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Great Britain. Parliament.

Publication/Creation

London : H.M.S.O., 1914.

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1914
AFRICA.

BLACKWATER FEVER IN THE TROPICAL AFRICAN DEPENDENCIES.

REPORTS FOR 1912.

(For previous Reports see [Cd. 6514], December, 1912.)

Presented to both Houses of Parliament by Command of His Majesty.
January, 1914.



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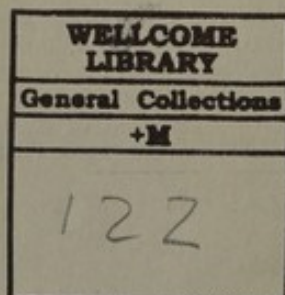
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MAPS.

- I. Spot map of Sierra Leone, shewing where cases occurred in 1912.
- II. " Northern and Southern Nigeria, shewing where cases occurred in 1906-1912.
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BLACKWATER FEVER IN THE TROPICAL AFRICAN DEPENDENCIES.

REPORTS FOR 1912.

Early in 1911 the following despatch was sent by the Secretary of State to the Governors of all the British dependencies in East and West Africa, with the exception of Somaliland :—

SIR,

Downing Street, 24 January, 1911.

It has been suggested by the Advisory Medical and Sanitary Committee for Tropical Africa—and I entirely concur in the suggestion—that, owing to the prevalence of blackwater fever in the Dependencies of Tropical Africa, it is desirable to collect all information bearing on this disease in order to throw as much light as possible on its nature and causation.

2. The opinions of medical authorities are divided as to whether the disease is directly related to malaria or whether it is a separate disease which is produced by a specific organism, not yet recognised, and which is possibly contracted in particular localities or buildings under certain conditions.

3. At present the conditions favouring the incidence of blackwater fever are not thoroughly understood; and it is possible that, by the collation and careful study of all cases which occur, some light may be thrown on this important subject and means suggested to prevent or diminish its occurrence.

4. With this object, therefore, I have to request that a special report may be forwarded annually by the Principal Medical Officer on all cases of blackwater fever occurring within the year in the Colony, attention being particularly paid in the report to the following points :—

I. *Locality :*

- (a) Physical features (*e.g.*, swamps, bush, forest, &c.).
- (b) Occurrence of a series of cases in any one place, particularly in any one building, specifying dates and relation to native dwellings and intercourse.
- (c) Insect fauna; particularly biting or sucking insects, such as mosquitos and biting flies, ticks, bugs, lice, fleas, &c. Specimens should be obtained and identified where possible.

II. *Seasonal Variation :*

- (a) Marked or unusual climatic conditions.

III. *Personal History :*

- (a) Medical history of patient (*e.g.*, previous diseases, attacks of malaria, habits regarding quinine taking, &c.).
- (b) Previous movements of patient and personal conditions to which he has been subject.
- (c) Microscopic examination of the blood (noting relation of examination to stage of illness).

5. It would be a great advantage if a map could be supplied with the report, showing the occurrence of cases in the various localities.

I have, &c.,

L. HARCOURT.

The replies were published [Cd. 6514] and presented to both Houses of Parliament. The report from Southern Nigeria was not included in the above Command paper, but was published separately.

The present paper contains the reports on blackwater fever for the year 1912, except that in the case of Nyasaland the report is for the year 1911-1912, to the end of March of the latter year.

It has been necessary to collate the several reports in order to secure as great a degree of uniformity as possible.

GAMBIA.

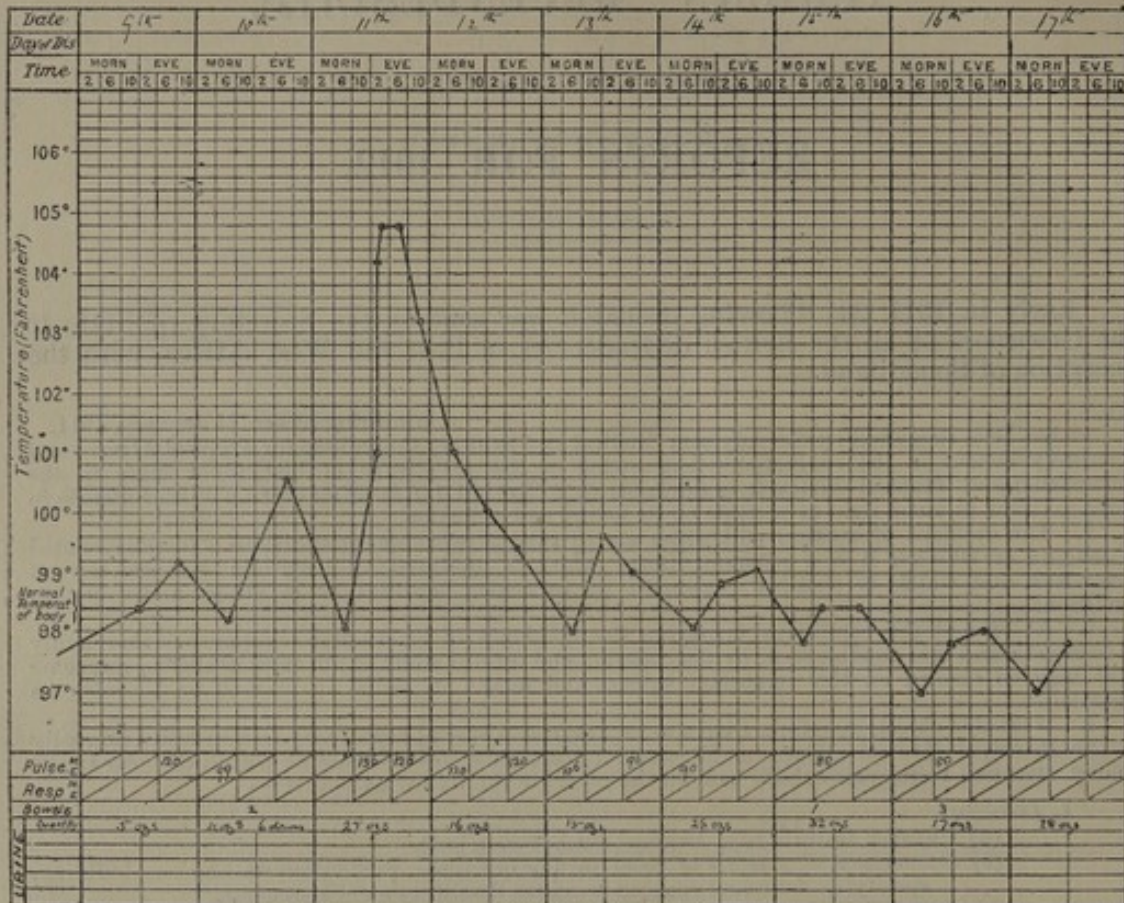
BATHURST.

CASE 1.

A Syrian trader, aged about 60.

Previous history.—This was unobtainable.

April



History of present illness.—On April 9th he was admitted to hospital, his friends saying that he had been suffering from blackwater fever. On admission, the temperature was 98.4° and the pulse rate 123. The urine was clear and did not contain albumen. He was given calomel grs. 5, and magnesium sulphate $\bar{3}$ i was ordered for the following morning.

He had a good night.

On April 10th the morning temperature was 100.6°. At 10 p.m., as the bowels had not been moved, he was given *Oleum Ricini* $\bar{3}$ i; two motions resulted.

On April 11th, at 6.30 a.m., the temperature was 98.4°. Quinine grs. 5 was given. At 9.45 a.m. he had a rigor, for which he was treated in the usual way. He now became very restless and complained of great pain over his kidneys. He vomited some greenish fluid. At 10.50 a.m. he passed six ounces of urine quite black in colour. The temperature rose to 104.8°. He was given large quantities of barley water—50 ounces in twelve hours—which he retained. There was no more vomiting during the day. The pulse rate was 136.

On April 12th there were symptoms of suppression. Only one ounce of urine had been passed between 2 p.m. on the previous day and 7.30 a.m. The morning temperature was 101°, the pulse rate 120. Barley water, hot milk, and small quantities of brandy were given by the mouth. The total quantity of fluids retained between 7 a.m. and 6 p.m. was 63 ounces. At 3 p.m. the colour of the urine began to improve. The evening temperature was 99.4°, the pulse rate 120.

