ANNUAL SANITARY REPORT, 1906—SIERRA LEONE.

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I took over charge of the District Laboratory, Sierra Leone, on December 15th, 1905. The work, however, embodied in this report, only properly commenced in March, 1906. The work done consisted mainly of (1) Parasitology, and (2) Water Analysis.

PARASITOLOGY.

(a) Malaria.—For the ten months under consideration, the blood of every man coming to hospital at Tower Hill with fever was searched. Of the 387 men examined, 172 had the malarial parasite in the peripheral blood, and of these, 171 were of the malignant tertian variety, one of the quartan, and none of the benign tertian. The malignant tertian form of the parasite, then, is by far the more common. That it is a malignant form of the parasite is undoubted. The red corpuscles are small and frequently crenated. The parasites take the form of small, sometimes minute, rings, each ring having two or three dots of chromatin. Often two, and occasionally three rings are found in one corpuscle. Many corpuscles in one field of vision are seen to be infected. No intermediate forms are seen between these rings and the crescents that are occasionally met with. There are, to my mind, many interesting points to note, if a comparison be made between the malignant tertian fever of Sierra Leone and the malignant tertian fever found in India, or at any rate in the Western Command in India. These points are as follows: (1) It is comparatively yielding to quinine. (2) When treated early, it is the exception to find crescents in the peripheral blood. All the cases having malignant rings in the blood were re-examined at intervals for crescents, and out of 171 cases so examined, in thirteen were the crescents found. (3) Of those comparatively few cases in which crescents were present, in only a small proportion did the crescents persist in the blood under treatment. In quite two-thirds of the cases the crescents disappeared under quinine. On these grounds it seems reasonable to me to suppose that we have in Sierra Leone a different species of malignant parasite to deal with than the one commonly met with in the West of India, and such I firmly believe to be the case. No cases of benign tertian were seen, and only three of quartan, of which two were found in native children. Besides the soldiers who were examined, a considerable number of natives were also seen. In one village in the Protectorate, situated on a swamp, the
blood of every native infant examined contained the parasite—either malignant tertian, or a mixed infection of quartan and tertian.

Fatal Cases of Malaria.—There was one fatal case (not including blackwater fever) during the year. It occurred in a European gunner. Smears and sections taken from the brain and spleen showed a tremendous invasion by the malignant tertian parasite, the capillaries being choked with malarial pigment and rosettes.

(b) Mosquitoes.—The mosquitoes conveying malaria here are the *Pyretophorus costalis* and the *Myzomyia funestus*. I believe that Major F. Smith, D.S.O., R.A.M.C., found another anopheline—a new species—but I have never been able to find it. Anophelines were found at the beginning, during, and at the end of the rains in the hospital, barracks, and guardrooms, but they always had to be carefully searched for. They were always easily obtained from the native dwellings in the town. Anopheline larvae were found in pools in the rocks in the valleys adjacent to Freetown, and in the low-lying rocky situations near the shore. I failed to find any during the dry season, at which time, too, it is exceedingly difficult to get anopheline mosquitoes anywhere except in the native dwellings. Mosquitoes are also found breeding in old bottles and tins in and around barracks. Further mention of this is made in the Sanitary Report by Stations.

(c) Ankylostomiasis.—A considerable amount of work has been done in connection with this disease. Since September 24th, 1906, the stools of every man admitted to hospital at Tower Hill were systematically examined for Ankylostoma ova. Previous to this date, only the stools of those men having fever not affected by quinine, or having some other symptom suggesting ankylostomiasis, were examined. Of (1) 130 non-European soldiers examined, ova were present in seventy-three cases, showing a percentage of 56.1. Of (2) ten European soldiers examined, in no cases were the ova found. The net result was to show the exceeding prevalence of the diseases amongst the non-European soldier.

Causation.—In what way is this prevalence to be accounted for? I am convinced it is not from the water supply, as I have frequently examined the slight sediment of the Mount Aureol and Tower Hill waters, and have never found any ova in them. Further, the disease is almost entirely confined to the non-European troops, which practically puts the drinking water out of court as a possible agent. I believe the cause to be as follows: (1) Probably a good many cases are imported from the West Indies with the arrival of the battalion. (2) We in barracks live close to a large city of non-European inhabitants. In the Annual Report of the Principal Medical Officer of the Colony for 1904, it is definitely stated that 48 per cent. of the inhabitants of Freetown suffer from ankylostomiasis, these figures having been arrived at from the examination of the stools of a large number of cases.

