

ENTERIC FEVER: A WATER-BORNE DISEASE.

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UNDER this heading I hope I may be allowed to reply to an article by Surgeon-General R. H. Quill, A.M.S., entitled "Enteric Fever: Is it invariably a Water-borne Disease?" which appeared in this Journal in September, 1906; more particularly do I wish to reply because the epidemic at Diyatalawa, the camp of the Boer prisoners, has often been cited in the lay and medical press as an undoubted instance of a fly-borne epidemic of typhoid fever.

In my paper published in this Journal in May, 1906, I endeavoured to show that flies, dust and contagion have little to do in causing epidemics of enteric fever, and therefore I could not pass over in silence the outbreak at Diyatalawa reported in the Army Medical Department Report of 1900.

Briefly, amongst 5,028 Boer prisoners, 600 cases of enteric fever occurred; the epidemic began fourteen days after the arrival of the fourth transport from South Africa, after the onset of the rains, and subsided when they stopped. No attempt was made to purify the water supplied to the Boer camp, as it was considered above suspicion. Having once spent a holiday in this part of Ceylon, which, though partly covered by jungle, is also the heart of the tea country, I made the statement that from the report as it stands it appears not impossible that the source of the water supply had been contaminated by an unsuspected tea estate, either by manure on the soil, or by the excreta of the numerous coolies working on it. To the suggestion that the water supply could have been polluted as above, Surgeon-General Quill gave an emphatic denial, but on account of information recently received from Ceylon, I propose to answer his reasons for considering the water pure above the intake.

Surgeon-General Quill states: "(1) The source of the water supply was what appeared to be a spring on the mountain side, some three and a half miles from the camp. This intake was extremely isolated and most difficult of access, as was brought home to me when, in company with Sir Allan Perry, I climbed the mountain side in the course of our search for a pure water supply. I can safely state that the source we selected was entirely removed from danger of pollution by wayfarers of any description;

and as to the tea estates alluded to by Major Faichnie in his paper, the nearest was several miles distant. Between those estates and our spring was a dense jungle. So far as my recollection serves me I have fairly described the location of our water source."

As nothing definite is said about the water between the intake and its source, which is the chief point of my criticism, this is hardly a sufficient answer, because I quoted Dr. Thresh's rule, viz.: "to inspect a stream for pollution, every tributary, drain and ditch should be noted carefully, as well as the extent and character of the area liable to flood, and the proximity of highly-manured land." Information as regards the source, received from the Royal Army Medical Corps officer now in charge of the camp at Diyatalawa, is as follows: "About the water supply of the camp: it is derived from three separate sources, springing from the high ground above the railway. Taking them in order going from the camp, the first originates in a small patch of jungle. . . . The second source is about half a mile further on: a stream about eighty yards long flows from a hollow in the hills into a concrete basin, thence through an iron pipe into the main, about 200 yards from and above the railway; the catchment area here is also uninhabited, but in the hill above the stream is a small portion of a tea plantation—there is no tea round the hollow, the source of the supply. The third source is about half a mile beyond the second; it is about a quarter of a mile away from the railway, but part of the catchment area here is a tea estate; a bungalow is on the hill above, and the water might be contaminated from this source; however, this source is not now used." From an entirely different source I have the same information, and also I am told that tea gardens slope up on each side of this third stream, and that these gardens are always manured; so that at the onset of the rains pollution from these tea estates, even though they are separated from the intake by dense jungle, would be conveyed into the camp in two hours' time.

Surgeon-General Quill states: "(2) The water in the large iron storage tanks located in the prisoners' camp was subjected to a weekly chemical examination, as well as to frequent bacteriological and microscopical examinations. The result invariably declared the water to be of great purity."

It may be noted that in the original Army Medical Department Report this is expressed differently: "Frequent chemical analysis invariably declared the water to be remarkably pure; a similar

verdict followed a bacteriological examination of the water." It is not quite clear, therefore, whether one bacteriological examination, or more, was made; this is important, as during the rains the quality of the water would alter with every shower; also, if the examination were made before the onset of the rains it would be valueless. A negative chemical examination is often, of course, of no value, as is well known and as may be demonstrated any day by simple experiment in a laboratory. Besides this, nothing is said of the nature of the analysis, and McConkey's test was not in use in 1900. Finally, if impurity is known to enter a water, it is quite immaterial whether it is found or not in the few ounces taken for examination out of several thousand gallons.

Surgeon-General Quill states: "(3) No alteration of any kind was made in the water supply or filtering arrangements during the time the camp was in occupation (over two years), yet no case of enteric fever occurred among the troops, or, I believe, among the prisoners, subsequent to the cessation of the imported (?) epidemic in December, 1900. I commend this fact to Major Faichnie, and would further remind him that the periodical rains continued in their due season, and that the tea estates remained under cultivation."

To this, in addition to the statement as above, that the suspicious intake was not now being used, the following information from the Inspector of the Public Works Department at Diyatalawa may be added. "Water from source at Hapartall was used when the camp was first opened. Latterly it was cut off, owing to supposed contamination by cattle, manuring of the estates bordering on its source, &c." In reply to as to when this was done, a minute is added: "It was about a year before the evacuation of the camp by the Boer prisoners."

The above information, obtained from three independent sources, as regards the water supply, does not tally with that given by Surgeon-General Quill. If his account of the water supply is right, then the epidemic at Diyatalawa serves as an instance, quite unique in my experience and reading, of a fly-borne epidemic where water could be absolutely and undoubtedly excluded; but if my version be correct, it gives yet one more instance of what I contend is so usual in any climate or any country, viz., given an impure water supply it is extremely difficult to stop enteric fever, as is shown by the fact that it occurred among the men forming the guard of the Boer prisoners, in spite of the minute precautions taken by

Surgeon-General Quill. Here it will be noted that, on the strength of the precautions taken, the disease is attributed to flies and contagion, but can there be any reasonable doubt that if the water were bad it was undoubtedly the original cause, however difficult it may be to say what was the exact method of infection? On the other hand, given a pure supply of water in pipes, so that it cannot be contaminated, however great the soil pollution, then even amongst Boers, with their notoriously insanitary habits, massed together in a moist tropical climate on the same ground for a long period, ground which had been without doubt specifically polluted by the severe epidemic, and with the camp no doubt swarming as before with flies, it is seen that enteric fever in epidemic form ceased and did not recur. To account for this, we find in the Army Medical Department Report that the diminution of the disease is put down to the redoubled efforts of those superintending the camp, and to the education in sanitation of those in it; but can there be any question that the great primary factor was the cutting off of the supply of impure water?

Until my information is shown to be wrong, I see no reason to alter my original statement that water cannot be excluded as the cause of the epidemic at Diyatalawa.