On April 13th the morning temperature was 98°. The yellow colour of skin and conjunctivæ, which had been slight, was now fading. At 9.30 a.m. he passed

fifteen ounces of urine of normal colour. At 6 p.m. the temperature was 99°. He again passed fifteen ounces of urine at this time.

From now on recovery was uneventful. No more quinine was given. The spleen was only very slightly enlarged. The liver was normal in size. A blood examination after the attack failed to show malaria parasites.

On April 17th the patient was discharged cured.

This was the only case of blackwater fever that occurred in Bathurst during the year.

BOARD SHIP.

CASE 2.

Steward on board a mail steamer, aged 36.

Previous history.—He had made ten voyages on the West Coast of Africa during three-and-a-half years, but had never resided there. He stated that he did not have an attack of fever until about a year before the "present illness," when he first began to take quinine. Six months before his "present illness" he suffered very much from fever, being ill almost continually for six weeks. For eighteen days before leaving Liverpool he took quinine grs. 5 every second day, and during the voyage he took quinine grs. 5 every day.

History of present illness.—June 7th: He was quite well for the whole of the present voyage until the night before his ship arrived at Bathurst from Liverpool, when he felt a little "seedy," but not ill enough to be off work.

On June 8th, at 3 a.m., he passed black urine, and later his skin became very yellow. On admission to hospital he was very weak and bloodless. The skin and conjunctivæ were tinted a deep yellow colour. The urine was quite black, and the passing of it caused great pain. The spleen could be just felt. Liver and heart were normal. The bowels were freely opened, and fluids only—barley water, soda water, and milk—were given by the mouth in as large quantities as he could take. A blood examination during the acute stage did not show malaria parasites. Within twenty-four hours the urine began to clear up. The patient had no dangerous symptoms during the attack.

June 9th: In the evening the urine was clear.

Recovery was uneventful. He was given a mixture containing *ferri et ammonii citratis*, grs. 5, and *liquor arsenii hydrochloricus*, m 5, during his convalescence. He left hospital for England in poor health, being very anæmic. No quinine was given during his illness.

(See chart facing page 8.)

MACCARTHY ISLAND.

CASE 3.

Clerk (aged 28) of French nationality, employed by a trading company; arrived at Bathurst from MacCarthy Island suffering from blackwater fever.

1. *Locality.*—

(a) *Physical features.*—MacCarthy Island is situated about one hundred and fifty miles from Bathurst, and is about three miles long by one broad.

The middle of the island consists of swamp, on the borders of which the town is built.

The trading firms occupy the frontage on the river and live in stone or wooden houses.

The natives plant ground-nuts and rice where possible, and the rest of the island is swamp and bush.

(b) *Occurrence of a series of cases in any one place.*—No record.

(c) *Insect fauna.*—The usual species of mosquito and biting flies and sucking flies found in Bathurst are also found in MacCarthy Island.

Specimens have already been sent home and identified.

2. *Seasonal variation.*—

The climate was such as usually obtains at this time of the year in MacCarthy Island—cold at night and early morning, hot in the mid-day.

3. *Personal history. Medical history.*—

The patient did not recollect having had a serious illness prior to this attack.

He had had one or two slight attacks of fever, and he had not been in the habit of taking quinine. Occasionally he had taken it when feeling run down.

(b) *Previous movements and personal conditions.*—He had been seven years in the Colony of the Gambia and one year in Dakar, with intervals of leave in France. The greater part of this time he spent in MacCarthy Island, where he was when he contracted this attack of blackwater fever. This tour he had spent twelve months between Bathurst and MacCarthy Island. He lived under the same conditions as in Bathurst, that is, he had mosquito-proof shelters, and good food and water. He was probably more exposed to the sun than he would have been in Bathurst, owing to the nature of his work.

(c) *Microscopic examination of the blood.*—The blood was examined on the fourth day of his illness, when there was hæmoglobinuria present and a temperature of 102°; no malaria parasites were found. It was also examined when the urine had cleared, with the same result.

History of present illness.—

Dec. 13th: He stated that he had been ill for two days before, and had not been fit for a fortnight. He was removed to hospital at once, and put to bed. His temperature was 101·8°, pulse 108, respiration 26. He passed 14 ozs. of urine, quite black; his bowels had not been moved for some time; he was given *mist. alba*, ozs. 2, and he passed two motions, which were bilious in character: Sternberg's mixture was given every two hours, as were also milk and barley water. He complained of tenderness over the bladder, and was very restless.

On Dec. 14th his temperature rose to 103·4°, and he complained of headache; he asked for iced champagne, which was given him, and a teaspoonful of brandy in milk was given occasionally. His blood was examined; no malaria parasites were found; his urine also was examined and found to be albuminous. At noon, he passed sixteen ounces of urine, which was beginning to clear, and at 6.30 another sixteen ounces, which was almost clear. During the afternoon he was very restless, and delirious at times; at 9.30 he was very weak, and at 10.15 he was given a hypodermic injection of strychnine. The Sternberg mixture was stopped, and *mist. pot. acet.* ordered, but the patient refused to take it. He was given iced barley-water with a little brandy every quarter of an hour through the night, which was retained. He was restless and wandering, and passed his water unconsciously. Temperature 103·3°, pulse 144, at 12 midnight.

He had a very bad night, and had no sleep. He passed water a second time unconsciously towards the morning.

Dec. 15th: He was very weak all day, but kept all his nourishment down; his urine was quite clear and abundant.

Dec. 16th: His medicine was changed to a mixture of *ferri et ammon.-cit.* and glycerine, which he took very well. He complained of headache, and, as his bowels had not been moved, he was given calomel, grs. 2, phenacetin, grs. 5. He was still restless and delirious during the night, and passed his water unconsciously. After midnight he slept for three or four hours, but was again restless when he woke.

He took his nourishment all the time very well, and retained everything he was given.

Dec. 17th: Although still very weak and in a critical condition, the patient seemed to have got over the worst of the attack. He took his nourishment very well and slept fairly well. His temperature still kept up, but otherwise the patient seemed better. The urine was still abundant and clear and contained no albumen.

Dec. 18th: The temperature dropped to 99·6°, and there was a considerable improvement in his condition. The temperature rose again in the afternoon to 101°.

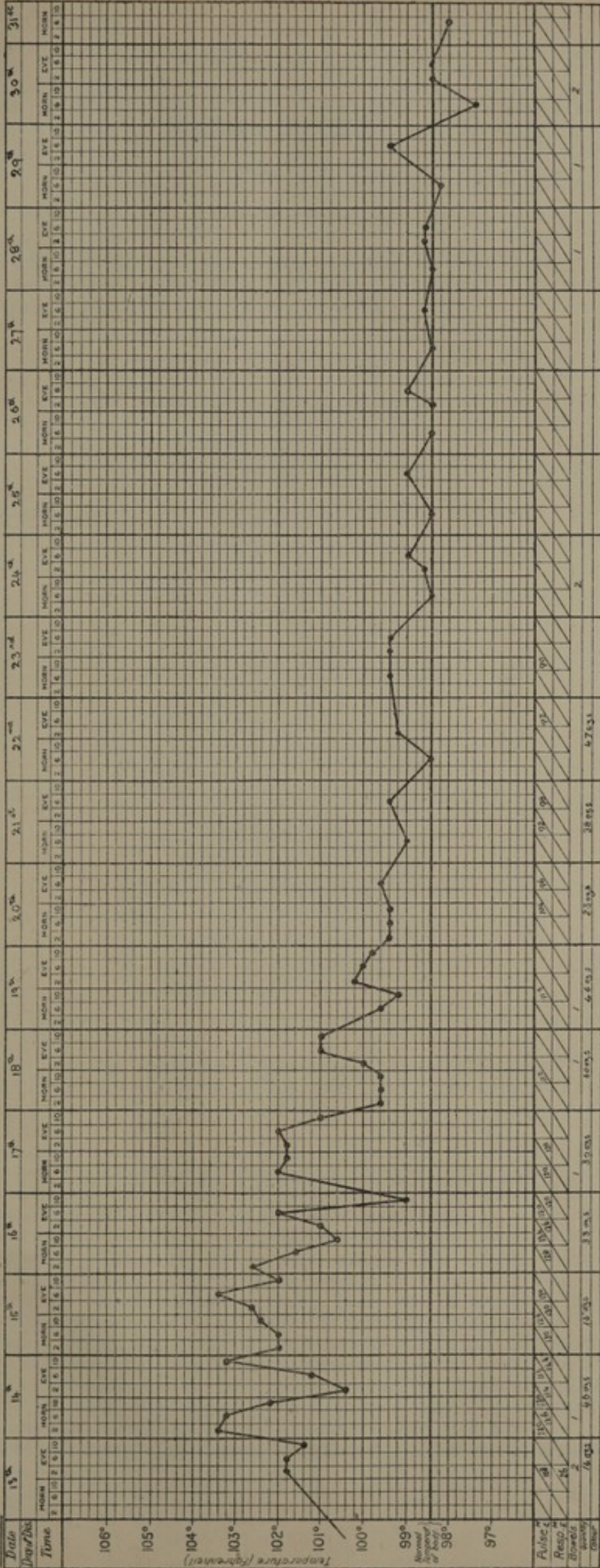
Dec. 19th: From now onwards the patient continued to improve, the temperature gradually dropping to normal with slight accessions. There were no complications and he was discharged from hospital on the 31st December—the twenty-first day of his illness.