Freetown is one mass of cess-pits, and during the heavy rains the
fecal matter gets washed out of these, the result being that the soil of the
town becomes saturated with sewage. I have several times found the ova
and embryos in puddles of muddy water. Besides the married soldier,
who lives in the town, practically all the non-European soldiers have
families or relatives there, and they are therefore continually in the town.
It is not unreasonable to suppose, therefore, that it is in the town the
infection takes place.

An experiment showing how long ova could be recovered from water
inoculated with a loopful of infected stool was made. This water was
examined daily and ankylostome ova were found up to the fifty-ninth day.
At the latter end of this period, the ova were very dark in colour, but
after the fifty-ninth day they began to disintegrate and finally disappeared
altogether.

The result of this experiment seems to show that moist soil con­
taminated with ankylostome ova may be a source of infection for at
least two months, and this is precisely the condition that pertains in
Freetown.

Character of the Disease.—In the majority of cases in which ankylos­
tome ova were found the patients presented no symptoms of the disease.
Previous to September, when the systematic examination of the stools
was begun, in many instances it was not until the routine examination
of the blood for malaria revealed a condition of eosinophilia that ankylos­
tome ova were looked for in the stools and found. In some instances,
however, the usual symptoms were present, and in a few they were
very severe. In one such case there was marked anaemia, high tempera­
ture, and tenderness with distension of the abdomen. The symptoms
were so severe that they suggested enteric fever, but Widal's reaction
gave a negative result. The stools were swarming with ankylostome
ova. After a course of thymol the symptoms entirely cleared up,
although a few ova were found in the stools.

(d) Trypanosomiasis.—The work in connection with this disease was
carried out on the lines instituted by Major Grattan, R.A.M.C., last
year, viz., palpation of the glands of the neck, and in those cases in which
any enlargement occurred, the puncture of such glands and the search for
trypanosomes in the gland juice; also the examination of the peripheral
blood for trypanosomes, and, in advanced cases, of the cerebro-spinal fluid
obtained by lumbar puncture. I have examined the following natives:—

West African Regiment.—All recruits and men not previously
examined by Major Grattan, also as many camp followers as could be
induced to submit to examination. One hundred and fifty-seven men
were examined. Gland puncture was performed on seven. Only one
case of trypanosomiasis was discovered. This case will be mentioned
again.

Sierra Leone Royal Garrison Artillery.—Ninety-one men examined.
Gland puncture was performed on six. No cases of trypanosomiasis were found.

Inmates of the Kissi Lunatic Asylum and Home for Incurables.—One hundred and forty cases examined. Gland puncture in seven cases. Two cases of trypanosomiasis were found. All these were old cases. No fresh cases were found, and this was not surprising, as only twenty new inmates had been admitted since the previous thorough examination had been made.

The Colonial Hospital, Freetown.—Owing to the kindness of the Principal Medical Officer of the Colony, and the staff of this hospital, I was allowed the run of the out-patients and of the wards, and a sharp look-out was kept for any cases having enlarged glands in the neck. Several fresh cases of trypanosomiasis were discovered.

Natives in the Protectorate.—During my trip to Taiama, and also at other times when in the Protectorate, I examined all the natives I could get for enlargement of cervical glands.

The following is an abstract of all the examinations made:

- Number of cases examined for enlargement of cervical glands: 605
- Number of cases in which gland puncture was performed: 40
- Number of cases in which trypanosomes were found in gland juice: 9
- Number of times in which lumbar puncture was done and trypanosomes found in cerebro-spinal fluid: 4
- Number of times the peripheral blood was examined for trypanosomes: 40

Previous Cases of Sleeping Sickness.—The following is a short account of the subsequent history of the cases of trypanosomiasis found by Major Grattan during 1905. Two of the three cases occurring amongst soldiers of the West African Regiment died, one of them, James Goba, of pneumonia, and the other, Makan Kamara, of sleeping sickness, complicated with persistent diarrhoea. Both these men were treated with atoxyl, starting with $\frac{1}{2}$ gr. hypodermically twice a week, and eventually reaching $\frac{3}{2}$ gr. every second day. The third case, No. 2783, Momodu, was under treatment by atoxyl for five months. He had no symptoms originally, and developed none during the period he was under treatment. He subsequently insisted on going to his home. I have only been able to trace some of the cases occurring amongst civilians. One case, “Jimmie,” was in the Colonial Hospital with pneumonia, from which, however, he recovered. Active trypanosomes were present in his gland juice. He has since left Freetown. Thomas Coker, another case, came regularly to see me at the Colonial Hospital, and was admitted for observation. He was put on atoxyl, but developed no symptoms, and finally insisted on going home. The two cases at the Kissi Asylum and Home for Incurables are still alive, though symptoms of sleeping sickness are developing slowly.

