hypertrophy and dilatation are of little real use unless the state of the whole heart, valves, &c., as to its respective sides is actually stated. But as to the "old men" only two were above 55 years of age, whilst nine were below 24 and 25 years of age. As to Pekelharig's weight of a beri-beri heart (13 oz.) I am not aware this is his average, but it must be remembered that his observations were not upon natives of India but European soldiers. Bentley, in the case of the large-framed Chinese, gives the amount at 10 oz., his range being from 8 to 13 oz. Surgeon-General Sibthorpe gives 7.8 oz. as the normal weight of the heart of the native, but the General Hospital experience gives it as 7 oz. Taking the normal weight therefore as $7\frac{1}{2}$ oz., it will be seen that increase above this average extends to not 17 but to 32 cases.

38. Now, it is upon the heart question that Captain Fearnside has laid particular stress. With him no dilatation or hypertrophy means no beri-beri—the pathognomonic sign is *absolute*. It is therefore necessary to direct attention to his incorrect assumption that Dr. Manson holds that the heart is "*always* [italics not in the original] enormously dilated and hypertrophied." It is solely by reason of Captain Fearnside's making such assumptions as to the *inflexibility* of the clinical and pathological symptoms of beri-beri that he is able to fortify the matter he has evolved. He particularly invites the attention of the laymen to this premiss [his paragraph 7 (1)], and I have no doubt the laymen who have perused Captain Fearnside's document have thereupon become fully convinced of his arguments.

39. Now if there can be one thing more certain than another in respect to beri-beri, it is the fact that the symptoms in various epidemics, localities, and individuals vary within considerable bounds in nature and severity. Thus, I shall not forget in a hurry the perfectly polite look of incredulity that came over the face of the late Inspector-General of Prisons, when I had to explain to him during our inspection, when typical cases were shown to Captain Fearnside, that the patella reflex might in certain cases be absent, in others diminished, and in others exaggerated, in accordance with the stage of development—and yet the disease dealt with would be beri-beri. Dr. Manson labours most consistently throughout his late book "Tropical Diseases," in his article in Davidson's "Hygiene of Warm Climates", and in Allbutt's System of Medicine, Vol. II, to show that there is no "always" about any result of beri-beri intoxication.

40. The following are the various expressions used by Manson that can, *without reading the context of his articles*, bear the dogmatic meaning Captain Fearnside would

give them. On page 453, Allbutt's System of Medicine, Volume II, Manson discusses the "special lesions" of beri-beri, and in continuation of the statement of pathology on page 454 states, "the cavities of the heart are always dilated, particularly those of the right side: besides being dilated the heart is also hypertrophied to some extent—especially the left side." In Davidson's "Hygiene of Warm Climates" he states, "the cavities of the heart are always dilated," those on the right side most so, often enormously. Both sides are also hypertrophied, especially the left. *But*, in his "Tropical Diseases," which contains his latest expressions of opinion on the subject, Manson puts the matter by no means dogmatically. After describing very marked cases of beri-beri, he states, "when we come to make a post-mortem examination we *may* [italics not in the original] find a heart slightly hypertrophied and enormously dilated." Now, that there shall be no doubt of the meaning of Manson as to the place filled by this heart lesion, the following quotations from the same works must also be taken into consideration: "Sometimes we may see a case which is completely paralysed so far as legs and arms are concerned, and perhaps wasted to a skeleton; *and yet this same patient may never have had a serious symptom referable to his heart or in any way threatening his life.*"

Here is another quotation from the same book (page 230) in which Manson warns again as to the varied results of the poison:—

"*Its uncertain course.*—He [the Medical officer] will learn that this disease, which is beri-beri, commences slowly or suddenly; that it may be preceded by a period of intermitting languor, aching legs, slowly advancing oedema of legs or face; or that the patient may wake up some morning and find that during the night he has become dropsical or parietic. Thus, the disease may develop slowly or rapidly. Equally uncertain is its progress and danger; within a day or a week, or at any time during its course, it may assume fulminating, malignant characters. It *may* completely subside in a few days, or it *may* drag on for months. It *may* get well apparently and then relapse. It *may* and generally does, clear up completely; or it *may* leave a dilated heart, or atrophied limb muscles with corresponding deformity. *The variety in the severity, progress and duration of beri-beri is infinite*; but in all cases the *essential* symptoms are the same—greater or less oedema, especially over the skins; muscular feebleness and hyperaesthesia, especially of the legs; *liability* to palpitation from cardiac dilation, and to sudden death from the same cause." [Italics not in original.]

41. The simple truth is that there is no golden rule as to beri-beri such as Captain Fearnside would lead the lay reader to imagine; the degree to which particular organs suffer depends upon conditions which vary infinitely. The "force"—as Manson puts it—of the disease may expend itself upon the particular set of nerves "picked out." As Manson states (page 494, Hygiene, &c.): "In all cases death is, so to speak, rather a matter of accident than necessity; it depends partly, of course, on the intensity of the poisoning, but more on the particular set of nerves picked out by the poison." And, again, he states:—"Mortality.—The mortality is very difficult to estimate. If we include the *minor forms of beri-beri*—*intoxication*—what we might designate beri-beria ambulant—such as *slight degrees of leg paresis, pretibial anaesthesia and oedema*, in our estimate, then the mortality is proportionately smaller than if *we estimate it only on such cases as lay up or exhibit serious signs of heart and other thoracic complications.*"

In speaking of the very varied results on the system and the heart, Manson also holds that the observer "will find that the cardiac bruits come and go; that the degree of dilatation of the heart is subject to variation; that what seemed organic disease completely disappears." I think I have shown in paragraph 27 that this is the state of affairs as to the "bruits" discovered by Captain Fearnside. In his monthly return for December 1897—before he had discovered there was no beri-beri in the Circars—he reports " * * * * Many of the convicts who were reporting sick in hospital had an ugly, puffy look with oedema of the feet and, in consequence, I consider it necessary to send 20 away to Vellore being suspicious that they were beri-beri. A considerable number of these had heart bruits and albuminuria * * " Only one of these cases now possesses a slight bruit, since his patients have been able to recover strength, out of the endemic area, in Vellore jail. Nor do I think that I have failed to show reason to believe that organic changes in the heart have been demonstrated in post-mortem examinations to a far greater extent than Captain Fearnside would allow (paragraphs 27 and 37 *supra*). If

Captain Fearnside requires it be shown that beri-beri of the Northern Circars of which he doubts the existence, can produce cardiac changes on more modern authority than that of Malcomson, I would refer to Surgeon Eveyard's Masulipatam cases, reported in the Madras Quarterly Journal for 1866. His post-mortem results show hearts weighing $12\frac{1}{2}$ oz., 15 oz., 12 oz. (a youth of 13 years) and $16\frac{1}{2}$ oz. The latter case had several cysts in the kidneys—a point on which Captain Fearnside was once inclined to lay great stress as opening wide scientific issues. Malcomson seems to me to point well to the plain fact that changes in the heart cannot be a matter of a short period. A certain amount of time is necessary for development. He states, in discussing "cardiac symptoms" "If recent, the disease is not likely to be either hypertrophy or dilatation of the heart." Had Captain Fearnside's cases been in the position of the cooly classes, or Surgeon Eveyard's prisoners continuing to live within an endemic area, and labouring whilst suffering from premonitory beri-beri symptoms, doubtless more cardiac mischief than has been actually noted would have developed; but, in view of ordinary medical care, rest from labour, and transfer from the endemic area, minor disturbances of the heart only might reasonably be looked to. Yet, as I have said above, it seems to me cardiac symptoms have been sufficiently well marked for diagnostic purposes—even abiding solely by Captain Fearnside's own statements and observations.

42. I have myself seen a well-built sepoy with what I have maintained is the characteristic red tint of the conjunctiva of uncomplicated beri-beri, having nothing but slight pre-tibial oedema and burnings of the hands and feet to show what he was suffering from, looking thoroughly healthy, take a hearty meal, and be a dead man within 7 hours of admission to hospital. No mal-treatment had killed him, for he had received no medicine after the diagnosis and before the setting in of the acute symptoms preceding his death. He was literally drowned before my eyes. Each step of the serous effusion into the pericardium, and lungs could be traced. It was a pure case of beri-beri undoubtedly, but far from there being any hypertrophy or dilatation of the heart on the post-mortem, the appearance was that of a heart of feeble fibre with traces of fatty degeneration. Bentley gives post-mortem results of typical beri-beri cases with hearts weighing 6 oz. and $6\frac{1}{2}$ oz.

43. *Paragraphs 16—26.*—The microscope of the present day and its teachings are of unspeakable value, but, in my opinion, the necessity for care in recording the clinical aspect of diseases simulating beri-beri are not less necessary now than when in 1835 Malcomson, without its aid, undertook the task of differentiation. The *plasmidium malarie*, and even the wily mosquito, are within the ordinary plane of professional knowledge, but the micro-organism of beri-beri remains unrecognized in a definite manner. I am not acquainted with any fact that would guarantee that persons having "brassy bodies" and "crescents" doing their worst within them, cannot harbour also the hypothetical micro-organism or toxin of beri-beri. Not even by classified pathological data collected from records that, on the one hand, he uses to support his arguments, and, on the other, declares untrustworthy (*vide* his paragraph 18) if not supplied by himself, can Captain Fearnside satisfactorily remedy this defect in the information he has placed at disposal. Three cases alone are given in detail in his pamphlet. Only one of these, No. 5622 (*vide* his Appendix) affords incomplete clinical symptoms resembling those of beri-beri. Yet, he would have it believed that cases such as No. 8261 and No. 7300 "would have been considered in former years typical of beri-beri" [Italics not in the original]. In the case of No. 7300, he states specifically that during the epidemic in January and February last the "case was considered one of beri-beri." The impression conveyed to most readers would certainly be that the Surgeon-General and myself had declared these special cases typical. I have the full list of all cases that were put aside for examination by us as suspected beri-beri, or were examined by me in February 1898, but these numbers do not occur. Captain Fearnside further assures his readers that whilst in former years "the diagnosis of convict No. 7300 might have been open to doubt, but with the aid of a high-power microscope such doubt can readily be cleared up." Of course, a microscope must be considered rather an essential in finding the *plasmidium malarie*, but I hardly think any one accustomed to examine cases of malaria would have found solely in this extraneous aid the comfort that Captain Fearnside predicts. Most men would have been amply satisfied, by the clinical history and the existence of enlargement of the spleen, that they had to deal with cases in which malaria had done its work. Such cases would not by the most ignorant be selected as

"typical of beri-beri." The high power microscope, certainly up to date, cannot "clear up" doubt, if it were suggested (as probably was the fact in this and numerous cases throughout the jail) that not only beri-beri was dealt with, but also malarial fever—or, in other words, that upon a population already subjected to "beri-beri intoxication" had been added an epidemic of malarial fever—as suggested in my letter, No. 889-S., dated 18th April 1898, paragraphs 4 and 9 (appendix C), which preceded Captain Fearnside's pamphlet by seven months. I consider, in the absence of the power to discriminate the beri-beri micro-organism or toxin, the amount of clinical data supplied (three cases) represents but "one half-penny worth of bread to this intolerable deal of sack." There is nothing in Captain Fearnside's pamphlet to show that he attempted anything beyond verifying—a fact that was never disputed—that the jail population, in addition to other ills, suffered from malarial fever. We are favoured with results of his examination of 109 cases in which the malarial germ in its different aspects was found; but there is nothing on record to show that, after carefully selecting as typical cases as he could find of the supposed beri-beri, it was in 30 per cent. of these he observed the "brassy bodies" and "crescents" so consistently. On the opposite, if the remaining 97 cases he examined were as free of suspicious clinical symptoms of beri-beri as the three he quotes, I can find little excuse for his dissertation on the *plasmidium malarie*, and none for his attempting, on such evidence, to combat the opinion that beri-beri existed as well as malarial fever.

44. Although it is apparently within official etiquette for a junior officer to publish an *ex parte* statement of his opinions as to an epidemic on which, as he says, officers of "longer service" than himself had officially reported, and to maintain that his predecessors in medical charge of the jail could neither diagnose cases nor record pathological results correctly, I judge it would be incorrect for me to question the accuracy of Captain Fearnside's pathological and clinical data. This policy I have followed throughout these pages, and, practically, I have used no other basis on which to refute his statements than his own records. It is, however, consistent for me to remark that whilst not for a moment questioning their accuracy, the having to rely solely upon these records for evidence upon which to prove facts, is not without its difficulties. Much of the very modernized pathology that exists in Captain Fearnside's records seems to me the offspring of plausible theories more than the result of sound deductions from experiment or practice by himself or others, whilst clinical details are woefully meagre, except in directions where his special theories lead. For example, it is startling to find that convict No. 7282 came to his end*, because "one ascaris lumbricoides," 12 inches long, resident in the small intestines, had set up inflammation of the bowels, although the day before his death he was said to be suffering from "acute dysentery"; and that in No. 7466 anchylostoma inhabiting the small intestines set up "secondary" dysentery in the large bowel—causing death—or that 77 "round worms" failed to kill (although a single worm killed one of the men already mentioned outright) and caused no other trouble than "aberration of the intellect" in the case of No. 7165†. The latter theory is apt to make the dream of possibility of securing this "lumbricoid toxin" for the product of antitoxins, that might fulfil a very useful function for the benefit of mankind in general—a dream, however, that is woefully marred by its being ascertained that the very existence of this "toxin" has neither been demonstrated by Captain Fearnside—nor any one else. Again, it was found that one patient died suddenly of pulmonary apoplexy, "due to a small clot [not verified] detached from some ulcer or other in the bowel" following anchylostomiasis. During the period Captain Fearnside thought he had to deal with "relapsing fever"—although he admitted he had seen nothing to warrant the presence of "spirilla" in the blood—he calmly noted on the margin of the hospital record of a case diagnosed by him tentatively as relapsing fever, "the pneumonic symptoms may only be due to spirilla present in the lung" (case No. 7698). After reading this entry, I could not help feeling that had I not nipped during my inspection this theory in the bud, there would have resulted a complete new pathology to suit the spirillum. Convict No. 8763 was admitted from the jail camp, on the 9th March 1898, convalescent from dysentery, but weak. On the 5th April,

* This was not the only man who died of a single "round worm".

