OBSERVATIONS ON BERI-BERI.

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During my residence in Singapore, from November, 1898, until January, 1903, and especially during the period of nine months that I was acting health officer to the municipality, I had opportunities of seeing a large number of beri-beri cases, and was much impressed with regard to several points in the disease which I will endeavour to describe. Various theories have been put forward as to the cause of beri-beri, and at present in the Straits and Japan, the best favoured theory is, that the disease is acquired through eating mouldy rice and sun-dried, partly decomposed fish, the staple diet of Malays and Chinese. Then, again, you see it stated that it is due to a special germ, but so far, although many experts have worked hard with a view to discovering the germ, their efforts have been fruitless. There was a severe outbreak of beri-beri in the Christmas Islands in 1902, and this was put down to the rice. Some of this rice was sent to the health officer; I made many cultivations in different media from the rice, but without result, so far as a specific germ for beri-beri could be detected, although there were numerous moulds and common forms of bacteria present. Amongst other causes are mentioned over-crowding in ill-ventilated and badly drained houses. From many observations it seemed to me that the origin of the disease was more likely to be situated in the soil, and either miasmatic or due to a specific germ. I could not help being struck with the fact that the boot-wearing community, notably Europeans and well-to-do Eurasians, &c., rarely, if ever, acquired the disease. The only cases I came across in Singapore amongst Europeans were patients in the Tan Tock Sen Pauper Hospital, and these men were in the habit of going about without shoes and stockings, pointing to a possible infection through the feet from the soil.

I employed a Malay "kebun" (gardener); he had only been with me about three months when he contracted beri-beri, and left for his home in the Straits. I employed another; he also contracted the disease and left. Both these men were perfectly healthy when I engaged them, and it bothered me considerably to think that they should have acquired the disease at my house, and led me to hunt around for the cause. Under the bungalow there was a dark, badly
ventilated cellar, which was only intended for the garden implements, &c. Both these men were like the usual run of Malays, viz., very lazy, and passed most of their time sleeping in this cellar, and it seemed to me highly probable that the soil on the floor of the cellar might be infected with beri-beri. I had the cellar well cleaned out and thoroughly disinfected, the floor being washed with a strong solution of perchloride of mercury, and converted the cellar into a dark room for photographic work. The next gardener I employed, who was also a Malay, did not frequent this cellar, and although he worked for me for a period of over six months, he was quite well and had no symptoms of beri-beri when I left Singapore. This may have only been a coincidence, but it seems highly probable that the soil was infected, and the fact of the room being dark and badly ventilated assisted in the development of the disease.

In 1902 I was asked by the Eastern Extension Telegraph Company to go to the Cocos Keeling Islands on one of their ships, and to report on a severe outbreak of beri-beri amongst the Malay and Chinese coolies on their works there. I obtained three weeks' leave and went down in charge of a number of healthy coolies to replace those on the island. On arrival I inspected the small island, and it was evident that the disease had been fostered by faulty housing. These islands are of coral formation, and only a few feet above the level of the sea. The Chinese coolies were located in a large shed built of "attap" (dried palm leaves) covering a framework of wood; the "attap" reached right down to the ground, and there was very little ventilation and light. To add to this the hut was built in a hollow on the sea-level. The Malays were better off, being located in a wooden house raised off the ground for about two feet. Here, a peculiar circumstance struck me: the fowls, of which there were a considerable number, used to go under this building to scratch in the dry soil, and the inhabitants complained that their fowls were dying off, so that it would appear that even the fowls were dying from beri-beri, acquired evidently from the infected soil under this house. The Europeans were located on high ground in excellently ventilated habitations and were in perfect health. Just before my arrival some capital huts, termed "ponduks" locally, had been erected on high ground near the sea, for the purpose of accommodating the new coolies. These "ponduks" was a kind of lean-to, built of bamboo uprights, and the roof, which was made of dried palm leaves, sloped down from the front to within eighteen inches of the ground behind, the whole
area in front being open, so that ventilation was of the freest kind. The ground underneath was made up of large blocks of coral covered with smaller fragments and then levelled off. "Charpoys," well raised off the ground, were supplied for the coolies to sleep on, and nothing was allowed to be put under the "charpoys." I may mention that the idea was taken from coolie huts erected on the adjacent islands belonging to Mr. George Clunie Ross, the owner and governor of the Cocos, and he informed me that he never had any cases of beri-beri on his islands. Before landing the new coolies I recommended that the old Chinese quarters should be burned down, and this was carried out. The Malay house was thoroughly disinfected with strong perchloride of mercury solution, the ground underneath excavated to eighteen inches, the excavated soil being thrown into the sea and replaced by broken up coral. Wire netting was placed around to prevent the fowls from going under the house. The new coolies were disembarked and put in the recently erected "ponduks." All the old surviving coolies were brought back to Singapore. I heard some considerable time after that no fresh cases of beri-beri had occurred on the island. Now, looking at the fact that there were no cases amongst the Europeans, and that they consumed the same kind of rice, made into curries, &c., as the rest of the inhabitants, and that they were located on the same small island, but under different conditions, in that they were properly housed, I have no doubt that the disease must have been imported first of all by one or more coolies, and that these first cases contaminated the soil under the coolie quarters, the disease being fostered and spread by the insanitary state of their dwellings as regards ventilation, &c. Again, looking at the effect of change of surroundings, &c., on the sick coolies I took back to Singapore, I was informed that I should lose at least eight of the coolies on my way back, and looking at their condition I fully expected to, but from the date of embarkation they nearly all began to improve, and only three died, one of these dying within a few hours of reaching ship. These three cases were all "wet beri-beri," and I have always noticed when one can get beri-beri cases under one's own observation in a proper building and with careful supervision, that the "wet beri-beri" cases are the hardest to cure and more likely to be suddenly fatal. It is marvellous how quickly a case will terminate fatally. You will see a man in the morning suffering from "wet beri-beri," and who is apparently progressing favourably in every way, and a few hours afterwards will be sent for and find him struggling for breath and in extreme agony. These cases
nearly always point to the cardiac region and say “sini tuan” (Malay for “up here, Sir”), “suda mati” (“am dying”), and nothing will save him. I have tried venesection and found it useless. You frequently get temporary relief by administering nitrite of amyl followed up by doses of nitro-glycerine, but the relief is only temporary. I have always found cases of “dry beri-beri” yield to treatment more satisfactorily than “wet beri-beri.” Cases of the former nearly always progress satisfactorily under favourable conditions, viz., location in a freely ventilated room, free diet of good milk and soup, &c.; iron, arsenic and strychnine, and especially the latter in the form of liquor, appear to be of immense advantage in promoting a cure. When the dry form has lasted some time, there is considerable wasting of muscles following peripheral neuritis, and massage is very beneficial, the Malays being especially adept in the art.

I have not attempted to describe the symptoms, &c., of beri-beri in this paper, as they have been so frequently described, but have limited my remarks to a few personal observations.