Fresh Cases of Sleeping Sickness.—(1) No. 2869 Private Momodu Kata, a recruit in the West African Regiment. I discovered active trypano-
somes in the cervical gland juice on October 4th, 1906. He is a fine-look­
ing man, the glands in his neck are well marked, and he has a peculiar
thickened and oedematous condition of his skin—otherwise there are no
symptoms at all. He has been under constant observation and no
alteration in his condition has been noticed. He comes from the
Maninga country, in French territory. (2) A child named Williams,
also admitted to the Colonial Hospital: an advanced case of sleeping
sickness, from which she died in a few days. She had come from the
Congo with her parents, who are reported to have both died from the
same disease. (3) Max Thomas, a boy sent to me by Dr. Bowers from
Kissi. A well-developed case of sleeping sickness, which proved fatal
to him in a short time. He had a history of having come with his people
from the Congo. (4) A Mendi woman named "Shata"; she came into
the Colonial Hospital in an advanced state of sleeping sickness, from
which she died in eight days. An autopsy was made, the organs showing
the usual characters of the disease. This woman's husband stated that
she came from Talama, in the Protectorate.

On this account I thought it right to visit this district, and try to
find more cases of the disease, and also to see if there were any in­
fected tsetse in the neighbourhood. This was accordingly done, but the
results were disappointing. I found specimens of the Glossina palpalis,
it is true, but on dissection no trypanosomes could be discovered in them.
Further, I palpated the glands of as many natives as I could persuade to
submit to examination. But they were entirely healthy working people.
I was unable to see any sick people. The natives are so superstitious and
timid that they hide away any sick person. It was only after several
palavers and much persuasion that I could get any people at all, even
healthy ones, to examine.

Prevalence and Distribution of the Disease in the Colony.—In
attempting to discover this, I had to be guided by the following known
data: (1) It is now an established fact that cases do occur in the
Colony and Protectorate of Sierra Leone. (2) We know that in Freetown
a certain number of cases are imported from down the Coast, the Congo
and elsewhere. (3) We also know that cases occur in natives who have
never left the Protectorate. (4) We do not know, however, how prevalent
the disease is, because the natives, being so timorous and prejudiced,
adopt the attitude of hiding their sick relatives away. For this reason,
the search for cases in the small areas that have been tried has more or
less proved a failure. To hope for much success in this respect, one
would have to sit down for several weeks in a suspected neighbourhood
and overcome the timidity of the native, and thoroughly obtain his con­

This method of investigation was clearly beyond my reach, and so
I turned my attention to the alternative method—the search for the causal agent, the *G. palpalis*.

The Tsetse-fly.—The first thing to do was to discover the distribution of the *G. palpalis* in the Colony and Protectorate. I had made a tour of a month’s duration with the Officer Commanding West African Regiment and the Commandant Royal Engineers in the north-west corner of the Protectorate. All along the route I was able to catch tsetse-flies, and these I sent to the British Museum for identification. They all proved to be *G. palpalis*. It was unfortunate that I was unable to dissect flies on this trip, to see if they were infected, but we were on duty of a military character, and were travelling as fast as possible. For this reason, too, I was not able to stop very long in any
one place to hunt out any possible cases of sleeping sickness. However, we know the distribution of the *G. palpalis* up to a certain point, vide map. It exists in the low-lying ground in the neighbourhood of Freetown, and also along the Lokkoh Creek, and the courses of the great waterways, viz., the Great and Little Skarcies, the Rokell, the Mobole, and the Tabe Rivers. It was a practical impossibility for me to make a complete tour of the Protectorate in search of flies, as it would have taken several months and have been very expensive. I accordingly approached the acting Principal Medical Officer of the Colony on the subject, with a view to obtaining his assistance in the matter. I gave him sufficient specimens of the *G. palpalis* to send to all his medical officers and the district commissioners in the Protectorate. They are to try and collect tsetse-flies both at their stations and also when on patrol in the bush. The Officer Commanding West African Frontier Force has very kindly consented to do the same, and specimens have been sent to all his subordinates in the out-stations. In this way we shall be able to collect tsetse-flies from every part and corner of the Protectorate. I am easily able to identify the *G. palpalis* and several other species of Glossina, and my successor here can easily learn to do the same from Austen's "Monograph on Tsetse-flies," which is in the Laboratory. It will therefore be unnecessary to send flies home for identification, and a great saving of time is thereby gained.