This was a typical blackwater fever case, and the most critical period was the day or two following the clearing of the urine, which occurred on the fourth day of the disease.

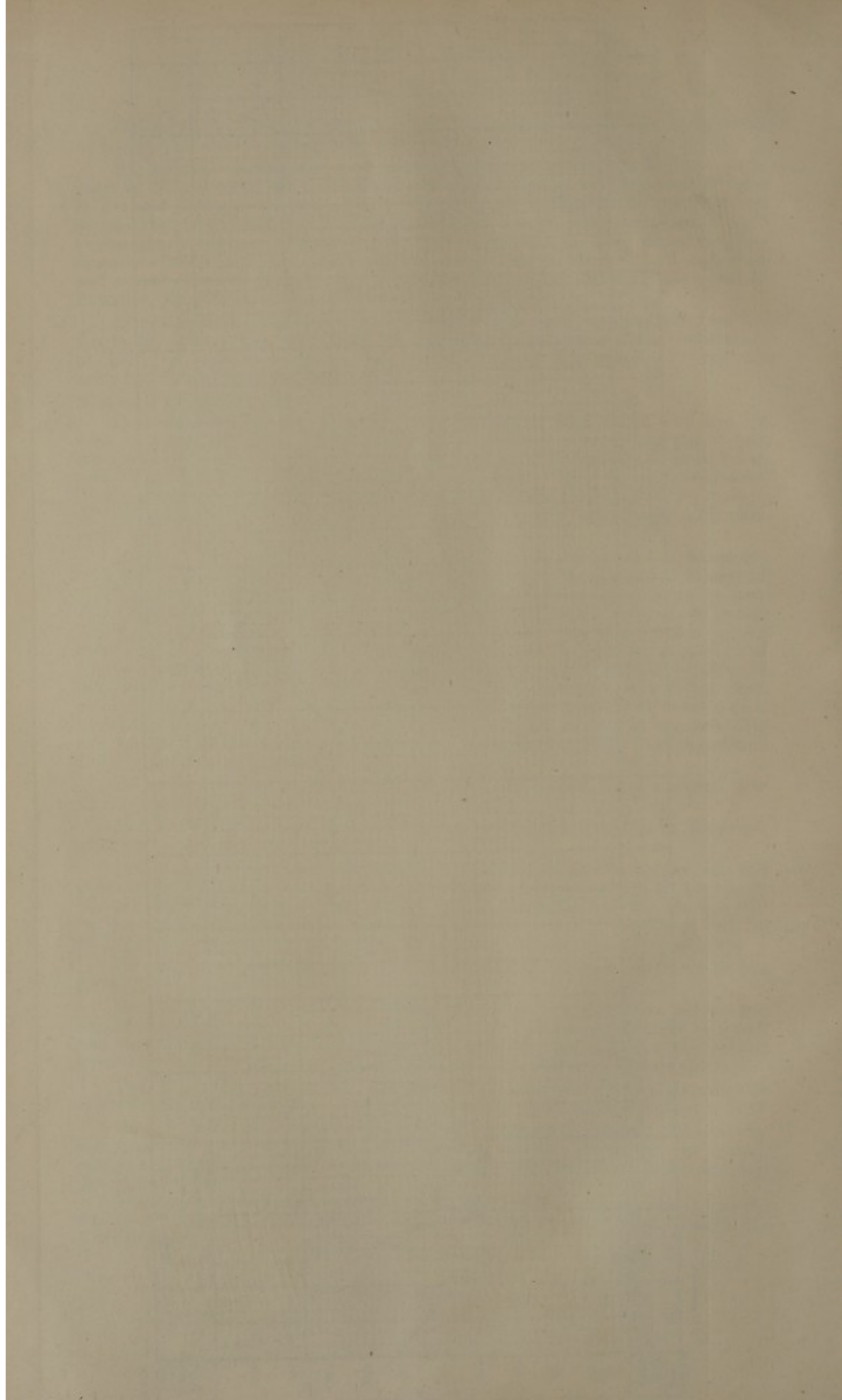
J. C. FRANKLIN.

December 1912

CASE 3



negative scale 10-11



SIERRA LEONE.

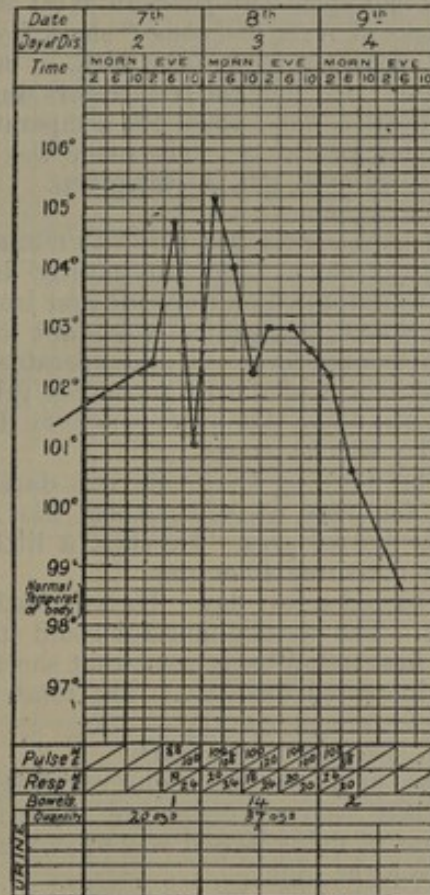
MOBE.

CASE 4.

A missionary, aged 27.

Previous history.—He had spent seven months on the West Coast of Africa, during which time he had repeatedly suffered from "small fever." He stated that he had taken quinine regularly, but this was doubtful.

July



History of present illness.—On July 7th he did not feel well. The urine was scanty, but clear.

On July 8th it was noticed in the early morning that the urine was dark. There was severe pain in the back and arms and the patient had a very severe and prolonged rigor. He was placed on board a boat and taken to Bonthe—a journey of about 4½ hours—and admitted to hospital.

On examination the skin was of a citron yellow colour; the temperature 101.4°; the pulse, 88 beats to the minute, was of fair volume. The patient was very weak, restless and sweating profusely. There was no vomiting. Blood films showed no malaria parasites. At about 7 p.m. he passed seven ounces of a very dark and somewhat viscid urine. At 9.30 p.m. he again passed somewhat clearer urine, making up the total quantity of urine for the day to 20 ounces. He vomited bilious matter twice. The temperature was 104°, the pulse rate 108.

On July 9th the patient was not so well. There was no vomiting, but he was very weak and the urine was not being secreted in sufficient quantity. At 7 a.m. the quantity passed in the previous twenty-four hours was 37 ounces. The temperature was 103°, the pulse-rate 120. The heart sounds were clear but weak. At 2.30 p.m. he was in a collapsed condition; the temperature was 99°; the pupils were dilated; the skin was cold; the respiration sighing; the bladder empty. He vomited twice. At 2.45 p.m. unconsciousness supervened. Death occurred at 3 p.m.