† Of this unfortunate man, Captain Fearnside states that he had acquired "a sort of immunity, but it is evident that the immunity did not extend so far as to counteract the action on the brain".

for the first time, he was noted as phthisical; and, on the 7th, he died. No. 8440 was admitted for ague on the 26th March, but it was not till the 6th April the Superintendent discovered the following unusual complications: "There is pulsation of the carotid artery in the neck, small aneurism and dilatation of the innominate artery, double bruit at the base; double bruit at the pulmonary artery; faint bruit at the mitral." Case No. 8323 was admitted on the 4th March. On that day, it is stated the "heart's action is weak and rapid"—showing that this organ has been duly examined—but, by the 24th March, the following terrible complications are supposed to have occurred: "Heart's action rapid, aortic valves incompetent, mitral bruit present, apex beat lowered, ringing sound at apex." Here is a case of "acute nephritis"—according to Captain Fearnside. He (convict No. 382) was admitted on the morning of the 19th December 1897. "Temperature 101.2, evening 99.2." It was then noted "a considerable quantity of albumen present." Next day, there was one-eighth albumen present; no fever is noted. There was no fever or albumen subsequent to this date, and he was discharged cured, without further symptom of "acute nephritis" on the 1st January. Cases are recorded as of "mitral disease", and "aortic disease", and "mitral and aortic diseases", but, from the beginning to the end, there is no account of the physical state of the heart, as found by percussion and auscultation, or of its progress under treatment. A case of the following character (abstract—with important points quoted *verbatim*) strikes one as decidedly "mixed":—

No. 6852. 14th July 1897.—Admitted for anchylostoma. 26th October 1897, discharged. 14th December 1897, "phthisis, mitral disease of the heart; urine albuminous; face puffy; swelling of the lower extremities". [Notwithstanding the discovery of these two diseases, no physical signs are given.] 14th December 1897.—Mis. Diuretic, C. Tinc. digitalis, Ol. ricini and Tinc.—Opii Bismuth and Pulv. ipec. co. 17th December 1897.—Continue. 18th December 1897.—"Four motions, no faecal matter present". 20th December 1897.—"Albumen present; motions loose, frequent". 22nd December 1897.—Died.

"Post-mortem.—Heart 8 oz., soft and fatty and well covered with fat. Left ventricle dilated and the muscular walls thinned out; aortic valve incompetent, Mitral orifice dilated; aorta showing a few atheromatous deposits. Kidneys.—Right, 5 oz., capsule strips easily. Pyramids injected. Left, 4½ oz.; small cysts about the size of a pin's head to a pea on the surface; capillaries of cortex injected. Intestines.—The whole of the large bowel in an acute dysenteric condition. The surface of the mucous membrane of the small intestine above the ileocecal showing numerous sloughs, and anchylostoma present in duodenum; stomach catarrhal. Lungs.—Right, 16 oz., surface clean; no adhesions; lower lobe oedematous one or two tough fibrous nodules in the structure of the organ. Left, 22 oz.; adherent to the posterior wall of the chest. Tough fibrous adhesions, probably due to pleurisy some years back."

45. Such examples of the nature of records that have been at my disposal suffice to show that it is quite possible, in the hurry of work, many of the symptoms of sufferers from beri-beri have escaped notice by Captain Fearnside; more especially as he was not predisposed to admit the existence of this disease. Indeed, like the postscript of a lady's letter, Captain Fearnside's post-mortem notes are much more detailed than the ante-mortem.

46. What then is the position occupied by malarial fever in influencing the general death-rate? Taking the question of direct mortality from fever, and comparing it with results obtained in other jails—a mode of comparison favoured by Captain Fearnside—it will be seen that, as already stated, there is no reason to regard the malarial germ of the Rajahmundry jail (if 1896, when admissions to hospital were too infrequent for safety, and the exceptional state of the population in 1898, be omitted from calculation) as possessed of extraordinary malignancy:—

TABLE NO. C.

Fever.

Years.	Rajahmundry Central Jail.		Other Central Jls.		Ratio per mille of average strength.			
					Rajahmundry Central Jail.		Other Central Jails.	
	Attacks.	Deaths.	Attacks.	Deaths.	Attacks.	Deaths.	Attacks.	Deaths.
1880	2,161	3	560	7	2,259.4	* 3.1	108.1	1.4
1881	1,315	..	524	7	1,371.9	..	103.5	1.4
1882	1,340	..	302	4	1,495.9	..	68.1	0.9
1883	847	1	445	5	1,134.9	1.4	116.5	1.3
1884	478	1	303	4	755.4	1.6	87.1	1.2
1885	386	1	367	1	670.9	1.7	105.6	0.3
1886	365	1	453	4	657.0	1.8	132.8	1.2
1887	774	1	501	1	1,411.5	1.8	89.6	0.3
1888	810	2	391	5	1,536.7	3.8	106.8	1.4
1889	377	..	320	3	721.0	..	83.4	0.8
1890	183	..	529	7	354.5	..	129.3	2.3
1891	196	1	597	10	360.6	1.8	124.3	2.0
1892	213	3	899	3	329.9	4.6	162.2	5.4
1893	81	..	645	2	129.2	..	117.3	0.4
1894	171	..	862	3	215.0	..	168.7	0.6
1895	218	3	1,095	4	325.2	3.9	215.3	0.8
1896	250	14	478	6	270.9	16.4	96.9	1.2
1897	4.6	3	476	2	429.3	3.0	99.6	4.4
1898	516	5	431	3	1,027.4	10.0	76.1	0.6

* Rumpu prisoners.

As to the indirect results of admission for malarial fever, in respect to its weakening and predisposing influence, there can be no doubt of the importance, and there has certainly been no wish to ignore what to most minds would be a fact not admitting of discussion, nor for a moment to maintain that beri-beri existed to the exclusion of malaria, or any other disease. On the opposite, the position of beri-beri is defined in the conjoint report (paragraph 25, appendix B) in the following words, which were in the original, to prevent the running to such conclusions, purposely italicised:—"What then we could contend is that so long as the jail population is liable to beri-beri, any sanitary error committed is likely to be at once responded to more readily than might be expected in a population not suffering from such disadvantages." But it must be remembered that the type of malarial fever as judged by the rarity of marked splenic enlargement, and by clinical records, and by the mortality is not severe, and that beri-beri is not unattended in its origin by fever.

Diagram A will show at a glance that the prevalence of dysentery and diarrhoea has been in certain years, and, according to diagram B, especially in certain months, greater than malarial fever; in fact, dysentery and diarrhoea characterize the period from 1891 (when ragi—affording less nitrogen than jowari and more difficult in preparation—was first introduced) to 1897. Letter No. 724, dated 19th August 1899 (Appendix D), from the Acting Superintendent of the Rajahmundry Jail, will show that the much-dreaded hill-men who bore in their systems "crescents," and are supposed to have induced the infection of the jail, spent but small intervals in the jail at all. They were induced the infection of the jail, although they did exist—were not very for considerable periods of their total confinement absent on trial, or were in camp. Hence, opportunities for infecting the jail—although they did exist—were not very good. They certainly had not such good opportunities of producing infection within the jail as the Rumpu prisoners (typical hill-men) of 1880. Reference to diagram A will show that, though there was a small rise of the fever rate during their incarceration, as a necessary sequel of the new population having amongst them more individuals affected with malaria before admission, it promptly fell in the two succeeding years—showing no general infection had occurred. But, as a matter of fact, are these hill-men so much to be dreaded as importers of "crescents"? The following shows the percentage of these men in the Rajahmundry Jail from 1894 to 1898:—

TABLE No. D.

STATEMENT showing the percentage of "hill-men" to the number of convicts admitted into the Rajahmundry Central Jail in 1894 to 1898.

Year.	Total number of convicts admitted.	Number of hill-men admitted.	Percentage of hill-men to the total number of convicts admitted.
1894	1,006	33	3.28
1895	1,248	47	3.77
1896	1,613	89	5.52
1897	2,518	78	3.90
1898	998	246	24.65

It will be seen that in 1896 when malarial fever gave the highest mortality (16.3 per mille) on record in this jail, there were only 5.52 per cent. of these men against 24.65 per cent. in 1898, when the fever mortality rate was 10.1 per mille—a fact which should suffice at once to show that other causes than infection from these special men were involved. But, the Rajahmundry Jail is by no means the only place where these dangerous germ bearers are confined. I have held charge of the Vizagapatam Jail, and am certain there was no want of malarial fever in those admitted from the hills; yet, no signs of beri-beri appeared. But, at the present day, the Superintendent, Vizagapatam Jail, reports that the percentage of hill-men to total confined is not less than 76.4. Hence, if these men had influenced the mortality in Rajahmundry, the mortality in Vizagapatam ought to have been appalling. This is not the case; neither does beri-beri exist there. Of course, it may be possible to show that Rajahmundry Jail possesses a mosquito that will take undue advantage of the existence of hill-men that is too apathetic to do so, or does not exist, in the Vizagapatam Jail. I am quite prepared to hear this theory evolved; but, in the meantime, these solid facts suffice.

47. What then caused the special outbreak of sickness and mortality in the Rajahmundry jail? As I have held in my Memorandum (appendix A) and this point is confirmed in the Conjoint Report (Appendix B), *no single cause can be assigned*. The jail is one where anchylostomiasis exists; malarial fever of an ordinary, and not particularly deadly type, is also present. Both these causes must have inimical influence. It is within the beri-beri endemic area, and undoubtedly has exhibited from time to time a tendency for beri-beri to make its appearance. When beri-beri transfers were promptly and intelligently carried out, the general health of the jail remained good, but the moment a medical officer arrived who did not believe in beri-beri, and allowed cases to accumulate, or effected "for official reasons" transfers in a half-hearted manner, the general health of the jail deteriorated as a result of beri-beri intoxication. Thus, from 1893 to 1895, the Inspector-General arranged transfers by telegram of such cases, and medical officers existed who were aware of the importance of prompt action. The improved health of the jail showed itself at once by a decided decline of the mortality. But, in 1896, a Superintendent took charge who undoubtedly ignored the advice of the medical officer as to the fitness of men for labour; penal diets were heavy; the methods of preparing and issuing food were open to criticism. After the first quarter of that year also came a medical officer who did not believe in beri-beri, and made no transfers. It was from this period, serious decline of the general health set in. The invalid gang swelled; but its members were not allowed to be free from labour of ordinary type though said to be untasked. The general weighments showed steadily increasing loss. Admissions to hospital decreased, but the mortality of those admitted increased—showing admissions were too late. After the first quarter of 1897 came another medical officer—Captain Fearnside—who devoted much time to anchylostomiasis, and made transfers for beri-beri only for "official reasons" (*vide* paragraph 10 of my Appendix C, and paragraph 13 of Captain Fearnside's pamphlet). The general management of the jail was disturbed by the occurrence of cholera epidemic in March, and in September and October 1897. A large proportion of the prisoners were sent to camp. This meant exposure to wet and laying upon damp earth and straw (*vide* appendix D—marginal notes). In September and October, 20 inches of rain fell. The camp in which the prisoners were placed on this occasion was simply a quagmire. This is what Captain

Fearnside himself thought of the matter when reporting in December 1897, after this camp has been broken up, and before he excoagitated the infectiveness of the hill variety of the plasmodium malarie:—"The health of the jail during the last month has been very unsatisfactory. The weather during the middle of December was very cold and high winds were prevailing. *This gave rise to ague, dysentery and diarrhoea.* Prophylactics have been used to all the jail since 15th November." It seems to me that it is impossible to ignore the exposure which a large proportion of the jail population had undergone in camp from time to time, when added to the conditions above mentioned, as leading to malarial infection and aggravation of already existing beri-beri. The unusual exposure of the river-bed finally *may* also have aided malarial distribution. During the whole of the period from 1896 to the first quarter of 1898, the strength of the jail was steadily rising—but of course the buildings were relieved at the time the large numbers were in camp (*vide* diagram A). Although estimated for a strength of 1,041, the cubic space in this jail is incorrectly calculated, in that all space over 13—14 feet in height is allowed to swell the total cubic space available. Its full population reckoned in this manner should not exceed 880. The fluctuation of the amount of air available per head is shown in diagram A. This increase of the population had commenced from 1891. Crowding, in some degree, and overcrowding, certainly, must have been a disadvantage in a jail where beri-beri existed.

48. Paragraphs 13 and 27 (a) of Appendix B shows that the condition of the jail buildings was altogether unfit where beri-beri existed,* and that the water-supply (paragraph 8 of Appendix A and 27 (f) of Appendix B) was decidedly objectionable, in the presence of anchylostomiasis. When the existence of beri-beri became marked, April 1897, it is noteworthy paragraph 13, Appendix B) that the flooring was already in process of being disturbed, and, consequently, there must have been room, without careful disinfection, for the scattering of the hypothetical beri-beri germ. In my opinion this could not have been without its influence; but in reply to the question as to what particular men were so engaged, the Superintendent was unable to give any better reply than that they were few in number. Had the Medical Superintendent believed in beri-beri, he probably would have disinfected the flooring before removal. It is quite possible, having regard to weighments of prisoners (diagram A), that in the hurry and the stress of work caused by sickness and epidemics of cholera and shifting them to camps, the supervision of the food arrangements was not as good as desirable—even after attention was drawn to this matter by me in 1896 (Appendix A). Indeed, the falling off in the weight in prisoners since 1896 was a marked feature in progressive unhealthiness, except where temporarily ameliorated by special issues of extra rations (diagram B).