*Dissection of Tsetse-flies.*—As I am always, or nearly always, able to obtain fresh specimens of *G. palpalis* from the neighbourhood of Aberdeen and the Lighthouse, I tried to ascertain if any trypanosomes could be found in any of them on dissection. Professor Koch, in his article, "Preliminary Statement on a Voyage of Investigation in East Africa," which appeared in the *Journal of Tropical Medicine* in February, 1906, stated that the best method to employ was to pull out the proboscis of the fly, and examine the droplet of clear fluid at its base for active trypanosomes. I used this method and also examined the contents of the stomach. All my results were negative. I also examined eight fresh flies (*G. palpalis*) at a town named Taiama, which is nearly in the centre of the Protectorate. The results of the dissections were also negative; this, however, does not go to prove anything, as the number of flies examined, forty in all, was too small. It must, however, be understood, that though tsetse are plentiful in certain localities, it is not very easy to get fresh specimens, as natives are lazy in collecting them, even at a remuneration of three pence per live fly.

*Health of Cattle and Horses.*—While on the subject of the tsetse-fly, it is right to say a few words on this matter. Generally speaking, the cattle are very healthy. This, however, is not the case with horses in Freetown, though I am informed by officers who have spent much time in the bush that there are a certain number of healthy horses in the Protectorate. These appear to have been imported from French
country, but I have no personal knowledge of this. In the town I have examined the blood of several horses that were suffering from a wasting disease, but have never been able to find trypanosomes in their blood. Moreover, I have never been able to find any *G. morsitans*, though it must be admitted that Major Grattan did find a few specimens of this species.

(e) *Blackwater Fever.*—This is the important disease of the Colony, and is the one that occupies the mind of the European residents more than any other. Its etiology is one of the scientific questions of the hour. Are we dealing with a definite and separate disease, or with some form or manifestation of malaria? In a series of ten cases of blackwater, in eight of which I examined the peripheral blood, I found the malarial parasite in five of them. In each of these instances I had early access to the patient, but in the remaining three cases I did not get the blood for examination until the disease was well advanced. This was unfortunate, as I think that the earlier in the disease that one can examine the blood the more likelihood there is of finding the malarial parasite. In the five cases in which the malarial parasite was found, I was much struck with the fact that in all of them the characters of the plasmodium were identical. All the films were stained by Leishman's method. In each instance the parasite took the form of the minute rings of malignant tertian, but with a certain difference. In the usual ring form of the malignant tertian, met with out here, the chromatin dot was situated in or on the thin line of the blue-stained protoplasm.

In the blood of each of the blackwater cases a great number of the rings, though it must be admitted not all of them, had the following peculiarity, the dot of chromatin was not situated in or on the line of protoplasm, but definitely inside it.

This seemed to me to point to the fact that blackwater fever was due to a definite and separate species of malarial parasite, and though the number of cases is too small to permit of a dogmatic statement, yet I must admit that I am inclined to this view of the etiology of the disease. In support of the theory of the malarial origin of blackwater I would like to mention the following interesting points that occurred in the course of a case suffering from this disease in Tower Hill Hospital: The patient, a European corporal in the Royal Garrison Artillery, was admitted with blackwater on November 2nd, 1906. He was placed on ext. cassie bereana liq., 40 minims every two hours, and for several days progressed favourably, his urine gradually clearing up until the 10th November, when it was quite free from hemoglobin. During this period he had a constant slight rise of temperature. On November 15th, however, the temperature rose to 104·4° F., and cerebral symptoms with coma developed. As his blood contained numerous malarial parasites, he was given quinine, 3 gr. hypodermically, together with ½ gr. of strychnine. Improvement took place almost immediately, consciousness
being recovered, and the temperature dropping to 101° F. During the next few days he had several attacks, but the hypodermics of quinine were persisted in, and on November 19th his temperature dropped to normal, and stayed there. The patient was invalided home on November 30th.