The patient was treated with Sternberg's mixture. Saline enemata were given;

milk, and milk and Vichy water, were given by the mouth. Poultices were applied to the back, and strychnine and digitalis were given hypodermically. He, however, never made any attempt to fight the disease, but was content to remain lying down, taking what was offered him, apparently not having the wish to live.

R. W. ORPEN.

BONTHE.

CASE 5.

A man of Swiss nationality, aged 24, residing at Bonthe.

Previous history.—He had spent two years in West Africa, during which time he had had one or two attacks of fever and some "small fevers."

History of present illness.—On September 24th, at noon, the patient took 18 grains of quinine in one dose. He suffered from rigors during the day and did not receive medical attention until 5 p.m., when the temperature was 104° , the pulse rate 112, and he was sweating profusely. The urine was quite clear. The spleen was felt easily. At 10 p.m. quinine, grs. 5, was given.

He slept well during the night.

On September 25th the morning temperature was normal, he felt fairly well, but was very anæmic, and a pale icteric tinge was noticed in the conjunctivæ. The administration of quinine was stopped and arsenic and iron were given.

On September 26th, at 8 a.m., the medical attendant was sent for. The patient was now suffering from blackwater fever. His temperature was 100.8° and he had a very severe rigor. The skin was of a brilliant citron yellow colour. He vomited bilious matter twice during the day. The urine was very dark—like stout; the total amount passed during the day was 34 ounces.

September 27th: In the morning the urine was darker than on the previous day. He was restless and felt very weak, but there was no vomiting. A systolic bruit could be heard in the mitral area. He slept a little during the day. The urine passed during the day measured 40 ounces.

On September 28th he passed a fair day. He was restless at times. There was some pain on passing urine. The systolic murmur could still be heard distinctly in the mitral area, the heart's first sound being somewhat short and sharp in character. Stimulants were given in increased quantity. The total urine passed during the day was 41 ounces.

He passed a fair night, sleeping for $4\frac{1}{2}$ hours.

On September 29th the urine showed signs of clearing, and there was less difficulty in passing it. There were no rigors nor vomiting; he took his nourishment well. The total amount of urine passed was 42 ounces.

He slept six hours during the night.

On September 30th he was better. The urine was clearing. The icteric tinge was not so pronounced and the patient felt stronger. There was a rise of temperature in the evening caused by the excessive amount of stimulant given.

October 1st: From this date the patient steadily improved. The urine gradually cleared, the patient gained in strength, and the cardiac murmur slowly decreased in volume.

On October 8th he was convalescent and was rapidly recovering strength, but was still very anæmic.

The patient remained well until October 18th, when the temperature rose to 102.4° accompanied by a rigor. He was put to bed. The blood showed, on examination, numerous malaria parasites. Quinine was given in small doses, the temperature fell and, after another rise on October 20th to 102° , again fell to normal, where it remained.

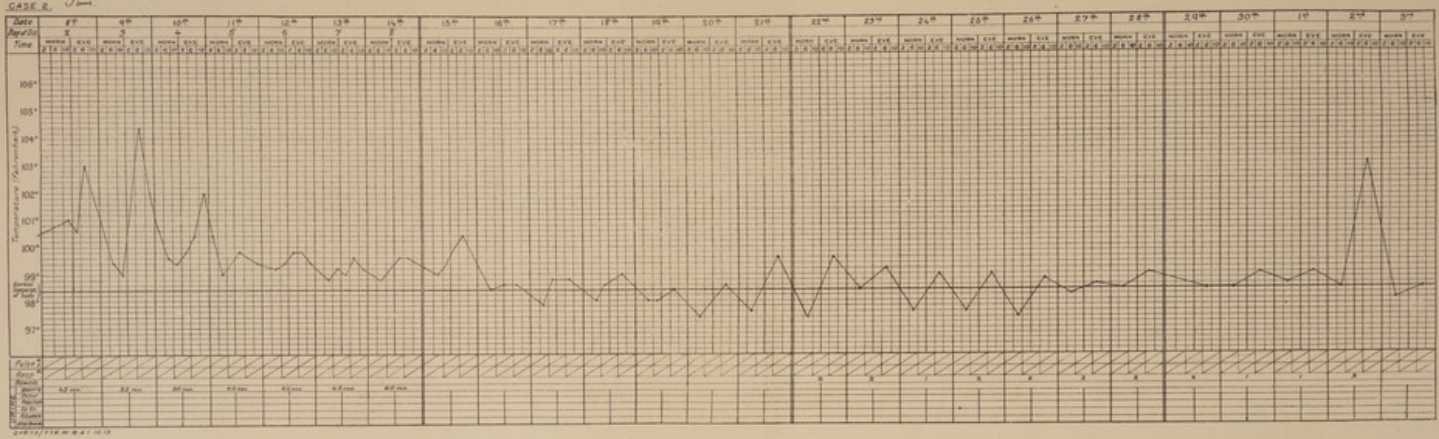
The treatment adopted during the attack of blackwater fever was by Sternberg's mixture and by saline enemata. Milk, Vichy water, Brand's essence, brandy and champagne were given.

The point of interest was the non-discovery of parasites in the blood at the time of the first attack and their presence during the second attack.

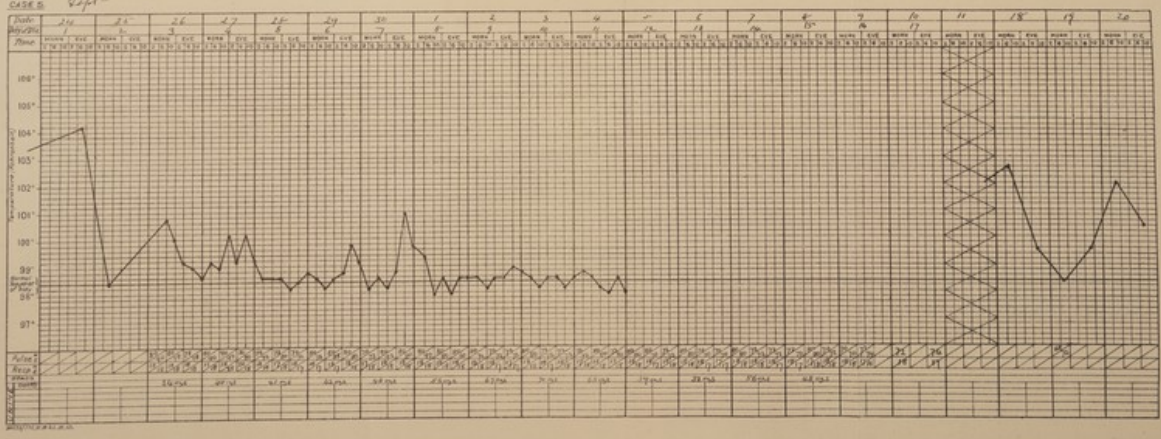
The attack was a severe one, the rigors were very much prolonged and severe, and the condition of the heart caused some anxiety for days.