49. In my opinion, therefore, there is ample reason why, under such a combination of evil sanitary circumstances, beri-beri, dysentery, and malarial fever should have become epidemic, without it being necessary to resort to theories of infection by hill-men. The history of the origin and progress of the conditions which favoured the increased incidence of these diseases, is set forth in the Appendices A, B, C, which have been already frequently referred to. These Reports were written long before the appearance of Captain Fearnside's pamphlet, and, therefore, are not open to the criticism of being written in successive chapters for special purposes. Yet, I believe that few medical men (having experience of beri-beri) could peruse these without perceiving that had the recommendations conveyed in paragraphs 10 and 11 of Appendix A been promptly acted upon, there would have been no such results as shown in Appendix B, and that had paragraph 27 (d) of that report been faithfully and scrupulously obeyed by a medical officer of a practical type favouring *ante-mortem* observations, and not for "official reasons" as a mere *placebo*, the chances were very much in favour of no such results as depicted in paragraphs 8 and 9, Appendix C, ever occurring. In my humble opinion, the whole case is an admirable illustration of the trite fact that sanitary warnings carry home far less conviction than the practical lessons conveyed by epidemics (*vide* my Appendix E). Appendix A, dated 27th October 1896, warned that such conditions as then existed would inevitably be disastrously responded to by a population in a jail where beri-beri had from time to time exhibited itself; Appendix B shows that, on the 30th April 1897, beri-beri had

* Appendix E shows that this was pointed out by me in 1894.

exhibited itself unmistakably, and urged, again, in more detail, measures already advised; Appendix C shows that, by February 1898, the sanitary forecast had been correctly made—it had demanded but a further incidence of insanitary conditions, and the appearance of a mild form of malarial fever, to start beri-beri as an epidemic—exhibiting itself in uncomplicated cases, and complicating and predisposing to other diseases.

50. Since receipt of Captain Fearnside's pamphlet, I inspected the jail in July of this year. I devoted particular attention to the "hill men." Of a total of 44 of those examined, I found 27·3 per cent. had enlarged spleens, of 129* examined of the ordinary population, 3·1 per cent. had enlarged spleens. The percentage of hill men to total strength was, I believe, still above normal: yet the health of the jail, under the various improved sanitary conditions required in paragraph 27 of the Conjoint Report, has rapidly recovered itself. But I felt surprised to find that one of the three clinical cases given in detail in the pamphlet as possessed of the malignant infective Rajahmundry plasmodium malariae (No. 7300) had been retained in the jail "purely for the purpose of following up his case," whilst as to the other cases of spleen I found they were, as far as I could ascertain—for the Superintendent drew a definite line between information available in his office books and information that he carefully informed me, he gathered for his private purposes as to the state of prisoners—no special action or precaution was taken in regard to them. In the case of No. 7300, I examined the blood, and found no "crescents." According to Captain Fearnside, they had disappeared from three to four months previously. Still, this would have permitted his residence several months in the jail with the "crescents" still flourishing. If Captain Fearnside believes the Rajahmundry malarial germ is infective directly or indirectly, it is an act of extraordinary temerity on his part to subject the whole jail population to the risk of another outbreak of fever, by retaining these men otherwise than in mosquito-proof rooms. He may have segregated and killed the special Rajahmundry jail mosquito, but the possibility of the survival of a single specimen ought to make his action in this matter consistent; yet, I question whether he really had taken, up to date of my inspection, the slightest precaution to make sure that new admissions to jail suffered from splenic enlargement, or not. If in this I wrong him, it is entirely due to his refusal to give me information that he declared to be gathered for his private purposes only. This is no flippant statement. My inspection conveyed to me a sense of how great a hiatus there might exist between theory and practice, even if that theory be gained "with the aid of a high-power microscope."

* 20·9 per cent. of these men had resided in the jail during the period of special mortality from December 1897 to June 1898.

October 1899.

Lieut.-Col., I.M.S.,
Sanitary Commissioner for Madras.

APPENDIX A.

[FIRST STAGE OF SPECIAL UNHEALTHINESS.]

MEMORANDUM ON THE HEALTH CONDITION OF THE RAJAHMUNDY JAIL DATED 27TH OCTOBER 1896.

There has been a decided decline in the health condition of the jail during 1896, when compared with the previous year. It must, however, be remembered that this was an exceptionally healthy period, in what has hitherto been an unsatisfactory jail from a health point of view. I draw attention to this fact, as it is desirable an exaggerated view of the importance of the present condition be not formed. I can place my hand upon no single specific cause for increase of mortality; on the opposite, I would regard it as due to a combination of conditions following inattention to sanitary details. Beri-beri is endemic in the neighbouring town. It is true this disease has not been reported as existing by the Medical officer this year, the only exception during 11 years being 1886, 1888, 1894. Removal of cases in 1895 to Vellore may have had influence on numbers. If this is to be abolished finally, all errors as to diet must be absolutely remedied, and the specific organisms credited with its causation must be got rid of, by a complete cutting off of ground soil air by means of an impervious paving, and complete disinfection of the walls by lime-washing after carefully scraping off old deposits. If the contention that resistance to this disease is to be measured by hygienic surroundings and especially in case of diet, it follows that in a large population, even if the full traces of beri-beri symptoms may not exhibit themselves, there may result a general lowering of the health and the modified conditions due to action of this virus.

2. In the two essential matters of water-supply and food, I think there is quite sufficient to account for increase under the heads of catarrhal inflammation and diarrhoea. On weighing the ragi pudding, it was found that in all cases the portions weighed more than estimated by the Superintendent, that is, against the required weight of 2 lb. 10 oz. there were found in successive weighments from different moulds the following results. This was shown by the Superintendent not to be due to variation in size of the moulds:—

	A mould.		B mould.		C mould.	
	LB.	OZ.	LB.	OZ.	LB.	OZ.
	3	3	2	14	2	12
	3	2	2	15	2	12
	3	2	3	0	2	13
Total average	3	2·3	2	15	2	12·3

Now there can be no doubt that this overweight was arranged without the knowledge of the Superintendent, and this fact is of value as showing that if the subordinates concerned can on one day arrange to show a surplus, there is nothing in the system to prevent them on other occasions arranging for a deficiency. There must thus be some flaw in the matter of supervision of issue of flour. On examining the method of cleaning the flour, I found that a sieve with *very fine* aperture was used. Only this one is available, and it seemed to me on looking at the amount of exposed surface for sifting that it was unlikely, without unusual honesty and hard work, the total of the day's issue could be really passed through this sieve—remembering the time required for again grinding the parts that it rejected. On getting flour from the store ready for issue and attempting to pass it through the sieve, it was evident that a very large percentage could not be passed through, and there can, therefore, be no doubt that the working with this sieve had been grossly burked—at least in this particular issue. This fact is of great importance when it is remembered that a very common complaint consists in extreme flatulence—a condition that was evident in the case of several convicts who presented bellies inflated like a drum. Again, this would be quite sufficient to account for the increase, or at any rate the increased tendency to catarrhal inflammation of the intestine. Against this, I might be reminded of the fact that but

little care in getting rid of husk is taken by the native outside. This is not a sound argument, without knowing the rate of sickness from diarrhoea by natives using ragi in this state; but, in any case, what I suspect would occur under such a state of affairs as described is, that the husk would become extremely unevenly divided amongst the total ground products, because the men who burked the work would grind and sieve to a certain point, and would then launch the unground masses of rejected husk into the total when not observed. Hence, certain individuals would get an excessive proportion of husk on certain days. However, to test the amount of husk that might serve, by reason of being absolutely indigestible, as a cause of irritation, I asked Surgeon-Major Sarkies to kindly have washed for me a single motion from a convict suffering from diarrhoea. The dried indigestible husk so recovered—and it must be remembered that the intestine must have been doing its best in previous motions to get rid of this matter—weighted in a completely dried $\frac{3}{4}$ oz. and measured 8.9 cubic inches.* I send this collected material for view by the Inspector-General of Jails. As no standard has been formed of what a prisoner upon this diet passes undigested in normal circumstances, I do not wish to place too much stress upon a subject that might easily be made very impressive. That there has been an error here as to the supervision for sieving, there can be no doubt, and a complete reform should be made, as well as in the system of issue of flour.

3. But I think a larger lesson may be learnt than merely in the local application of this experience. It seems to me that the whole question of ragi-cleaning requires at the hands of a Medical officer attached to a large jail full investigation. Neither myself nor Deputy have time for this work; but I would suggest that by using sieves of various grades of fineness, feeding selected convicts and constantly observing their condition, weight and work, and by causing the intestinal contents to be collected and washed through fine muslin, a very fair idea as to what the native intestine can or cannot do in attacking husk would then be fully secured. This matter having been ascertained, the experimenter should settle definitely the gauge that should be used, and define with exactitude the area of the sieve surface that should be employed to secure the proper fulfilment of the work, &c. This, with a report on other details as to the best method of cleansing and storing, would form a valuable addition to the means for preventing jail diarrhoea outbreaks. In the event of such a matter being taken up, I would specially warn that the convicts experimented upon be placed under the discipline of the Medical officer for the time being. I made an experiment in the Trichinopoly jail in 1876 by feeding convicts on various fineness of sifted ragi, and one lot with nothing but husk. But the "husk subjects" were in just as good condition at the end of the experiment as the others, showing clearly enough they had got their proper food in some way or other!

4. The use of the fine sieve was introduced on the 15th May. It is true the death-rate from bowel-complaints is not continuous since then, and it may be argued from this that it exhibited no effect; but if the admission rate for catarrhal inflammation of the intestines, diarrhoea, dysentery, colitis, peritonitis, typhitis be compared for 1894, 1895 and 1896, I do think the tracing of an influence becomes very probable if it be allowed that in the use of this sieve *per se* there was nothing injurious, but that the *care* with which it has been used has at times been greater than others.

Admission rates per mille of strength from diseases of the intestinal tract:—

Months.	1894.	1895.	1896.
January	57.5	95.3	116.6
February	73.5	114.0	169.0
March	194.8	81.0	207.1
April	126.5	162.2	151.3
May	186.0	† 95.4	81.4
June	103.6	140.3	234.2
July	162.9	‡ 453.7	121.4
August	343.8	402.7	182.0
September	133.5	218.7	499.0
October	105.8	..	..
November	79.6	15.6	..
December	62.2	11.9	..

* It was afterwards shown that my instructions had been misinterpreted and that, notwithstanding the 9 cubic inches of husk, the man whose motion was examined did not suffer from diarrhoea.

† 15th May new sieve introduced.

‡ Boiled water introduced.

5. Again, in my examination of 557 convicts present on parade and excluding those in hospital—which by a most regrettable mistake I was not shown—I found 3.9 per cent. had spongy gums and 1.8 per cent. were anæmic. The anemia could undoubtedly be conducted to by the hurrying onwards of the contents of the intestines brought about by excess of husk. If this were conjoined with a slight defect in vegetable diet, the spongy gum condition would be secured, without the total symptoms of simple scurvy being present. The accompanying information furnished by the Superintendent will show that once each day a *mixture* of vegetables was issued. Some of these may be good antiscorbutics and some not; but it follows that on one day a convict may be well provided with antiscorbutics or not, according to the proportion which may exist in the total issue; and, in this connection, it must be remembered that at best the vegetable ration permitted is scanty. Calabash and snake gourd are frequent entries and can be of little use. Now, I think in this matter the Jail Department is very much at sea. I am aware a circular exists showing what may be regarded as good antiscorbutics and what not, but in spite of my inquiries of the author (stated by Surgeon-Captain Crawford to be Assistant Surgeon Hollingsworth) I have never been able to ascertain the grounds on which the decision was arrived at in these cases. I think an independent investigation by a good chemist should be undertaken and the results be regarded as a standard.

6. Since July 1895, it has been supposed that the water drunk by the convicts has been issued boiled. In the case of the close prison cells, I found a single small chatty on a scrap of fire, but I was assured that chatties were boiled sufficient for the whole supply of that part of the jail. The allowance for wood was stated to be 20 lb. for 20 chatties of 3 gallons each, or a total of 60 gallons. But, to boil this amount of water, not less than 78 lb. of wood would be required. Again, on visiting the female section and interviewing the matron on the subject of the boiling of water, I found, notwithstanding her deliberate endeavours to deceive me, that no boiled water was then available, and I think the chances decidedly are that boiled water is rarely used there. Now, in connection with this subject and with the matter of husk-sieving, it must be remembered that, although there were fluctuations as to months, on the whole, increased admission from affections of the intestinal tract have been all subsequent to May 1895.

7. I consider this matter of importance not so much in respect to any loss by reason of not boiling water as to show that all could not have got this water and that, as a result, probably defective sources have been used—such especially as the remnants of water in the bathing cisterns, which, as formerly pointed out, are not only open but cannot be completely emptied.

8. I need not dilate upon the old subject of the open well in the jail, nor the open iron cistern into which is received the ground water. This has in former years been pointed out both by Surgeon-Major McNally and myself. It seems to me that completely filling in the well after the method of Koch is advisable, also pumping to a covered cistern, and thence by pipes to the blocks. The present arrangement of distributing bathing water by pipes and drinking water by manual labour is a ridiculous reversal of what is requisite; especially as after the expense of conveying bathing water by pipes has been gone to, all the evils of "open bathing cisterns" are calmly perpetuated.

9. It seemed to be possible, having regard to the admission of Parvatipur jail prisoners, that they may have infected the jail with dysentery. But I can trace no evidence on this point. However, it is a matter well worth remembering in a jail where earthen floors exist, and where for night conservancy no impervious surfaces are prepared for receipt of vessels, that extreme cleanliness and occasional removal of (and replacing by fresh earth) the adjoining part of the flooring, is desirable.

10. I consider from enquiries made as to the nature of work of weakly men that more care is requisite in selecting the description of labour on which they are placed. [A subsequent investigation by the Inspector-General of Prisons proved that this want of discretion was a factor of much importance in regard to the general decline of health; italics not in the original—W.G.K.]