(f) Enteric Fever.—There have been no cases amongst the troops in the Command. The absence of enteric fever is one of the most noteworthy features in the medical history of the Colony. Why it should be absent in a spot which apparently has ideal conditions for the growth and development of the bacillus is at present a pure mystery. I was first of all inclined to take the view, that the reason lay in the character of the drinking water, which is remarkably pure, both chemically and bacteriologically. I am convinced now, however, that this is not the only factor, and indeed, not the chief one. My reasons are as follows:—

Freetown itself has now a very pure water supply, but this was not completed until last year, although part of the water supply has been fairly good for some years. Previous to this good supply being laid on, water for drinking purpose was obtained from wells. Now, Freetown is one mass of cess-pits, practically every house having its own pit. During the torrential rains in the wet season these cess-pits freely overflow, and practically the whole soil of the town gets saturated with sewage. The condition of affairs was then, that the inhabitants lived and ate their food off sewage-polluted soil, and drank sewage-polluted water, this too, in a moist, tropical climate, and amongst a people debilitated with malaria and syphilis. In spite of these favourable conditions, enteric fever was and is practically non-existent. This information I have on the authority of the acting Principal Medical Officer of the Colony. He further states "the agglutination test has been tried many times, but as far as I know without results."

To my mind, these facts point to the presence of some factor other than the possession of a pure water supply, in the non-existence of enteric fever. Whether this factor lies in the hematite soil, or whether it is that anti-toxins are developed in the blood of the inhabitants in infancy, I cannot say; but I make no apology for stating the above interesting points in connection with a disease the importance of which cannot be over-estimated.

SANITARY REPORT BY STATIONS.

Tower Hill.—This is the headquarter station, and is situated some three-quarters of a mile from Freetown at an elevation of about 400 feet.

The Barracks.—These are two-storeyed buildings. They face north and south, but are not built in echelon, being in one straight line with no spaces between them. They are of an old pattern, and the rooms are dark and gloomy. The building for the Sergeants' Mess and Staff-Sergeants' quarters, and also the block of married quarters, are new and of an excellent pattern.
Officers' Mess Block.—This is an old two-storeyed building. The ground floor is taken up with various offices, the first and second floors with mess-rooms, headquarter offices and officers' quarters. It is a very old building, and many of the quarters are not at all desirable owing to their age and extreme gloominess. The officers' quarters, in a building called the "band hut," are light and airy.

Disposal of Excreta.—This is on the dry-earth system. The latrine buckets are taken away at night, and the contents are emptied into the sea, when they are carried away into the Atlantic by the strong currents. This system works very well.

Disposal of Refuse.—This is done by contract, and the most constant supervision is necessary to ensure efficiency. Old bottles and tins have been continually found in the vicinity of barrack, and during the rainy months they remain half full of water, forming excellent breeding places for mosquitoes. The difficulties here are: (1) That bottles and tins are of no commercial value, and so there is no inducement to take them away; (2) that the grass and vegetation grow so quickly that bottles and tins may be easily thrown away without being noticed. These remarks apply not only to Tower Hill, but also to the other stations in the Command. It was a dangerous nuisance, as I am sure it tended to increase the breeding of mosquitoes. By constant supervision of the contractors, however, and the continual clearing of vegetation by fatigue parties, this nuisance has been very considerably reduced.

Houses in the Town.—Owing to lack of accommodation at Tower Hill, British N.C.O.'s have to occupy houses in the town. One of these I condemned on sanitary grounds as unfit for occupation, and accordingly another house in the town was found. Both these houses are in a good sanitary state, and I have nothing to urge against them on this ground, but I think their situation is objectionable. I consider it wrong for British N.C.O.'s to live in the town at all, as they are surrounded by insanitary native dwellings, and are in the midst of a native population infected with malaria and ankylostomes. For these reasons I have strongly recommended that a suitable site be chosen at Tower Hill, and quarters built on it for the accommodation of these N.C.O.'s.

Sanitary Improvements during the Year.—The surface drainage has been considerably improved, bath and ablution accommodation increased, and many minor improvements in connection with cook-houses and latrines made. A new block of officers' quarters is in course of construction, also a new canteen and recreation room. The stream from which the water supply is derived has been efficiently protected by enclosing it with wire fencing. Also, I am glad to say, mosquito nets are being provided for non-European troops. This is a step in the right direction.