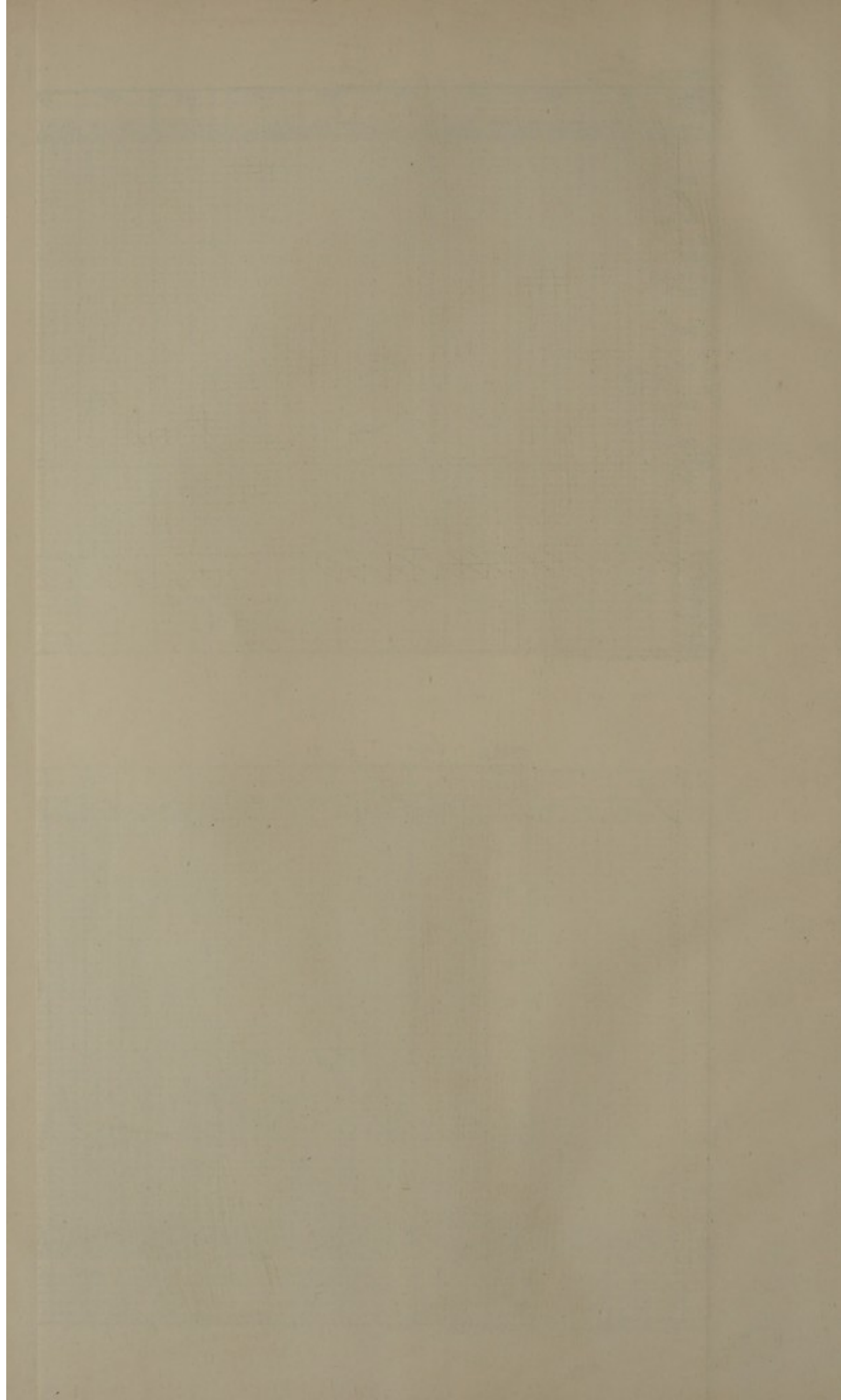
R. W. ORPEN.

CASE R. *Safe*



CASE S. *Safe*





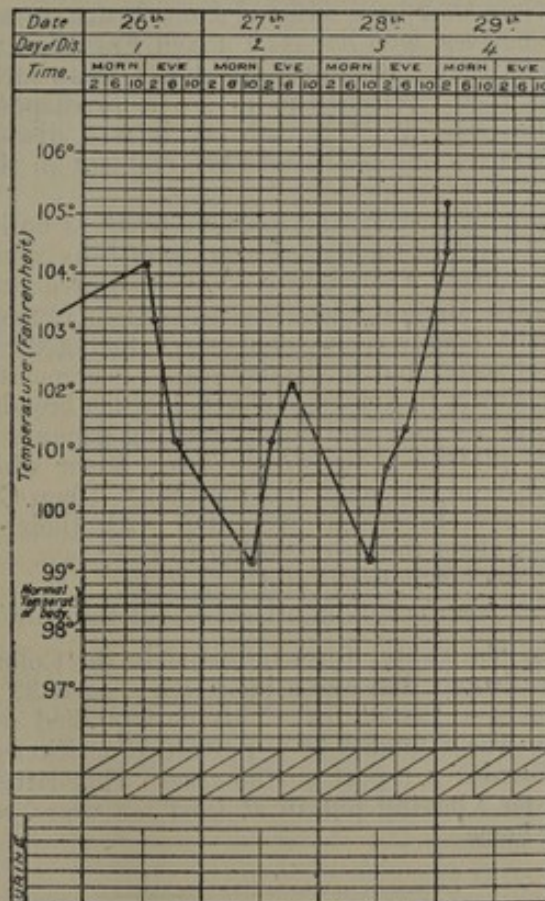
FREETOWN (MOYAMBA).

CASE 6.

A lady missionary, aged 32.

Previous history.—She arrived in the Colony for the first time in 1899 and lived in Freetown without a break until 1907. During this time she maintained fairly good health, but suffered at times from slight attacks of malarial fever. In 1907 she had her first attack of blackwater fever, after which she was invalided to England, where she remained for over six months. In 1908 she returned to the Colony and lived at Ascension town, about two miles from Central Freetown. In 1910 she commenced to show signs of weariness, due, undoubtedly, to constant teaching. She took quinine irregularly. Her condition not being on the whole satisfactory she was advised again to take a holiday in Europe, but refused. She continued her duties as usual till 1911. Towards the latter end of this year she suffered now and again from bilious attacks which she called "sick stomach." She was unable to eat much, all her efforts to work being done under the determination not to yield to sickness. At Christmas time she visited Moyamba, where she stayed for three weeks, living in the vicinity of the native town. She returned to Freetown, as she said, rested and better, on January 24th.

January



History of present illness.—On January 26th she went for a short walk in the morning, returning home between 8 and 9 a.m. At 10 a.m. she had a little fever, but did not take to bed till about 1 p.m., when she had a slight rigor and noticed that her urine was black. The temperature was now 104°, and medical advice was sent for. At 2.30 p.m. the temperature was 103°; she had taken phenacetin and caffeine and was perspiring. At 7 p.m. the temperature was 101°. She was cheerful. There was no vomiting. She was perspiring and the urine was still black in colour.

On January 27th, at 9 a.m., the temperature was 99°. The skin was acting freely. The bowels had been opened. There was no vomiting. There was no pain over the regions of the liver, stomach or spleen. The urine was plentiful and of

lighter colour. At 2 p.m. the temperature was 101° . The skin was not now acting so freely. She was fairly comfortable. The urine was still being passed in fair quantity and its colour continued to improve. At 6 p.m. the temperature was 102° . She was perspiring and complained of headache. After the bowels had acted, however, she again felt more comfortable. The blood was examined microscopically—no malaria parasites were found.

During the night she slept badly, and felt quite weak and tired in the morning.

January 28th, at 9.30 a.m., the temperature was 99.0° . She was taking her nourishment fairly well. The urine still continued to clear up: there was little sediment in it. At 6 p.m. the temperature was 101° . She had slept at times during the day and felt the better for it.

At 1 a.m. on the morning of January 29th she had a severe rigor. The temperature rose to 105° . At 2.15 a.m. the temperature was 104° . The skin was hot and dry, and she was said to have had a slight convulsion. She was now semi-comatose; the coma deepened till she died, early in the morning.

Remarks.

The officer reporting this case makes the following remarks:—

"I do not believe that blackwater fever is related in any way to malaria fever. It is a disease due probably to some parasite or toxin in the blood. Europeans are more predisposed to it than the natives of this Colony, and such of the natives that have suffered from it are, in my experience, among the better-class natives, who live on a mixed European and native diet or on a solely European diet. By European diet I mean meat, pastry, and other highly seasoned food. Alcoholism is not a predisposing cause. Lowered vitality predisposes to it. I cannot say it is a disease of any particular locality, as it attacks Europeans whether resident in the hills or among the valleys.

"Ascension town, where this patient lived, is built on a plateau about 80 feet above sea level, at the foot of a range of hills coming from the southern end of the peninsula. The plateau is of a rocky foundation, consisting of laterite and granite, distant about two miles from Freetown, from which it is separated by the Alligator river. This river during the rainy season contains a large volume of water, but in the dry season it becomes an extremely narrow stream running slowly in a narrow channel which broadens in places. Large boulders interrupt its flow and form breeding grounds for mosquitoes. On the south of the plateau is the Congo Town River which separates it from Congo Town, while to the north lies the Congo Town Creek. The hamlet is inhabited by a few fishermen, who live with their families in bamboo-thatched cottages along the road leading to Freetown. Mosquitos are plentiful, as are the *Glossina palpalis* and *morsitans*.

"Blackwater fever occurs at all seasons of the year."