11. My opinion of the present position in this jail then is as follows:—The jail is one notoriously unhealthy, and although there are hopeful fluctuations from time to

time, on the whole, the tendency is to considerable mortality from all causes, *plus* the exhibition of a special disease—beri beri; (2) that no effort has been made by modifying the structure of the building to place the inmates in a correct position to resist the influence of this special disease; (3) that, granting this disease is endemic and that persons placed under good hygienic conditions more especially as to suitability of food (as clearly proved of late in connection with the Japanese navy) can successfully resist beri-beri intoxication, it may well happen that a general lowering of the health of those exposed to its influence may occur, although not proceeding so far as to declare itself in the form of typical beri-beri; (4) that in addition to incorrect buildings under the special circumstances stated, errors have occurred in important matters in connection with the preparation of grain and the issue of flour and of vegetable diet and control of water purity, which factors acting upon a population the health of the more susceptible members of which has been lowered, have readily combined to increase the general sick rate and diseases referable to the intestinal tracts. My recommendations amount to revision of building, water-supply arrangements, and details as to food. In addition, the Medical officer should be required to carefully separate those suffering from grades of anemia, spongy gums and dyspepsia (as shown by great flatulence), and where work is possible—a certain amount being desirable—*its nature should be defined by him* [italics not in the original]. All of these classes should have temporarily an extra ration of 4 oz. of vegetable, and where dyspepsia does not forbid it, efforts might be made to increase the available nitrogen of the diet cheaply, by issue of 2 oz. “muchakottai.” Either the boiling of water should be correctly effected, or be abandoned entirely.

12. I asked the Superintendent to cause some of the wards to be specially measured. If this was done, I have mislaid the notes. I think this need should be effected for, although the cubic space is duly marked, it seems to me likely height has been too much trusted to, and that the fact that space should not be regarded as “available” above 13 to 14 feet has been ignored.

(Signed) W. G. KING, Lieut.-Col., I.M.S.,
Sanitary Commissioner for Madras.

APPENDIX B.

[SECOND STAGE OF UNHEALTHINESS.]

EXTRACT FROM PROCEEDINGS OF THE SANITARY COMMISSIONER FOR MADRAS FOR THE
FOURTH QUARTER OF 1898.

Rajahmundry Jail—Report on the Sanitary condition of—.

Reports having reached Government that a serious outbreak of cholera had occurred in Rajahmundry Jail, the Surgeon-General and the Sanitary Commissioner were requested to visit the institution and to submit a report as to the causes of the outbreak. They were also directed to report as to the general sanitary condition of the jail, which had for several months previously caused anxiety.

The following is their conjoint report:—

CONJOINT REPORT on the sanitary condition of the Central Jail and prisoners at Rajahmundry by the Surgeon-General with the Government of Madras and the Sanitary Commissioner for Madras.

[Reference.—G.O., No. 439, Public, dated 21st April 1897.]

Vital statistics for the Rajahmundry Central Jail are available from 1875 up to date. From these the following table has been compiled:—

No. I.

STATEMENT showing ratio of admissions into hospital and deaths per mille per annum of the daily average strength of the Central Jail at Rajahmundry from 1875 to 1896.

Years.	Daily average strength.	Ratio of admissions per mille per annum of the daily average strength.					Ratio of deaths per mille per annum of the daily average strength.				
		Diarrhoea.	Dysentery.	Beri-beri.	Fevers.	Total admissions from all causes.	Diarrhoea.	Beri-beri.	Fevers.	Total deaths from all causes.	Total deaths from all causes excluding those from epidemic.
1875 ...	950.41	178.9	...	...	269.4	855.4	7.2	...	1.1	24.2	24.2
1876 ...	915.19	179.2	...	...	389.2	1,094.8	2.2	...	1.1	19.7	19.7
1877 ...	1,036.62	134.1	...	...	469.0	1,066.9	1.9	...	2.9	23.2	23.2
1878 ...	1,192.60	150.1	...	...	299.3	862.8	6.7	...	1.7	21.8	21.8
1879 *	967.73	388.7	...	...	676.2	1,573.5	25.8	...	3.1	61.0	58.9
1880 †	956.47	65.7	186.7	...	2,256.4	2,997.0	37.5	...	3.1	85.54	85.54
1881 ...	957.88	21.9	121.0	...	1,371.7	1,839.0	5.2	...	...	25.12	25.12
1882 ...	895.78	52.2	93.2	3.3	1,487.3	1,833.6	2.2	...	...	19.98	19.98
1883 ...	745.31	102.3	63.8	...	1,125.3	1,716.5	4.0	...	1.3	19.94	19.94
1884 ...	632.78	97.7	41.9	...	741.4	1,327.7	1.6	...	1.6	17.06	17.06
1885 ...	575.39	50.4	36.5	...	668.4	1,192.7	...	...	1.7	19.10	19.10
1886 ...	555.59	27.0	41.4	...	1,016.9	1,303.1	3.6	...	1.8	12.60	12.60
1887 ‡	516.92	60.3	68.8	40.2	1,469.7	1,857.9	7.3	10.9	1.8	74.97	74.97
1888 §	527.10	159.4	85.4	3.8	1,532.9	2,111.6	3.8	...	3.8	20.87	20.87
1889	520.75	272.7	109.5	28.8	723.9	1,478.6	...	5.8	...	21.12	19.20
1890 ¶	530.33	175.4	98.1	28.3	354.5	1,272.8	1.9	9.4	...	26.28	26.28
1891 **	543.52	386.4	121.4	123.3	360.6	1,155.4	31.3	13.9	1.8	64.39	64.39
1892 ††	645.66	193.6	178.1	65.1	218.4	1,054.7	35.6	6.3	4.6	99.10	68.15
1893 } ‡‡	627.01	25.5	57.4	35.1	129.2	401.9	4.8	5.0	...	19.14	19.14
1894 } ‡‡	794.63	127.1	28.9	10.1	208.9	625.5	3.8	...	...	18.88	18.88
1895 } ‡‡	762.40	141.7	89.2	17.1	322.7	843.4	5.2	1.2	3.9	24.92	24.92
1896 ...	849.39	151.9	127.2	7.1	175.4	811.2	8.2	...	15.3	47.09	47.09

* Delayed influence of famine.

† Rump rebellion prisoners.

‡ Beri-beri outbreak. Annual Sanitary Report for 1887, paragraph 8.—Twenty-two cases of beri-beri occurred during the second half of the year, of which 8 died; the first case occurred in March, the last in October. In addition to indubitable cases of beri-beri, “general dropsy” was also found accompanied by anchylostoma (Assistant Surgeon Hadden, October return). Cases of beri-beri amongst Burmese convicts in July were transferred to Vellore in August.

§ Dysentery and diarrhoea show increase in September 1887.

|| Only two cases of beri-beri, not transferred; but suspicious cases occurred showing it was not got rid of.

¶ Ragi substituted for cholam in May. Dysentery and diarrhoea, increase in June and July, 34 cases. Beri-beri appeared at intervals in year especially towards close, but only two transfers. Increase of diarrhoea attracts attention.

** Beri-beri began to wax towards end of year, six transfers.

†† Increase of beri-beri without prompt transfer. Medical officer remarks that diarrhoea often preceded beri-beri and sometimes followed it.

‡‡ Increase of dysentery and diarrhoea side by side with inefficient removal of beri-beri.

§§ All beri-beri cases promptly transferred until the end of first quarter 1896. During nine months of 1896 new Medical officer declared no beri-beri existed.

2. On the 30th April, the strength of the jail was 889, including 64 under treatment in hospital. The whole of the convicts were subjected to a superficial medical examination. Under this system 156 males, or 18 per cent. of the male population, were found to present symptoms that denoted the necessity for minute examination.

3. The fact that men were in hospital was not allowed to weigh in coming to a decision as to their general health state, at time of inspection, that is, the existence of a temporary complaint was not regarded as cause for classifying men as in "bad" or "indifferent health," if their general health state did not exhibit more than temporary falling off from a normal healthy condition. On subjection to a second and minute examination, it was found that 56 or 6.5 per cent. of the total strength were in bad health. Hence it may be concluded that, either on account of poor physique or constitutional condition, the remaining male convicts selected, or 11.6 per cent. of the male population, required special care as to labour or diet, or, if both classes be considered together, a total of 18.1 per cent.

4. The objective symptoms that attracted special attention in those in bad health were recorded against each as follows:—

Puffiness of face	...	...	...	...	...	...	...	10
Puffiness of face and œdema of legs	...	...	...	...	...	...	...	13
Ill-nourished (falling off in weight)	...	...	...	...	...	...	...	16

Of the above, 15 men complained of premonitory symptoms of beri-beri affecting the nervous system, such as pain on pressure of the muscles, tightness round the chest, difficulty of breathing, anæsthesia of limbs, burning of the hands and feet, hyperæsthetic patches, twitching of muscles, insomnia, etc. Of the total of 56 in bad health, their general depressed condition was in some measure accounted for in the case of 10 by recent recovery from cholera.

5. In the case of 27 females examined, 10 were in "bad health" and 7 in "indifferent health;" 14 were noted as anæmic, some markedly so; but only one had œdema of the legs.

6. Of 41 prisoners in quarantine that were examined, it was found that 9, or 22 per cent., were in indifferent health. Of the total, one was anæmic.

7. The result of inspection of the entire population therefore showed that 13.0 per cent. were in indifferent health and 7.4 in bad health, or that a total of 20.5 per cent. required care as to diet or labour.

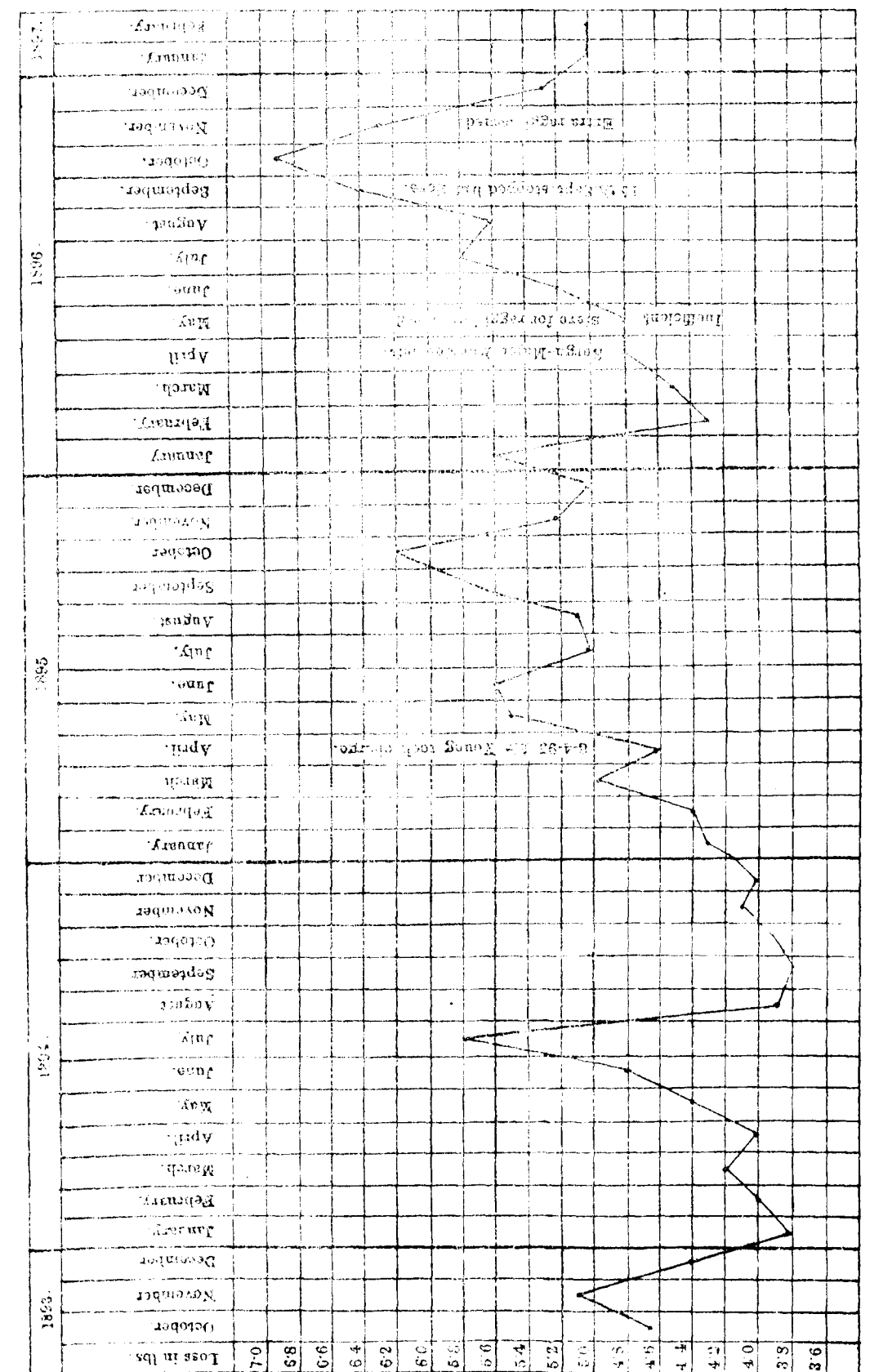
8. The following table exhibits the convicts remaining in jail on the 30th April 1897, classified according to years of admissions and the percentage of these in "bad" or "indifferent" health:—

No. II.