Signal Hill, Murray Town, King Tom, Falconbridge, Farren Point.—At these places batteries for the coast defence are situated. Minor sanitary
recommendations have been made in respect to surface drainage, cook-houses, &c. These have either been done or are in process of being carried out.

Mount Aureol and Kortright.—These stations are occupied by the 1st Battalion West India Regiment. The former is the headquarters, and the latter accommodates one company. Mount Aureol is at an elevation of 800 feet, and Kortright some 200 feet higher. They are both over a mile away from Freetown and form an ideal situation for troops.

Barracks.—These consist of wooden huts, which, speaking generally, face north and south. For the most part they are of good pattern, being light and well ventilated. The general sanitary condition is good and the drainage efficient.

Water Supply.—This at present comes from the same stream that supplies Tower Hill, but at a spot some 300 yards above that supply. The water is laid on by pipes to Mount Aureol, but has to be carried by hand to Kortright. As these three stations derive their water supply from the same source, there is usually a shortage of water in the middle of the dry season, hence a new water supply to Aureol and Kortright is in course of construction. This supply will be brought by pipes from a stream at Gloucester Saddle, a distance of nearly three miles. The catchment area of this supply is an extremely good one. There is no human habitation or native hut in the vicinity, neither is there any cultivated land. As this area is within the danger zone of the Kortright rifle range, it is not frequented by natives, and so the risk of pollution is practically nil. Other sanitary improvements of a minor character have been made in connection with drainage, cook-houses, ablution rooms and latrines. The night-soil is buried about a mile away from barracks, as it is too far to take it to the sea. Formerly it was buried in one large pit, but I have recommended the use of shallow trenches instead, and this plan has been adopted.

New Buildings.—The following have been erected: Commanding Officer’s quarters at Kortright, mess offices and billiard hut at Aureol, and several new buildings for the men. Annexes have been added to the wards of the hospital at Aureol, and an officers’ ward is in course of construction, as also are new officers’ quarters.

Wilberforce.—This station is occupied by the West African Regiment. The barracks are laid out on a plateau some 800 feet high, and about three miles from Freetown. They consist of mud huts running east and west. The sanitary condition is satisfactory. The buildings for the officers’ quarters and mess and also those for the European non-commissioned officers are some 300 yards from the lines, and at a slightly higher elevation. They are of an excellent pattern and are built facing east and west.
A H. Morris

Water Supply.—This is brought in pipes from a stream at Regent, some three miles south of the station, and is pure and plentiful.

Disposal of Excreta.—Same as at other stations.

Sanitary Improvements.—Several minor ones have been made. Repairs and improvements have been made to the huts of the hospital, and some new huts have been built, viz., a ward for Europeans, a hut for operating and one for infectious cases. A new Commanding Officer’s quarter has been built.

Stations in the Protectorate.

Port Lokkoh.—In this station there is at present one company of the West African Regiment. A fresh site has been obtained for barracks and new huts have been built for the men, and have been in occupation since March, 1906. These huts are very satisfactory. The ground on which they are built is somewhat swampy during the rains; but this defect has now been remedied by efficient drainage. Sites have been chosen and the plans are out for a new hospital, guard-room, cells and company offices.

The building at present in use as an hospital is quite unsuitable for the purpose. As it is intended to station one more company of the West African Regiment at Port Lokkoh, some land adjoining the present site of barracks has been obtained, and more huts will be built for the new company.

Water Supply.—This is from a spring and is pure water. There is, however, a shortage during the dry season. To remedy this I have recommended that the present natural basin for catching the water be enlarged, concreted, and a dam built; also that it be efficiently protected.

Mabanta.—In this station there is quartered one company of the West African Regiment. The general sanitary condition is satisfactory. Minor sanitary defects were noticed in connection with ventilation of cells, lighting of prisoners’ room, and destruction of woodwork in latrines by white ants; all these defects have since been remedied.

Water Supply.—This is from a spring and is good. I have recommended that the dipping place be concreted and efficiently protected.

Batakanu.—This station has been occupied since April, 1906, by that company, West African Regiment, which was previously quartered at Magbele. The latter station was abandoned in November, 1905. The sanitary condition is satisfactory. No structural improvements have been undertaken, as this station will be vacated early next year, when the troops occupying it will go to the new lines at Port Lokkoh.

Small-pox.—This disease, which is endemic in the Protectorate, has been very prevalent this year in the Karina district. A few cases occurred amongst the troops at the out-stations. The usual precautions of vaccination, isolation, &c., were taken.