Two other cases of blackwater fever occurred in the Colony* during the year: one at Blama on the railway. He was a missionary, aged 33 years, who had been in the Protectorate for over four years. This patient died without medical assistance. The other case was attended by a private practitioner not in Government service, who did not furnish a report on the case. This latter case was a patient who was an old "coaster," having put in at least ten years' service in the Colony. He recovered and went home.

BATKANU.

CASE 7.

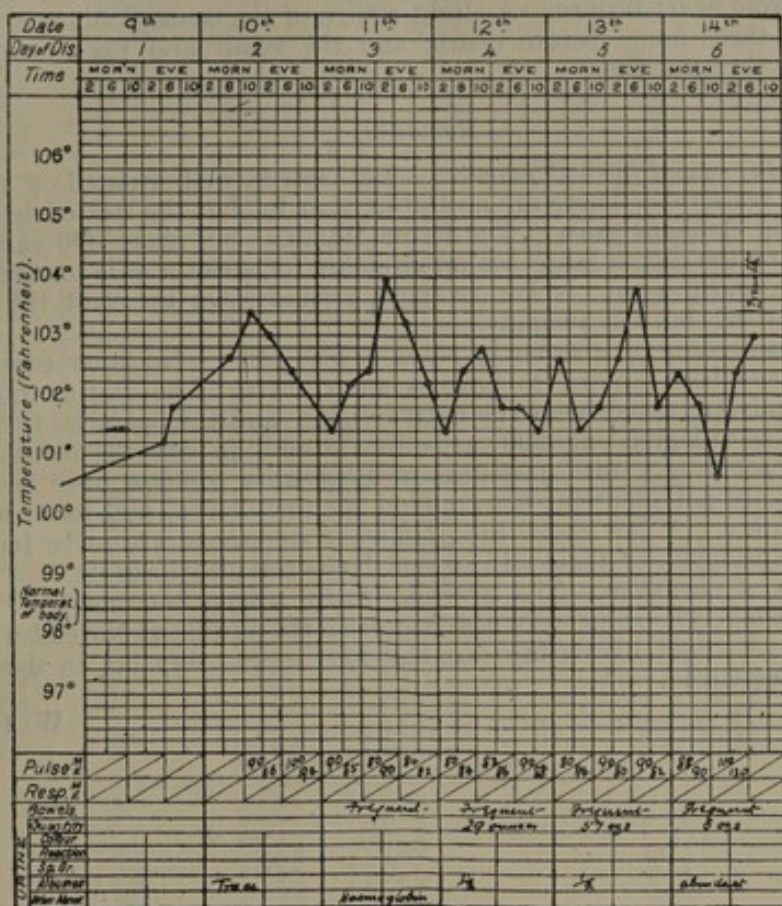
Government official, aged 52, who lived at Batkanu.

Previous history.—He had completed 13 years' service. During that time he had had several attacks of malarial fever. During his last tour's service (1912) he had kept good health. He did not take quinine regularly. He was very temperate

* As opposed to the Protectorate, where the next case (Case 7) occurred.

in his habits and took no intoxicants at all for the two months immediately preceding his illness.

November



History of present illness.—For a week before his illness the patient complained of and was treated for constipation. He was somewhat worried and upset about his work.

On the morning of November 9th, while at work in his office, he complained to his medical adviser of headache. At 4 p.m. on the same day he sent for medical attention. His temperature was now 100.4°. An examination of the blood failed to reveal malaria parasites. He said that he had been taking quinine, grs. 20, for the past four or five days. At 11 p.m. bilious vomiting occurred and a definite rigor was noticed. Both liver and spleen were enlarged.

November 10th: At 10 a.m. the temperature was 103.6°—the maximum for the day. Vomiting occurred spasmodically during the day. He complained of thirst, nausea and pains in the back. Three dark liquid motions were passed. The urine was quite clear but contained a trace of albumen.

November 11th: At 11 a.m. the temperature began to rise, until at 2 p.m. it reached 104°—the maximum during the illness. Simultaneously with this rise in temperature, hæmoglobin appeared in the urine and was present for the rest of the day. The blood was again examined, but no malaria parasites were found. The pulse, small, regular, and compressible, was about 86 beats to the minute. A large quantity of urine was passed, but with considerable straining. Frequent motions, containing both bile and hæmoglobin, were passed.

November 12th: At 2 a.m. there was profuse perspiration and with it the hæmoglobinuria gradually disappeared. Rigors were frequent—every 20 minutes. Vomiting and diarrhoea were most persistent. No food or medicine could now be retained. The urine, of which 29 ounces were passed, contained about half its bulk of albumen.

Nov. 13th: Exhaustion was marked and the pulse and heart grew gradually weaker. There were delirium and unconsciousness. The temperature remained between 101.6° and 103.8°; the highest temperature recorded was at 6 p.m. 57 ounces of urine were passed during the day.

Nov. 14th: Signs of heart failure now showed themselves associated with the distressing symptoms of the previous day. The pulse became very rapid and irregular and the first sound of the heart became inaudible. Only six ounces of urine were passed during the day. At 3 p.m. a convulsion set in, during which the patient died from heart failure. A slight return of the hæmoglobinuria was noticed about two or three hours before death, and the vomit and fæces also contained hæmoglobin at the same time.

Remarks.

I. *Locality.* (a) *Physical features.*—Batkanu is well situated on a hill about 700 feet above sea level. There are no forests near by, but the station is surrounded by fields of long elephant grass. The River Mambolo lies about 300 yards away to the north, and on the east, a large swamp stretches for about a mile towards the same river. On the south, again, is low swampy ground. On the west the country is low and undulating, but not swampy.

(b) *The occurrence of a series of cases in one place.*—No other cases of black-water fever have been known to have occurred here. The station quarters for European officials are rather near the native village and the barracks for the native messengers. The village is only 500 yards distant and the barracks are still nearer.

(c) *Insect fauna.*—A few specimens of *Stegomyia fasciata* have been noticed, but mosquitoes are not plentiful here during the dry season, and most of them are of the genus *Culex*. A few tsetse flies, *Glossina morsitans*, are to be found at the river near by; specimens of these will be sent home for identification.

II. *Seasonal variation.*—The previous rainy season had not been an exceptionally heavy one. The rains were nearly over in the middle of November, when the case occurred. A slight harmattan was blowing; it was very hot in the day time, but the nights were cold.

W. C. E. B.

TABLE OF INFORMATION UNDER CERTAIN HEADS REGARDING CASES OF BLACKWATER FEVER OCCURRING IN SIERRA LEONE DURING 1912.

Name.	Age.	Race.	Occupation.	Locality.			Seasonal Variation, marked climatic conditions, &c.	Personal History.				Where case occurred.
				(a) Physical Features, Swamp, &c.	(b) Multiplicity of cases in same place, house, &c.	(c) Insect Fauna.		(a) Previous Illness.	(b) Quinine Prophylaxis.	(c) Previous Movements.	(d) Blood Examination.	
Case 4. (Fatal.)	27	European	Missionary	Near a river, swampy.	No other cases reported.	Mosquitoes and sand flies.	Similar to Case 7.	Repeated small attacks of fever during past seven months.	Patient stated he had taken quinine regularly.	Only nine months in West Africa.	Not examined.	Only seen by Medical Officer in last stage. In Protectorate. (Dr. Orpen's case.)
Case 5. (Recovered.)	24	Swiss	Trader	Low-lying, swampy mangrove creeks.	Occasional cases in the locality.	Sand flies, Stegomyia, Culex, and Anopheles, also tsetse flies.	Humid, heavy rainy season, June to September.	Malarial fever attacks.	Not stated.	Two years' residence in West Africa.	No parasites at early stage, but found during convalescence.	In Bonthe, Sherbro river. (Dr. Orpen's case.)
Case 6. (Fatal.)	22	European	Missionary	Two mountain streams at each side of house, about 1,000 yards away. January is a dry season month, when there is no swampy land near. It is level grass land, dry and burnt up in dry season, but water-logged and full of pools in rains. Formation — rocky, chiefly laterite and syenite.	Occasional cases occur in Freetown and neighborhood, but not in any one locality more than another.	Stegomyia and Anopheles, also Glossina, are found at different times of the year.	The harmattan season, from January on and off until end of February, is cool at night and morning time.	Mild attacks of malarial fever occasionally, one previous attack of black-water fever.	Irregular.	Lived in Freetown and its neighborhood from 1899, with short intervals of absence in Europe.	No parasites found.	Case occurred at Freetown (Dr. Renner's case.)
Case 7. (Fatal.)	52	English	Government Official.	High land, about 300 yards from river; low-lying plains and swampy areas in the neighbourhood some 400 to 500 yards away.	No other cases recorded.	Stegomyia, Culex, and tsetse flies.	The previous rains were not excessive, they were nearly over when the case occurred. A slight harmattan was on at the time; nights cool, days hot.	Had suffered from several attacks of malarial fever.	Irregular.	An old resident in the Colony, 13 years; had been on patrol a week previous to onset of attack.	No parasites found.	At Bakau, Kairi district, Protectorate. (Dr. Bower's case.)