Years of admission.	Number of men in jail on 30th April.	"Bad" health.		"Indifferent" health.	
		Number.	Per-centage.	Number.	Per-centage.
1891	25	2	1.3	1	0.6
1892	25	...	...	2	1.3
1893	19	2	1.3	1	0.6
1894	29	3	1.9	...	...
1895	92	9	5.8	13	8.4
1896	238	25	16.0	36	23.1
1897	437	15	9.6	46	29.5

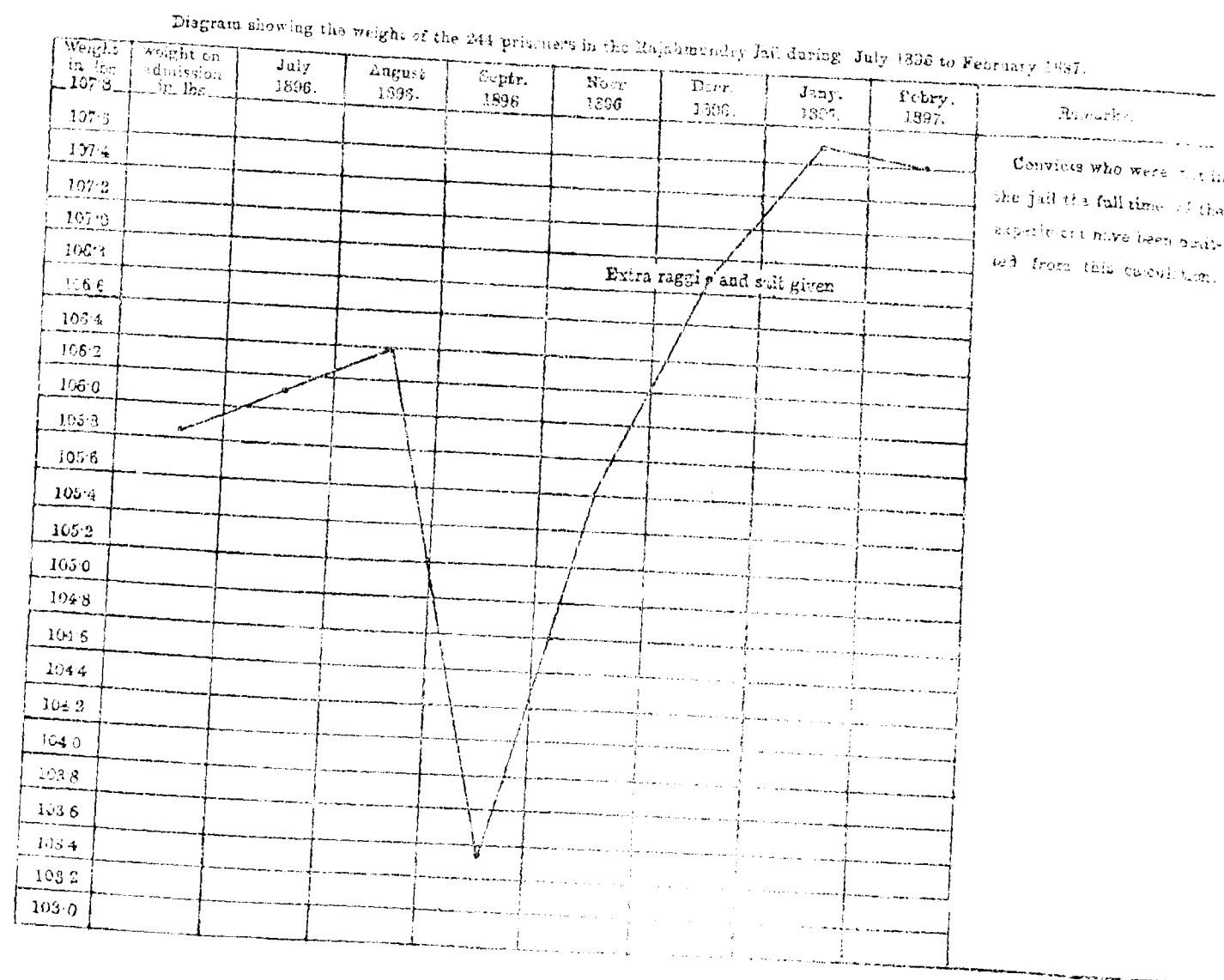
9. The annexed diagram exhibits the variation in weightment of the total jail population between 1893 and 1897. It is unfortunate that the information for more of the year 1893 than shown could not be obtained from the jail records:—

Diagram A.



From the 29th October 1896 to 25th February 1897, on the recommendation of the Medical officer of the jail, 243 convicts were given extra ragi and salt. The following exhibits the result:—

Diagram R.



10. The following shows that during 1896 the invalid gang underwent expansion from month to month:—

No. III.

STATEMENT showing the strength of the invalid gang at the end of each fortnight in 1896.

Months.	Con-valescents.	Light labour.	Total invalid gang.	Rice diets.	Months.	Con-valescents.	Light labour.	Total invalid gang.	Rice diets.
January ...	39	17	56	52	July ...	40	27	67	51
February ...	46	21	67	60	August ...	38	24	62	48
March ...	49	19	68	53	September ...	49	23	72	49
April ...	47	17	64	57	October ...	61	25	86	48
May ...	49	21	70	59	November ...	64	32	96	51
June ...	48	18	66	66	December ...	80	31	111	63
	40	26	66	61		79	35	114	48
	34	34	68	36		72	69	141	59
	33	33	66	39		76	116	192	53
	33	34	67	51		74	210	284	54
	32	30	62	55		67	220	287	74
	42	28	70	54		67	216	283	88

* Surgeon-Major Sarkies took charge.

11. It would have been of utility to have been able to exhibit side by side with the results of our examination of the physical state of the convicts, the actual employment of individuals on the day of inspection. Lest any difficulty should be felt by the Superintendent as to stating the employment on the 30th April, he was asked as an alternative to supply information for the day preceding the inspection. The following is the Superintendent's reply:—

"The particular labour on which the prisoners referred to in your No. 1050-S., of 14th May 1897, were employed on 30th April 1897, is not recorded in any registers, and the weightment statements for the first nine months of 1893 are not to be found in the records of the jail."

It is not understood why any difficulty should exist, at any time, in proving the description of labour on which a convict is employed. We draw attention to this fact, as in a few instances the convicts did not seem to us to be judiciously classified for labour purposes, having regard to their health state. This may have been, and probably was, the legacy from the last régime; but that we should not have an opportunity of verifying our opinions by comparison with any record exhibiting the labour which convicts were placed at the time of our inspection seems to us unsatisfactory.

12. During the last six months of 1896, 150 convicts were subjected to penal diet for a total of 755 days, being an average of five days per head, or at the rate of ten days' penal diet per annum. In addition the use of "gunny clothing" for punishment was largely employed.

13. *General sanitary condition.*—It is not intended to allude to sanitary conditions further than where these would seem to have a direct bearing upon the subject before us. The following description of the flooring has [at our request] been furnished us by the Superintendent:—

No. I Block contains 5 wards, each holds 26 prisoners. The flooring is of mud. Each ward contains 26 pials. The pials are of mud.

No. II Block.—The flooring is of brick. Each cell has 4 pials of the same size as those in No. I block and are of raw brick and mud.

No. III Block.—The flooring is of brick. Pials are of the same size as those in No. I block and are made of raw brick and mud.

No. IV Block.—The flooring is of brick and pials of raw brick and mud.

No. VI Block.—The flooring is of brick and chunam, but chunam worn out. Pials of raw brick and mud.

No. VII Block.—The flooring is of brick; pials of raw brick and mud.

No. VIII Block.—The flooring of stone slabs and pials of raw brick and mud.

Civil Ward Guard room.—The flooring is of mud. Pials of raw brick and mud.

The general impression conveyed by an inspection of the flooring is that the majority is formed of rammed gravel. But the result has apparently been brought about either by gradual accumulation from the feet of convicts or purposely in the

process of "leeping" with red mud, so that a fairly uniform coating of earth is observable. During our inspection this was in process of being removed from certain of the wards, so that the underlying raw brick flooring with widely gaping joints was brought to view.

14. The main features of the water-supply are sufficiently described in the attached report by the Sanitary Commissioner on cholera, but it is desirable that attention be also drawn to a detail in the method of distribution as affecting the kitchen, namely, that the whole of the kitchen utensils are washed on an uneven brick platform on which the water is confined by a temporary bund. The convicts in washing the kitchen utensils stand in the midst of the pool so made.

Food.—All food materials seemed sound. There was, however, in the matter of vegetables a want of discretion as to selection of those of antiscorbutic properties.

Conservancy.—Conservancy buckets are at nights placed within the wards on special spots. These spots were not specially prepared, unless such preparation be represented by the old deposits of earth already described as covering the floors. The night-soil is disposed of by trenching.

Opinions and recommendations founded thereon.—Taking the whole of the facts above brought together into consideration, it is evident that if the unfavourable years of famine and Rumpa rebellion be excluded, the population of this jail, on the whole, enjoyed fair health up to the year 1887. In that year, the Inspector-General in his annual administration report states that the Rajahmundry Jail "from being a healthy jail, is now one of the most unhealthy." Further on, he describes this change as having taken place "within the last few years," but a consultation of the statistics of the preceding years does not bear out this assertion. On the opposite, the change was sudden and marked, and, moreover, if the succeeding years' statistical results be regarded, it will be found that, although the health state has fluctuated within wide limits so as to hold out hopes of permanent mitigation, years of high mortality have repeatedly occurred to an extent unknown before 1887, and that even the most favourable results have not equalled those preceding 1887. In that year there was neither cholera, small-pox, nor influenza; yet the mortality reached the high figure of 74.97, whilst in 1891, 1892 and 1896 (excluding also epidemic diseases) the mortality was 64.39, 63.15 and 47.09 per mille, respectively. In other words, in the twelve years previous to 1887, whilst excessive mortality occurred but twice, and this was fully accounted for by the condition of Rumpa prisoners and the legacy of the famine, subsequent to that year excessive mortality has occurred four times in ten years, and this notwithstanding the advance of medical and sanitary science made in the interval. Put in another way, if the two years fully accounted for by the famine and the Rumpa rebellion be excluded, the average mortality from 1875 to 1886, on an average strength of 845.93, was 20.28 per mille excluding common epidemic diseases, and from and including 1887 to 1896 it was 38.79 per mille on an average strength of 634.77. It is obvious, therefore, that one of the first steps is to ascertain the nature of the change to which attention was, as already stated, specifically called in 1887. The sanitary incident of that year was undoubtedly the admission of a gang of convicts from Burma amongst whom there were 22 cases of beri-beri, of which no less than 13 died of it in Rajahmundry and 5 subsequent to the transfer to Vellore. It may be added that the Inspector-General remarks that it was a "curious coincidence" that beri-beri appeared amongst an old batch of Burma prisoners in the Vellore Jail on the very day those affected with beri-beri arrived from Rajahmundry. In a subsequent annual report, the Inspector-General in remarking upon the existence of beri-beri in this jail points out that importation was first due to these convicts. But the medical returns show that one case of beri-beri was admitted in 1887 previous to the arrival of the Burma convicts. Further, it will be observed that the statement given above shows admission to the extent of 3.3 per mille in the year 1882 for this disease.

15. This remarkable change of health condition established in 1887 was coincident with the importation of beri-beri cases in unprecedented numbers, and up to date beri-beri has never been absent from the jail. As regards the small number of admissions in 1896, it must be stated that these occurred solely whilst Surgeon-Major Marsden was in medical charge in the first quarter of the year, and that subsequent to his departure Surgeon-Major Sarkies who succeeded him maintained that no beri-beri existed, although he found one case about two days

prior to his giving up charge in 1897. If the notes attached to Statement I be read, it will be seen that much in proportion to the care and promptitude with which beri-beri cases have been sent from the jail to Vellore has the general health of the jail fluctuated. Thus, coincident with a failure to recognise beri-beri subsequent to the first quarter of 1896, increase occurred in general unhealthiness of the jail, whilst the prompt removal inaugurated by the Inspector-General in 1893 and practised up to that period induced the opposite result.

16. A further peculiarity is evident from this statement; in the matter of rate of admissions for medical treatment, it will be seen that there has been a great diminution of recent years; thus, although in 1896 there was a mortality of 47.09 per mille, the admissions to hospital were only 809.9 per mille against 1301.3 in 1884, when the mortality was only 12.60 per mille. This points to an undue tendency to restrict admissions to cases having pronounced symptoms.

17. To demonstrate the importance of the beri-beri incident in 1887, it is necessary to investigate the etiology of this malady. The disease is one which has received very little attention from the medical profession in past years, and hence there existed till recently differences of opinion, traces of which are still found. This difference was really brought about by confounding the "wet form" of beri-beri with the "general dropsy" following profound anæmia caused by an intestinal parasite—the anchylostomum duodenale. In tracts of country where such cases had been carelessly known as beri-beri, this disclosure, instead of establishing the difference between these diseases, conduced to the erroneous opinion that such cases of general dropsy were really beri-beri, but that this disease was caused by anchylostomiasis. This tendency was further augmented by its being a common professional error, amongst those who have not dealt with this disease clinically, that a leading symptom of beri-beri is anæmia. Confusion has also arisen on the subject in the possible, if not frequent, finding of anchylostoma within the intestines of men subject to true beri-beri.* Still further has this confusion been accentuated by the very widespread incidence amongst natives of anchylostomiasis, and the rarity with which direct observation to establish its occurrence has been undertaken—the process of verification being repulsive. Nevertheless, controversy as to whether kala-azar in Assam was of the nature of beri-beri, malaria, or anchylostomiasis has shown that the parasite is exceedingly common amongst all natives having to deal with labour on soil. Thus, Dr. Dobson, in his investigation, illustrates the common occurrence of the anchylostoma by showing that in 651 healthy emigrants examined by

* Surgeon-General Bidie and Surgeon-Lieut.-Col. Lancaster made search for these parasites in post-mortems in the Vellore Jail of men who had died of beri-beri after transfer from Rajahmundry. They found none.

† Only 90 out of this 651 were free of other forms of intestinal parasites.

him no less than 417, or 64 per cent., harboured this parasite.† Surgeon-Captain Williams in Madras showed that in post-mortem examination on 26 subjects dying of various diseases in the General Hospital, Madras, no less than 52 per cent. suffered from anchylostomiasis. Its presence has been demonstrated in the Vizagapatam Jail by Surgeon-Major Sturmer, in Mangalore by Surgeon-Major Bannerman, and in the Rajahmundry Jail by Assistant Surgeon Hadden. The chances are therefore that to say a population of natives suffer from anchylostomiasis, is but to define an undesirable condition that is more or less normal.

18. Having thus far shown how the single symptom of general anasarca has been confused with the "wet form" of beri-beri, it is necessary that we should state certain peculiarities of beri-beri which bear upon the present investigation. It is generally held that beri-beri must be classed with the disease of microbic origin, but although to several micro-organisms has been assigned the rôle of causative agent, even those who have worked most at the subject admit that no certainty has been arrived at as to its identity. Its method of reaching the human system is apparently by medium of the air. It is careful as to its home—only certain places forming a congenial abiding place. Thus, whilst in Rajahmundry it flourishes, in Vellore it readily dies out; hence it has been customary to assume for it endemic areas. Although Maccomson excludes Rajahmundry from the endemic area when he wrote in 1832,‡ in a report written for the Medical Board two years later it is shown that beri-beri was a constant cause of mortality in the old jail in the fort,

‡ He, however, withdraws this statement in a foot-note.

and also affected the native troops stationed there. At the present day, "general dropsy" and beri-beri both figure in the municipal registers. But whilst it shows a tendency to thus flourish in certain areas, it can make a temporary home in any quarter of the globe; thus, in 1894, it was the cause of severe mortality in a lunatic asylum at Dublin, and about the same period an outbreak occurred amongst lascars who had arrived several months previously in the London docks. A further peculiarity of this disease is, that when once introduced it clings tenaciously to buildings and even ships, and so fully is this believed in that one of the proposals seriously mooted as to the outbreak in Dublin was the complete demolition of the asylum. Another peculiarity that we think of special importance upon which Pekelharing insists is, that all persons living within the area where beri-beri is endemic have the special micro-organisms within their blood, and that numbers of these persons exhibit minor symptoms of beri-beri such as slight oedema of the legs without displaying the classical symptom of peripheral neuritis; in short, he maintains that a population so situated becomes subject to "beri-beri intoxication"—a condition analogous to that found in malaria. Again, a most important experience has been gained by the Japanese. Beri-beri was so common amongst crews as to render their navy of questionable utility as a fighting body. As recent events show, this opinion has been changed; before the war, beri-beri had practically disappeared from the Japanese navy, as a result of strict attention to diet, more especially as to its nitrogenous constituents [increase of resistance by the well-nourished body]. The influence of simple beri-beri intoxication is shown by a general depression of vital energy. New comers are peculiarly liable to its influence; prolonged residence conduces to immunity.

19. Having regard then to the peculiar behaviour of beri-beri, it is not difficult to concede that granted the disease existed in the Rajahmundry Jail prior to 1887, on the admission of the 22 cases of this disease from Burma, the concentration of the poison became considerable and that, as the medical history has shown since,* the population has been subjected to beri-beri intoxication; there has been exhibited a depression of the general health of the population that has caused it more readily to respond to unfavourable sanitary conditions when superimposed. For example, there is reason to believe that beri-beri intoxication would predispose to bowel affections, which has formed one of the marked causes of admissions since 1887. Thus Manson states: "I have met with cases in which the development of the symptoms of beri-beri was preceded by an attack of diarrhoea; and this so frequently that it has occurred to me that the relationship may not be altogether one of coincidence merely;" and the Medical officer of the jail in 1888 made precisely the same observation, as will be found recorded in the Inspector-General's administration report for that year.

20. Since Surgeon-Captain Fearnside,† the present Superintendent of the jail, took charge, very much to his credit he has revived the fact, which had not been officially referred to after Assistant Surgeon Hadden's tenure, that ancylostomiasis existed in the jail. This we think of importance as contributing to the unhealthiness of this jail; but we would specially warn against this being regarded as the main cause, and indeed for this reason have entered into the above details to prevent confusion as to what is really meant by beri-beri. Statement II suffices to show that far from prolonged residence leading systematically to degeneration of health, the opposite really results. Such statistics could not be produced were the main cause of sickness in the jail ancylostomiasis; moreover, it would have been impossible to have looked for the extreme variations in health shown in the statistics from year to year. Prolonged residence must have meant in each case greater chance of infection, and consequently a greater drain on the constitution by the blood-sucking parasite. Yet beneficial effect of prolonged residence is compatible with what might be expected to result from beri-beri intoxication—new comers being readily affected, prolonged residents overcoming the influence. Besides, the universality of ancylostomiasis and its existence in this jail as far back as 1887, as shown in paragraph 17, would point to this being but contributory to the main cause.

* An examination of the records by the Surgeon-General gives rise to the suspicion that cases otherwise diagnosed from time to time were of the nature of beri-beri.

† He states that ancylostomiasis were found 48 times in 52 cases examined by him. Ancylostomiasis is so common in the new admissions in the jail that santonin was used by Surgeon-Major Sarkies as a routine practice.

21. In the footnotes attached to statement I, it has been sought to prove that just in proportion as the jail staff segregated and got rid of beri-beri cases from the jail, so did the health of the jail improve, that is to say, that the foci from which beri-beri intoxication could spread were on such occasions diminished. Thus, the most striking beneficial results subsequent to 1887 were obtained in 1893, when the Inspector-General of Prisons grasping the importance of this step, directed he should be informed of such cases, and that arrangements for movement should be made by telegram. Up to the end of the first quarter of 1896, this system was in vogue; then succeeded Surgeon-Major Sarkies who found no cases of beri-beri, and with this absence of removal of foci of intoxication came increased incidence of sickness.

22. Whilst stating above the nature of the poison of beri-beri, no reference has been made to the symptoms by which it can be recognized. This might be superfluous were it not that the opportunities of meeting with this disease do not occur to all Medical officers, so that a Medical officer not well in touch with the convicts might not readily detect the symptoms till far advanced. A very good description of how far this difficulty in recognizing the disease by those not accustomed to see it is thus given by Manson:—

"There are few diseases with so varied a clinical facies as beri-beri, consequently it is exceedingly difficult to convey in words a clear conception of what it is like.

"To the medical man encountering it for the first time, and with only European experience and the ordinary text books to guide him, case after case may present itself in the out-patient room or in the wards of a native hospital, and yet he may for a long time entertain no suspicion as to the real nature of the disease he is dealing with. Such diagnoses as muscular rheumatism, locomotor ataxia, progressive muscular atrophy, heart disease, Bright's disease, oedema from anaemia, suggest themselves—so varied and so apparently unconnected are the elements of the picture. Such as a matter of fact, are some of the diagnoses the novice in tropical medicine generally, on his first encountering beri-beri, arrives at and registers. By and by he is agreeably astonished to find that many of his presumed locomotor ataxia cases recover rapidly, his progressive muscular atrophy cases to progress, his Bright's disease cases show no albumen in a fairly dense urine, and his heart cases lose their bruits. On the other hand, he is painfully surprised at the number of sudden deaths occurring among patients who did not seem to be very ill; he cannot account for the frightful attacks of dyspnoea he frequently has to treat, for the anæsthetic patches in the atrophic cases, for the absence of ocular, bladder and other characteristic symptoms in the apparently ataxic cases. After a time the idea of peripheral neuritis may occur to him, and then, perhaps, on a hint from some one with more experience, or from a book or by a sort of happy inspiration, he one day concludes that the diseases he is dealing with are but phases of the many-sided complaint, beri-beri. Such I know to be the history of many a medical man's initiation to the diagnosis of this disease."

23. It will be seen that the disease exhibits itself essentially by various disturbances of the nervous system, and nothing therefore but close and careful examination of cases holding this fact in mind, is likely to secure correct segregation.

24. As exhibiting the actual state of affairs as to beri-beri prevalence in the jail, we may state that five cases were found by us in which distinct beri-beri symptoms were discoverable. One of these had been diagnosed as chronic Bright's disease by the present Superintendent; this case was complicated by ancylostomiasis, but nevertheless presented indubitable symptoms of beri-beri. One of the warders has also acquired the disease since his residence, and the senior Hospital Assistant, after undergoing the great exertion incident to the epidemic of cholera, has developed premonitory symptoms.

25. What then we would contend is that so long as the jail population is liable to beri-beri, any sanitary error committed is likely to be at once responded to more readily than might be expected in a population not suffering from such disadvantages. As an illustration of such an error occurring, we would point to the use from 15th May to 15th September 1896 of a sieve for preparing ragi flour by the Superintendent that was inadequate as to size for the work done, so that there resulted increased intestinal irritation in a susceptible population (vide statement No. IV attached) and a decrease in weight (vide diagram A), the abolition of this sieve was followed by beneficial influence.

No. IV.

ADMISSION rates per mille of strength from diseases of the intestinal tracts.

Months.	1894.	1895.	1896.
January ...	57.5	95.3	116.6
February ...	73.5	114.0	103.0
March ...	194.8	81.0	207.1
April ...	123.5	102.2	151.3
May ...	183.0	95.4 *	81.4
June ...	103.6	110.3	234.2
July ...	162.9	453.7 †	12.4
August ...	313.8	402.7	182.0
September ...	133.5	218.7	439.0
October ...	105.8	...	...
November ...	79.6	15.6	...
December ...	62.2	14.9	...

* 15th May new sieve introduced.

† Boiled water introduced.

A very obvious sanitary error was certainly that committed by the former Superintendent, in ignoring the advice of his Medical officer as to classification of men for labour purposes.

In the course of our inquiry, it was shown that Surgeon-Major Sarkis had protested against this action in certain cases. On the visit of the Sanitary Commissioner in August 1896, he called the attention of the Superintendent and the Medical officer to cases that he considered unfit for the employment on which they were engaged, and in his report on this occasion advised that greater care as to classification should be exercised. Inspection by the Inspector-General subsequently also brought this fact to light. The causes which brought this about are dealt with in another connection; it suffices here to say that in our opinion this ignoring of the classification of labour could not have failed to have led to disastrous results. Again, although we do not make comparison with the punishments inflicted in other jails, it seems to us that more caution was desirable as to the use of insufficient diet, it being usually better policy to exact extra work than to starve a man. The use of "gunny bag" clothing is, we believe, an effective punishment; but as this clothing is likely to be handed from man to man and is also difficult as to cleansing, it certainly should not be practised in this jail.

26. There is reason to believe that the choice of vegetables as to antiscorbutic properties has not been judicious.† We elicited from the present Superintendent the fact that on one occasion since his taking charge finding the weight of vegetables short of the day's demand, he was given the reason by the Deputy Jailor that to give more would reduce the garden produce too heavily! If this species of economy has been practised from time to time, it is evident that the spongy gums found in 3.9 per cent. on a former occasion can be accounted for.

27. (a) Holding the above opinions, therefore, we conceive that it is possible to restore the healthy condition obtaining in this jail prior to 1887 by more strict attention to all sanitary details than has been practised, seeing that beri-beri is distinctly a disease that becomes extinct in a population placed under correct hygienic conditions, and will as distinctly resume its sway on bad hygienic conditions being allowed to recur. Thus, in the case of the Japanese navy, the sanitary error which gave predisposition to the infection that had attacked their ships was lack of nitrogenous diet. This error being remedied, beri-beri was successfully resisted. With this object, the first efforts must be directed towards removal of beri-beri infection in the Rajahmundry Jail. This can be done by pursuing systematically the policy inaugurated in 1893 by the Inspector-General of Prisons of prompt removal of those affected to Vellore. Each ward should be most carefully disinfected with perchloride of mercury solution, which could be best carried out by use of either the equifex sprayer, or the cheap modification made by use of Chinese wooden pumps. All whitewash should be removed from the walls; a second spraying should then take place followed by fresh whitewashing. The present floorings and pials should be removed entirely. The flooring should be replaced by concrete cement or asphalt plastered, or by square cut stone slabs cement pointed; the pials should be formed of masonry or concrete cement or asphalt plastered.

(b) Standards should be established as to the size of mesh and area of sieves used for the preparation of ragi.

(c) A careful re-classification of the whole of the jail convicts as to fitness for labour should be effected at once. The condition of the women demands instant care, practically the whole are unfit for any form of severe labour. In this connection, it would be well for the Jail department to make it understood that labour may be hard in the physiological sense even if not in that of the code, and that not tasking labour does not make it medium or light.

(d) All cases exhibiting puffiness of the face or oedema of the legs, or both, or complaining of the various premonitory symptoms of beri-beri, whether these be accompanied by the presence of anchylostomiasis or not, should be segregated as quickly as observed, and be maintained under frequent observation. They should be retained in a separate building, which should be disinfected with perchloride of mercury solution every month; special care as to receiving the excretions of these men in disinfectants, and subsequently disposing of them by burning, or failing this, by deep burial with disinfectants should be practised. The clothing should also be washed separately and be treated with disinfectants or be boiled. The moment in any case nerve symptoms point to peripheral neuritis, it should be transferred from this jail to Vellore.

(e) Both the cases of the character mentioned in the preceding paragraph, and those exhibiting mere falling off of weight and general depression should have the nitrogenous elements in the diet increased by the issue of 2 ounces of lab-lab beans, and where this fails to bring about improvement or, in severe cases, 5 ounces of meat should be issued daily instead of twice weekly as at present, in addition to the lab-lab bean.

(f) The water-supply of the jails should at once be replaced on a sanitariously sound basis, by shutting up the well completely. Instead of having the barrels of the pumps within the wells, these should be placed at the side in a jack well so as to prevent the necessity for men descending, and thus risking contamination. The elevated iron cistern should be protected from light and the effects of temperature, by the provision of a suitable roof. The water should be distributed to the various blocks and to the kitchen by pipes, so that water can be drawn upon the spot direct. If these precautions be used, we consider, having regard to the depth of the well, there is no necessity for using Pasteur's or any other filter in this jail. The open bathing cisterns should be abolished, and bathing should be conducted by "roses," or by suitable outlets from the pipes direct.

(g) The arrangement of placing conservancy receptacles within wards should be stopped. Semi-detached privies should be attached to the wards, so arranged that the night-soil can drop direct to the exterior as well as the urine. Automatic arrangements should exist for deodorization by dry earth.