R. M. FORDE,
Principal Medical Officer.

20th February, 1913.

NORTHERN NIGERIA.

The Acting Principal Medical Officer, in forwarding the report on "Blackwater fever in Northern Nigeria for the year 1912," states :—

"Of the fourteen cases recorded in the accompanying charts, I am able to forward particulars, as called for in the Secretary of State's despatch, No. 34/1911, of twelve such cases. Particulars of one of the remaining cases—an attack of blackwater fever of a very mild type, resulting in an uninterrupted recovery—could not be obtained, owing to the subsequent immediate departure from the Protectorate of both the patient and his medical attendant. The other was a fatal case, in a trader of Portuguese extraction, who, although his death was the obvious result of an attack of blackwater fever, could not be reached before death by a medical officer. The deceased had been for some years continuously resident in the country, and his mode of life was, as far as can be ascertained, entirely unsuitable for a European subject in tropical Africa.

"As regards the twelve cases of which details are given, the points which would appear to call for comment are closely akin to those mentioned in the report for the year 1911, and are briefly :—

- (a) Residence in native-built mud houses of eight of the persons affected.
- (b) In nine cases, out of the twelve reported upon, the patients were irregular in their habits regarding quinine taking.
- (c) Negative results of the microscopic examination of blood, which were carried out whenever possible.
- (d) Although not actually stated in the majority of the cases, I gather that the persons affected were subject to much exposure to sun and rain.

"The mud houses of native build, (a) above, were fully described by Dr. Manning in his report for 1911. In many instances, housing of this nature is, for the present, the only possible one, and I would add that properly constructed mud houses are cool and fairly comfortable, and I cannot think that residence therein is to be regarded as generally inducive to conditions favouring attacks of hæmoglobinuric fever. This opinion is supported by the fact that there are many officers of long service in the Protectorate who have been for several years compelled to live in native-built houses, and whose record of health shows a complete immunity from blackwater fever.

"Nine of the cases recorded, and at least one of the two unrecorded, occurred in men who were neglectful or irregular quinine takers. This fact enhances Dr. Manning's remarks in his last report, and, I consider, strongly supports the probability of previous malarial infection being a predisposition of blackwater. In a clinical report received on one of the cases under reference—a man of most irregular habits in the use of quinine—the medical officer in charge wrote as follows :—

"It would appear that the cause of hæmoglobinuric fever in this case was, in the main, brought about by the injudicious taking of quinine in large doses, as the patient took grs. 25 in one dose, the views of Koch, Christophers, and Stephens on this point being apparently upheld as to hæmoglobinuric or blackwater fever being due to quinine poisoning."

"Microscopic examination of blood, made in every possible case, revealed nothing worthy of note.

"Undue exposure to the tropical sun can, I consider, only be regarded as indirectly predisposing to hæmoglobinuria in that its weakening effect on the physical condition renders the person so exposed more liable to infection of any nature.

"You will, no doubt, observe that two charts only accompany this report; the third, showing the relative incidence of blackwater to cases of malarial fever, I am unable at present to submit owing to complete information regarding the latter disease not yet being available. I propose to forward this with my Annual Medical Report, which is now in course of preparation.*

"It is a matter for regret that cases of blackwater fever have not diminished in number during 1912, and that the mortality is of a higher percentage than the

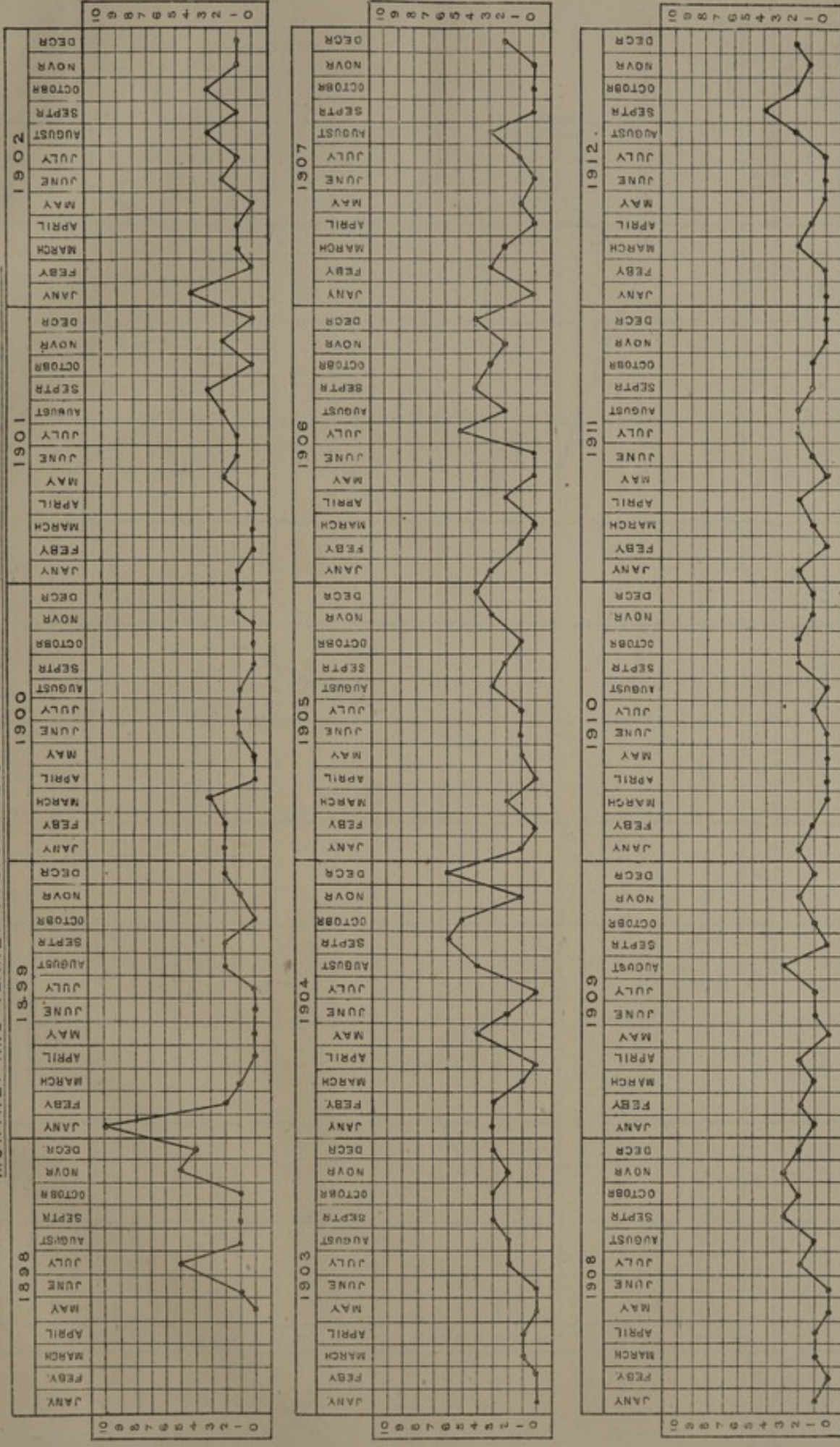
* Annual Medical and Sanitary Report, Northern Nigeria, 1912.

Horizontal lines represent number of Cases.
Vertical lines represent Years & Months.

BLACK WATER FEVER.

Black line shows incidence of Cases.
(Fatal & non fatal cases combined)

MONTHLY AND YEARLY INCIDENCE OF CASES FOR THE PAST FIFTEEN YEARS.