(h) The quarantine wards should be enlarged sufficiently to enable complete segregation of batches received during the period they are kept under observation.

(i) One of the fruitful causes of spread of anchylostomiasis and other intestinal and skin parasitic diseases will have been got rid of by the abolition of the open bathing cisterns by preventing the use of water, in which foul hands, &c., have been dipped. Men employed on gardening or any form of earthwork should, on arrival from the garden, be required to wash their hands carefully.

(j) All receptacles for night-soil should be of iron, and so constructed that they might be disinfected by direct application of heat without material damage. It would be advisable to destroy all night-soil by means of the Silchar incinerator along with all rubbish, until at least a reduction of the affection ["anchylostomiasis"] is reported. A suitable "Field form" could be obtained for Rs. 250. Parts of the garden in which night-soil has been deposited should be put out of cultivation and be deeply ploughed at frequent intervals for a period of six months, so as to thoroughly expose the soil to the action of the sun.

(k) To prevent a recurrence of the conditions referred to in paragraph 25, we advise that it be ruled by Government that when a Superintendent considers himself justified in refusing to carry out the recommendations of the Medical officer he shall uniformly place his reasons in writing, and shall forward one copy to the Inspector-General of Prisons and another to the Surgeon-General with the Government of Madras, through the Medical officer concerned.

APPENDIX C.

[THIRD STAGE OF UNHEALTHINESS.]

From Surgeon-Lieutenant-Colonel W. G. KING, I.M.S., M.B., C.M., D.P.H., Sanitary Commissioner for Madras, to the Inspector-General of Prisons, dated Fort St. George, 18th April 1898, No. 880-S.

With reference to your reminder, dated 30th March 1898, to forward a statement of my opinion in the matter of the present sickly condition of the Rajahmundry jail, I have the honour to refer you to my telegrams, dated and the 1st March, showing that full information of the nature required from the Superintendent had not been received. Rather than delay further this subject, I now forward the information required.

2. Since the inspection by the Surgeon-General with the Government of Madras and myself on the 29th April 1897 (*vide* G.O., No. 1657, Judicial, dated 26th November 1897), the population has increased from a daily average of 878.87 in that month to 1,141.55 in December 1897, owing to numerous admissions of prisoners from amongst the hill tribes. Many of these are stated to have arrived in an evil condition following privation. Returns of sickness and mortality from this jail have been received up to January only.* The following table exhibits results since the period mentioned :—

* This day the return for March has been received but not that for February.

Months.	Daily average strength.	Admissions.					Deaths.						
		Diarrhoea.	Dysentery.	Beri-beri.	Fevers.	Total admissions.	Total excluding those from epidemics.	Dysentery and diarrhoea.	Beri-beri.	Fevers.	Total from all causes.	Total excluding those from epidemics.	
1897.													
April	878.87	..	46.54	2.28	38.69	185.47	185.47	..	..	..	185.47	185.47	
May	904.87	..	15.47	5.52	19.89	187.87	187.87	..	..	..	187.87	187.87	
June	905.59	..	7.73	1.104	8.83	163.43	163.43	..	..	..	163.43	163.43	
July	1,011.58	..	6.92	0.989	12.85	207.60	207.63	..	..	..	207.63	207.63	
August	1,063.16	..	5.64	..	16.93	129.80	129.86	..	..	..	129.86	129.86	
September ..	1,261.87	..	35.66	..	41.21	337.41	334.42	0.8	..	..	334.42	334.42	
October	1,095.16	..	39.26	..	73.05	359.76	346.98	9.91	..	..	346.98	346.98	
November ..	1,117.40	..	20.58	..	103.81	328.44	327.55	..	..	..	327.55	327.55	
December ..	1,141.55	..	31.53	18.396	153.30	353.90	353.90	1.75	..	..	353.90	353.90	
1898.													
January	1,051.87	..	55.14	22.82	160.67	479.14	479.14	3.8	..	0.95	482.89	482.89	

3. It will be seen that following a period of comparative immunity extending from April to August, increased admissions occurred under fevers and dysentery.

4. On date of inspection, 10th and 11th February 1898, there were 229 sick. The percentage of disease causation was as follows :—

Total sick	229
Causation of diseases—	
1. Parasite of the intestines—	Per cent.
(a) Anchylostoma	9.6
(b) Ascaris lumbricoidis	4.4
2. Disease of the lungs—	
(a) Pneumonia	2.6
(b) Bronchitis	4.4
(c) Pleurisy	6.6
(d) Phthisis	3.1
3. Fevers—	
(a) Ague	27.9
(b) Simple continued fever	7.0

4. Disease of the intestines—	
(a) Catarrhal inflammation	13.1
(b) Dysentery	0.9
(c) Diarrhoea	2.6
6. Privation	1.3
7. Heart diseases	

State of health on admission of total sick—	
Good	40.2
Bad	36.2
Indifferent	23.6

Loss or gain in weight.—Loss of 3.8 lb. in weight on an average.

A perusal of the statement and of the table given in the preceding paragraph conveys the impression that sickness present was of a general character, no disease specially predominating unless it be “ague”.

5. Inspection in hospital showed that ventilation had been greatly impeded by mats covering the windows on both sides. The wards being literally full, the atmosphere was decidedly foul. On proceeding to examine the cases, I was not impressed with their gravity, having regard to the time spent in hospital; indeed, in the case of many, it was difficult to see that any cause existed for their admission, other than that this formality is requisite under the jail rules, if observation is extended over 24 hours. Many of the cases might, with benefit to themselves and their fellow-patients, have received observation by daily being paraded before the Medical Officer at the hospital. As a result of this system, several cases were registered under “ague” without symptoms of any disease whatever being ascertained, that is, beyond the patients’ verbal statement, that they had fever before arrival. In the absence of a diagnosis, many had received no treatment, beyond being placed on a probationary “spoon diet” preliminary to receipt of hospital “rice diet.” In the afternoon, however, of a batch of applicants for admission several were found in reality to be suffering from fever of a mild type.

6. A camp had been formed to which the sick had been drafted. Here the admissions from ague had been numerous; but inquiry showed that the medical subordinate on duty did not know which men had shown symptoms of fever on admission, and which not. Although confronted with apparently acute attacks of fever, quinine was not in use; if any treatment were given, liquor arsenicalis was trusted to. On examining the dysentery cases, there was reason to believe they were treated on a routine system. It was held that special arrangements existed for the stools of these men being daily inspected, and that this was not so on the present occasion was said to be due to a disturbance by inspection. A patient admitted as suffering from a “double aortic murmur” presented in my opinion no such symptoms; but the Superintendent, who stated he had not had time up to that date to examine the case, although he had been admitted several days, considered there was a pulmonic systolic murmur.

7. I have to draw attention to these facts, as I found myself in the position in attempting to investigate the state of health of the prisoners with practically no data to rely upon, in regard to the reported new factor of fever. It was of little use to investigate the nature of a fever where the patient had been some days under observation without a thermometer having been used, and with nothing beyond his own statement of the existence of fever previously. In short, in my opinion, all medical arrangements in this jail were, at the time of inspection, absolutely disorganized. This state of affairs, the Superintendent held, was due to the large and increasing stress of sickness coupled with the insufficient number and the frequent changes of medical subordinates, owing to pleas of sickness when confronted with duty of an irksome nature.

8. In the camp, a considerable portion of the men presented puffy faces and oedematous extremities to a more marked extent than seen on any previous inspection.

9. The first indication in this enquiry was to ascertain whether the fever now complained of was causative of mortality in the present time, or whether it had brought about the mortality in the past months. So far as could be gathered, under the unfavourable circumstances described above, the fever was not otherwise than of mild and ephemeral type, and was not directly connected with the mortality; it was

also of recent occurrence, and was, therefore, not connected with the past mortality. The next question to decide was whether the fever had indirectly affected the gravity of prevailing diseases and mortality. Thus, it might well be that the fever had increased the number presenting puffy faces and oedematous feet. Enquiries, however, elicited no definite relation between the two events. A few declared the oedema had occurred subsequent to the fever; others that it had appeared gradually without fever. It therefore seemed that, whilst the oedema might follow an attack of fever, it was not essential it should precede it. As to the exact nature of the fever, whilst explicitly not committing himself to a definite opinion, the Medical Superintendent suggested that "relapsing fever" was present, and, indeed, had so far convinced himself on this point as to state, in the hospital records, that in a case of pneumonia, "the symptoms may be only due to spirilla present in the lungs." It was, of course, desirable to determine whether malaria or relapsing fever was suffered from that the blood should be examined microscopically, and for this purpose, finding the Superintendent unwilling to place his private instrument at my disposal, I asked him to forward specimens to Madras; this, however, he has neglected to do up to date. The clinical symptoms, however, are such as to negative relapsing fever definitely, and to demonstrate sufficiently obviously fever of a mild malarial type. Again, a very large number of examinations of urine negative the connection between the presence of oedema and kidney mischief; indeed, the persistent search for albumin, with negative results, seems in some measure to account for the absence of sufficient time on the part of medical subordinates for effecting detailed measures in respect to the sick. A further suggestion of the Superintendent was that a malarial fever was dealt with that had been brought about by germs that had undergone an increase of virulence sufficient to cause infectiveness. Of this infectiveness, however, he was not in a position to produce evidence. This explanation is similar to that advanced by Surgeon-Captain Rogers with reference to "kala azar." The infectiveness of this disease is still a point under discussion by the medical profession, but to argue at this stage that the malarial germ (a protozoon) can acquire a direct infectiveness is at least premature. That anchylostomiasis would undoubtedly favour the existence of oedema was in a former report conceded; but such a result, if uncomplicated by any other disease, would be looked for solely in cases presenting a high state of anaemia following the blood-sucking propensities of the parasite concerned. An examination of 59 cases failed to establish a connection between anaemia and the oedema. Indeed, at least two cases that were selected as typical for discussion presented no anaemia whatever; they were physically well developed men, and did not suffer from any disease of the heart. In one of these oedema of the extremities was not bilateral, thus pointing decidedly to deranged nervous control and not to a blood condition; slight oedema over the tibia was also evident in men not obviously anaemic. In one case the patellar reflex on both sides and, in another, on one side was found impaired; in others, certain of the reflexes was exaggerated. Every effort was made to prevent the prisoners understanding the subjective symptoms of beri-beri; yet the feeling of precordial tightness, of burnings in the hands and feet, twitchings of the muscles, and palpitation of the heart were complained of in various instances. In this connection, it must be remembered that 28 cases which were regarded as most resembling beri-beri had, previous to my inspection, been transferred to Vellore by the Superintendent.

10. In reference to the admitted existence of anchylostomiasis, it was found that the Superintendent had, as a matter of routine, exhibited both santonine and thymol for several months. He declared the latter had not been given as systematically as he could have wished, as the bazaar supply did not equal his demand. Still, he admitted that a very large portion of the prisoners had been treated, as a routine measure, since he had taken charge in 1897. He was, however, not in a position to show that this measure had either diminished the number of cases suffering from puffiness of the face and oedema of the feet, or had produced an improvement in the general health of the population. *On the other hand, the statistics given in paragraph 2 show that, whilst up to July some care as to beri-beri had been exercised, subsequently no special selection had been undertaken for this disease.* Although not necessarily *post hoc propter hoc* mortality and sickness set in, a circumstance that coincides generally with the history of this jail (*vide* paragraph 16 of the joint report alluded to in paragraph 2 of this letter).

11. Under the above circumstances, I see no reason to modify the opinions, and advice founded thereon, given in the report by the Surgeon-General and myself. This opinion was to the effect that beri-beri was endemic in the jail, and that a condition of "intoxication" from this disease coupled with weakening influence of anchylostomiasis predisposed the inmates to less effectual resistance to the inroads of other diseases, and to results of unsatisfactory hygienic conditions than would be the case with the population under normal circumstances, and that it was essential that by hygienic measures calculated to decrease the chances of beri-beri maintaining a hold in the building he adopted, and that side by side with these means he enforced against the spread of anchylostomiasis. In this case, the predisposition of the jail population was doubtless favoured by the admission of a large number from the bills in a weakly condition during the prevalence of famine. In this condition prisoners would more readily be open to infection, and thus more foci of beri-beri would exist within an area favourable to the persistence of the still dubious microbe producing it. There is, however, no evidence to show that the presence of those famine-

* The clinical history of beri-beri shows that it is occasionally ushered in by mild fever, but it is no essential part of what is a non-febrile disease.

stricken persons had infected the jail with dysentery. As to the fever itself*, it seems to be merely a superadded factor to the ordinary circumstances affecting the health of the jail population. This dis-

case was, so far as could be judged by depending on the incomplete data at disposal, of a mild malarial type, and acted detrimentally in precipitating the puffiness of the face and oedema of the legs, to which "beri-beri intoxication" had predisposed the prisoners. It has not seemed to me to be necessary to make extended inquiries on the point, but it is worth recording that old inhabitants of Rajahmundry informed me that not since 1879-80, when a similar outbreak of fever occurred in the jail, was the river-bed in its proximity so largely exposed. It has been long held that the wind blowing from the Rumpa Hills influenced the amount of fever in this jail. This may simply mean the wind passing over the exposed river-bed, in the sand of which is plenty of organic matter derived from highly malarious regions. This, of course, implies the possibility of conveyance of the malarial germ in its present recognized (plasmodium malariae) or in some modified form or, secondarily, by the mosquito, or its remains [Manson]. Exactly how this is effected matters little, as few doubt the transmission of malaria by wind. If unusual exposure of the river-bed had any thing to do with the matter, the municipal statistics should show an increase of deaths from fever over the numbers in corresponding months in the previous year, that is, from August to January. The following statistics give color to, but are not sufficiently confirmatory of this theory:—

		Deaths from									
		Years.	Cholera.	Small-pox.	Fever.	Dysentery and Diarrhoea.	Injuries.	Dropsy.	Beri-beri.	All other causes.	Total.
1	2	3	4	5	6	7	8	9	10	11	
August		1897	52	..	24	16	3	8	..	26	129
		1896	37	..	21	9	2	10	..	21	100
September		1897	39	..	25	24	1	15	..	37	141
		1896	17	..	26	20	..	9	1	35	108
October		1897	37	..	27	15	1	16	..	24	120
		1896	..	..	19	7	2	11	..	16	55
November		1897	..	..	28	12	4	14	..	26	84
		1896	..	..	17	3	3	7	..	23	51
December		1897	..	..	23	15	4	13	..	13	68
		1896	..	..	22	5	3	13	..	35	70
January		1898	..	..	16	8	5	12	..	14	52
		1897	..	..	16	4	3	12	..	37	72

		Rate per mille of population.									
		Years.	Cholera.	Small-pox.	Fever.	Dysentery and Diarrhoea.	Injuries.	Dropsy.	Beri-beri.	All other causes.	Total.
12	13	14	15	16	17	18	19	20			
August		1897	22.6	..	10.1	6.8	1.3	3.4	..	11.0	54.5
		1896	17.6	..	10.1	3.8	0.8	4.2	..	8.9	45.7
September		1897	16.5	..	10.6	10.1	0.4	6.3	..	15.6	53.5
		1896	7.2	..	11.0	8.5	..	5.8	0.4	11.8	44.0
October		1897	15.6	..	11.4	6.3	0.4	6.8	..	10.1	50.7
		1896	..	..	8.0	3.0	0.8	4.6	..	6.8	30.2
November		1897	..	..	11.8	5.1	1.7	5.6	..	11.0	35.5
		1896	..	..	5.9	1.3	1.7	3.0	..	9.7	21.5
December		1897	..	..	9.7	6.3	1.7	5.5	..	5.5	28.7
		1896	..	..	10.81	2.4	1.3	5.5	..	10.6	30.4
January		1898	3.9	..	6.8	3.3	2.1	5.1	..	5.9	25.2
		1897	..	..	6.8	1.7	1.3	5.1	..	12.6	30.5

12. The Medical Superintendent has ascertained that numbers of hill men suffer from cysts in their kidneys. So far as is known the occurrence of small cysts in the kidneys is of no great pathological importance, and it does not seem possible to connect this condition with the existing state of the health of the jail generally.

13. As regards direct prophylactic treatment of the prisoners, in addition to measures calculated to increase the nitrogenous elements of the diets (as already advised in this special jail), I consider that during special prevalence of sickness when in the case of recent admission of hill men, it is ascertained definitely that opium-eating has been habitual, it would be advisable to issue opium during at least the first six months of confinement—reducing the dose gradually to nothing in the subsequent months.

14. In closing this letter, I think it desirable to remind you that the question of the nature of beri-beri, kala azar and anchylostomiasis is at present under active discussion by a profession notorious for differing in opinion. As an instance of one combination of ideas, I may state that Sir Joseph Fayrer described an epidemic that occurred in Calcutta as "acute malarial oedema or beri-beri." You have had in charge of the jail since April a Medical Superintendent who is enthusiastic on the subject of anchylostoma and other intestinal worms, and, judging from an examination of the hospital records, I consider any benefit that could have been gained from a partiality to the theory of general ill-health founded on their presence in the population, has had more than a fair trial. Without ignoring the influence of intestinal parasites, and setting aside, as far as feasible, all theoretical considerations as to

sation and terminology, I think it must be clear to you that there is a disease endemic in this jail that was endemic in its predecessor, and is still so in the neighbouring town, which has been long known by the medical profession as beri-beri; that new arrivals are peculiarly liable to contract it; that long residence under good hygienic conditions confers power of resistance; that many, though not all, suffering from oedema of the feet present symptoms referable to disturbances of the nervous system, and not to mere anemia; that the disease, although its existence had been recognized prior to that period, first underwent accentuation upon the jail population shortly after the arrival of a batch of Burmese convicts admitted by suffering from beri-beri; that experience in this jail has shown that prompt transport of all cases affected with this disease was followed by improvement in the general health of the population, and that neglect to do so produces the reverse results; that experience also shows that any cause influencing the general health of the population is at once reflected by an increase of cases of oedema; that the behaviour of the disease is such as to lead to the belief that it is conveyable to fresh arrivals from sources of infection within the jail; that if this be so, and its nature be at least analogous to, if not actually, beri-beri, the probability is the microbes causing it adhere to the walls and soil of the buildings, and, consequently, as a practical sanitary measure, that one of the first steps to get rid of is segregation and transport to localities unfavourable to the propagation of the infective cause, and subsequent complete disinfection of the building, and permanent improvement of its structure.

APPENDIX D.

From W. E. MITCHELL, Esq., Acting Superintendent, Central Jail, Rajahmundry
to the Sanitary Commissioner, Madras, dated 19th August 1899, No. 724.

Quantity of rainfall in
inches for the periods
mentioned in the
letter.

INCHES.

0.47

3.93

0.05

0.10

15.52

(i) On the 11th, 12th and 17th July 1897, 220 undertrial prisoners were received from Polavaram.

On 18th July 1897, 254 Runapa prisoners were sent into camp. They were in camp from four to thirty days and the camp was closed on 7th August 1897.

(ii) The following movements of undertrial prisoners were made:—

To Polavaram on 22nd July 1897 .. 36 prisoners.

.. " on 23rd " .. 27 "

.. Koilgudem on 5th August 1897 .. 111 "

.. Cocanada on 16th " .. 48 "

Of these 96 prisoners returned on 30th August 1897 and seventy prisoners returned on 6th September 1897.

(iii) The camp was re-opened on 14th September 1897 and closed on 16th October 1897.

(iv) None of these prisoners were taken inside the jail as they were accommodated in the sheds erected in the quarantine yard and in front of the jail. The civil debtors' yard was vacated and was converted into a hospital for the prisoners outside the main jail. None of these prisoners came from Kurnool.

(vi) No fresh admissions were received in September. They were the prisoners who were taken to Koilgudem, &c., for trial. They returned to the jail, some on 30th August 1897 and some on 6th September 1897. They were accommodated in the sheds erected outside the jail and sent to the camp on 14th September 1897 and brought back on 17th October 1897 to the sheds erected behind the jail.

(vii) The periods during which prisoners were sent to camp from September 1897 to April 1898 are given below:—

	From	To
3.93	Camping ground shed ..	18th July 1897. 7th August 1897.
15.52	Do. ..	14th Sept. " 16th Oct. "
1.13	Sheds behind the jail ..	17th Oct. " 16th Nov. "
..	Do. ..	17th Jan. 1898. 31st Jan. 1898.
1.0	Camping ground shed ..	1st Feb. " 16th April "

(up to 31st March 1898).

(viii) During the above period the total strength of the jail was about 1,300. There were 200 sick and 350 or so in camp. After the camp was established on (Fox Hill) all new arrivals were sent to the camp and none were admitted to the main jail.

(ix) A statement showing the strength of the jail camp, from July 1897 to April 1898, is enclosed.

STATEMENT showing the relative strength of the Central Jail proper of the camp and the sheds outside.

Dates.	Camping grounds.	Sheds outside the jail.	Sheds behind the jail.	Total pick-up.	Jail proper.
1897.					
18th July ..	254	42	..	1,112	816
25th " ..	233	..	..	1,077	811
1st August ..	159	35	..	1,118	824
8th " ..	..	48	..	1,074	865
15th " ..	..	49	..	1,083	1,034
22nd " ..	..	40	..	1,048	1,068
29th " ..	..	..	..	1,104	1,104
5th September ..	..	52	..	1,200	1,118
12th " ..	..	124	..	1,282	1,158
19th " ..	370	103	..	1,278	865
26th " ..	408	53	..	1,258	797
3rd October ..	429	..	..	1,325	799
10th " ..	326	63	..	1,175	786
17th " ..	..	89	154	1,032	789
24th " ..	..	23	132	974	819
31st " ..	..	49	216	1,059	800
7th November ..	..	..	196	1,001	805
14th " ..	..	35	..	1,006	1,001
21st " ..	..	72	..	1,165	1,003
28th " ..	..	42	..	1,149	1,008
5th December ..	..	37	..	1,152	1,005
12th " ..	..	16	..	1,119	1,103
19th " ..	..	30	..	1,155	1,123
26th " ..	..	40	..	1,167	1,127
1898.					
2nd January ..	..	15	..	1,120	1,105
9th " ..	..	15	..	1,115	1,008
16th " ..	..	17	..	1,051	1,057
23rd " ..	..	31	179	1,006	790
30th " ..	..	21	212	972	796
6th February ..	313	..	..	968	505
13th " ..	326	..	..	857	501
20th " ..	305	..	..	873	508
27th " ..	234	..	..	877	648
6th March ..	140	..	..	820	672
13th " ..	181	..	..	809	628
20th " ..	121	..	..	792	608
27th " ..	99	..	..	697	508
2nd April ..	48	..	..	423	305
9th " ..	61	..	..	391	299
16th " ..	9	..	..	317	285

No. 5918.

Office of the Surgeon-General
with the Government of Madras
Madras, the 9th October 1899.

From

Surgeon-General C. Sibthorpe, C.B., F.R.C.P.I.,
Surgeon-General with the Government of
Madras,

To

The Director-General,
Indian Medical Service,
Simla.

SIR,

With reference to your letter No. 4158 dated the
2nd August 1899, I have the honor to forward herewith a
memorandum compiled by the Sanitary Commissioner, Madras, on
the subject of mortality in the Central Jail, Rajahmundry,
and to state that I fully concur with Lieutenant-Colonel
King.

I have &c,

(Signed) C. Sibthorpe,

Surgeon-General,

Surgeon-General with the Government
of Madras.

No. 269.

To

The Honorable the Chief Secretary to Government,
Public Department.

True copy forwarded for information.

2.

A copy of the memorandum is also attached.

Madras

9th October 1899)

Surgeon-General,
Surgeon-General with the Government
of Madras.

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APPENDIX E.

REMARKS IN OFFICIAL VISITORS' BOOK, RAJAHMUNDY JAIL, BY THE SANITARY
COMMISSIONER FOR MADRAS.

5th July 1899.—Sanitation advances by methods that are slow and tortuous in
this country. Demonstration of sickness as a result of conditions—not warnings—are
demanded. In 1889, Surgeon-Major McNally advised the well should be covered in;
it is not correctly completed to this day. In 1894, I advised the well be covered in,
the covering of elevated cistern, the abolition of the filters, and of the open bathing
cisterns—suggesting in lieu of the latter delivery of water by jets controlled by taps
or valves, and the rendering of all floors air and moisture tight by correct flooring.
In 1896, when the health of the jail had begun markedly to degenerate, I again
pointed out the latter necessity, and whilst maintaining that “to no single cause could
the unhealthiness be assigned but to a combination of inattention to sanitary details.”
I pointed to the fact that beri-beri had at intervals haunted the jail, and that “if
this is to be abolished finally, all errors as to diet must be absolutely remedied, and
the specific organism credited with its causation must be got rid of by a complete
cutting off of ground—soil air, by means of an impervious paving, and complete dis-
infection of the walls by whitewashing, after carefully scraping off old deposits.” I
cautioned that, “if the contention that resistance to this disease is to be measured by
hygienic surroundings and especially in case of diet, it follows that on a large popula-
tion, even if the full train of symptoms may not exhibit themselves, there may result
a general lowering of the health and the modified conditions due to the action of its
virus.” In my opinions and recommendations, Surgeon-General Sibthorpe, C.B.,
fully concurred in our consultation in 1897. Consequently, it strikes me that if these
recommendations were right in 1894, and in 1896, and in 1897, it should not have
required the burst of mortality of 1898 to demonstrate their advisability; at any rate,
I am glad to find they are now being acted upon. The Medical Superintendent has
taken much trouble in demonstrating the existence of malarial organisms in the bod-
of certain convicts. Their existence can hardly be regarded as a peculiarity of
inhabitants of the Rajahmundry Jail—but certainly the matter should receive
earnest attention as one of the conditions liable to produce a “general lowering of
health.”

Amongst certain other suggestions made by me in 1896, I would again refer to
paragraph 6 of my report, dated 27th August, in which it was surmised, in absence of
information asked for from the Superintendent (Mr. Young) and not supplied by him
by mistake that, “although the cubic space is duly marked (on the blocks), it seemed
to me likely height has been too much trusted to, and that the fact that space should
not be regarded as “available” above 13 to 14 feet has been ignored.” The present
Superintendent (Captain Fearnside) has to-day supplied me with the measurement of
an “association block,” and I find if this universally-allowed sanitary rule be accepted,
blocks meant to accommodate 30 prisoners should only accommodate from 24 to 26,
according to the special standard accepted. Under these circumstances, “overcrowd-
ing” in this jail must have been of no rare occurrence. The work effected in
improving the structure of walls and floors in the jail up to date is substantial and
exhibits good workmanship. I, however, suggest the grant be increased sufficiently
to allow of the cement-lining of the walls to be carried up fully 4 feet 6 inches so that
defilement by spitting, &c., shall be readily dealt with.

I invite attention to my repeated remarks as to defective quarantine arrange-
ments (1894—1896). Washing of vessels in the kitchen is still primitive and
unsound. Direct flow from jets could easily be arranged for, instead of a method
permitting of dipping into a cistern, tubs, &c.

5th July 1899.

(Signed) W. G. KING, Lieut-Col., I.M.S.,
Sanitary Commissioner for Madras.

No.

DATED

CURRENT No.

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ENCLOSURES TO C. No.

ORDER OF GOVERNMENT

A A A A A A A

LETTER OF GOVERNMENT.

STATEMENT WITH DITTO.

PAPERS NOT FILLED UP, BEING MEANT FOR DESPATCH
IN ORIGINAL.

N.B.—

- A = Copy in full.
- B = Not to be copied.
- P = Copy abstract only.
- Q = Copy heading only