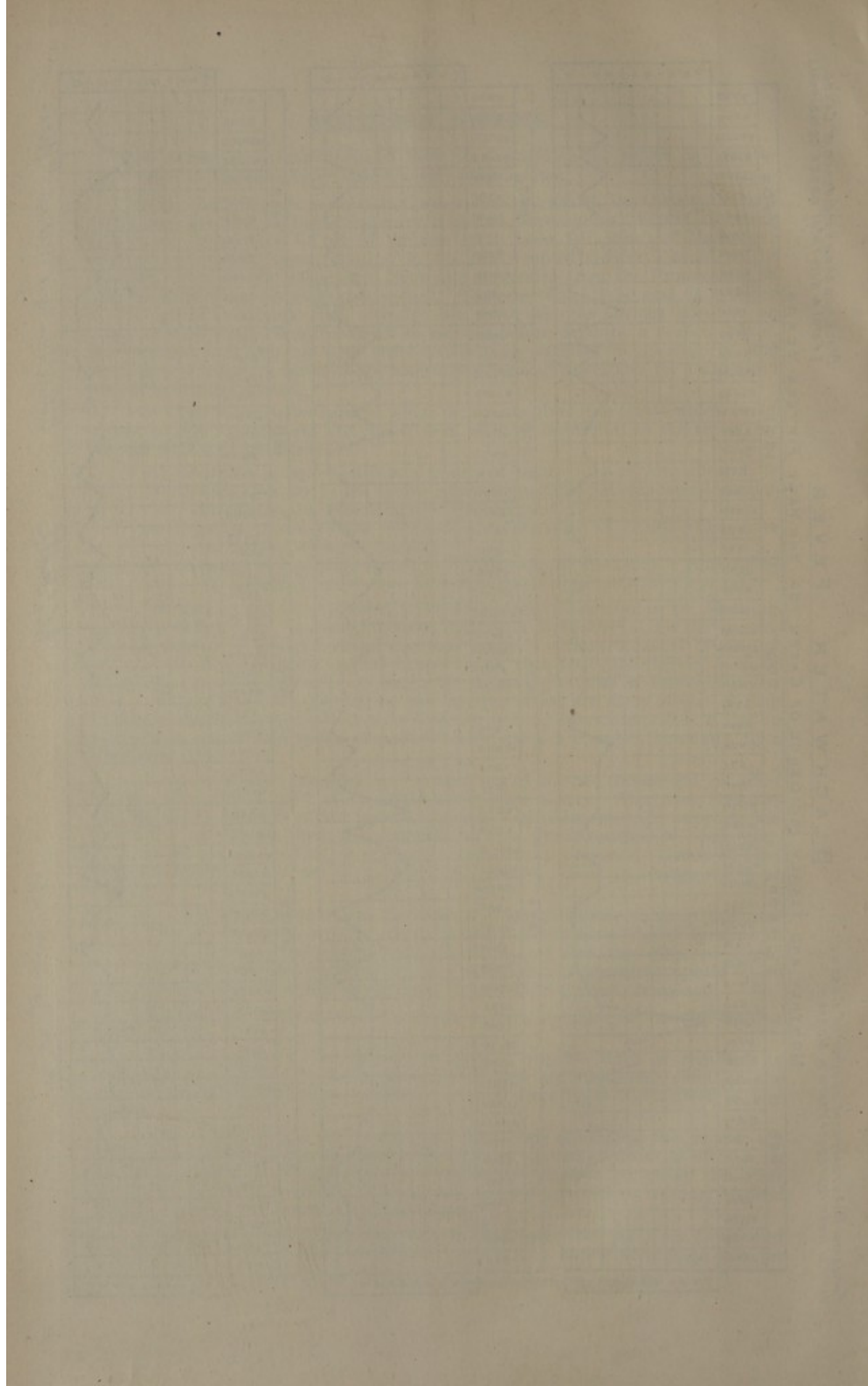


1898 1899 1900 1901 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912

January 1913.

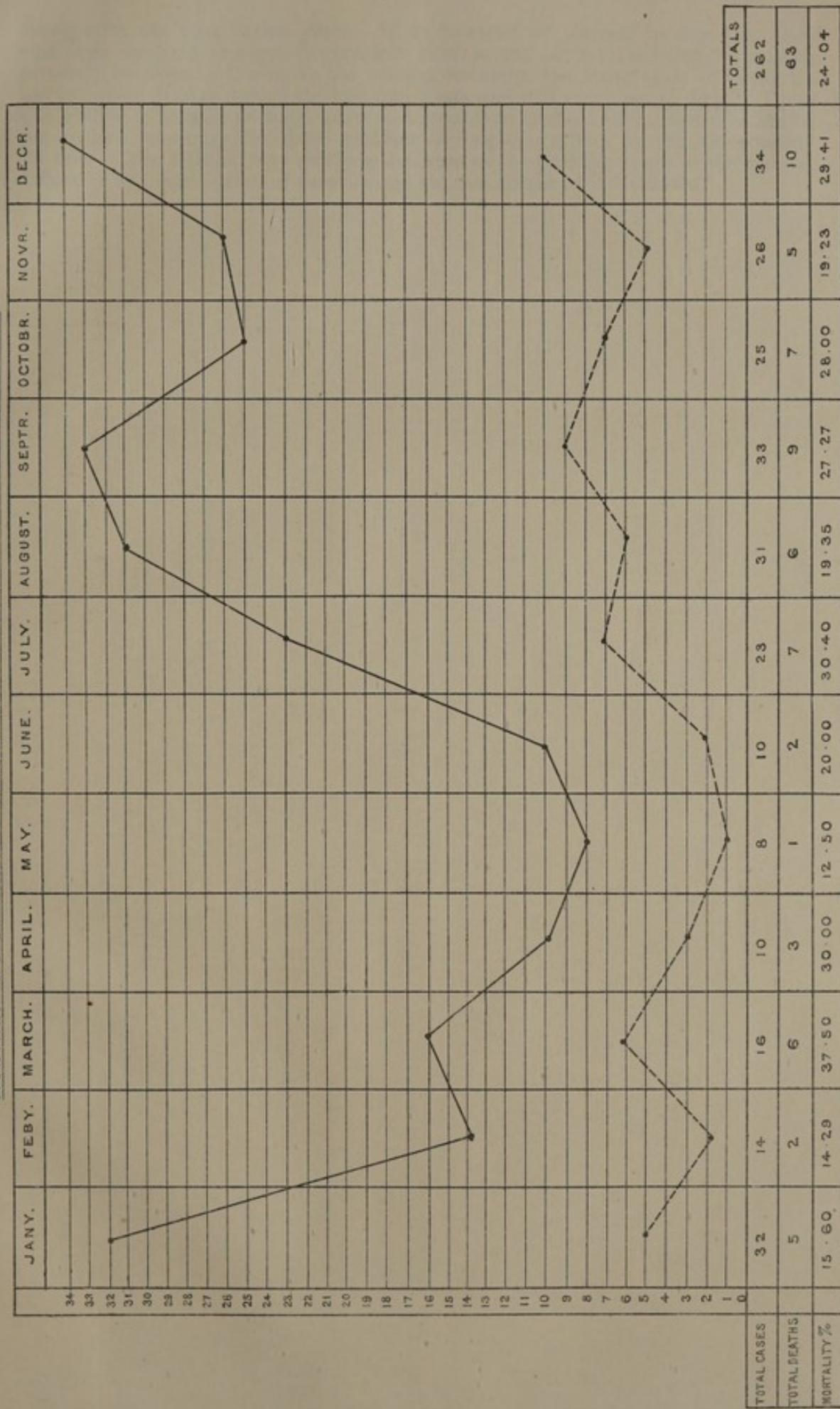
W. Hall

Acting Principal Medical Officer



BLACKWATER FEVER.

MONTHLY INCIDENCE OF CASES AND DEATHS 1898-1912 INCLUSIVE.



Horizontal lines represent number of Cases.
Vertical lines represent months.

Black line represents Total Cases.
Broken line represents Fatal Cases.

W. J. Hall
C. J. Pro. 1891/13.

average for the past fifteen years. It is, however, of interest to note that only two cases occurred amongst Government officials, the other cases being in persons privately employed. Owing to the mining industry, the latter class of residents has increased greatly during the last four years and still continues to do so. These men are not generally, perhaps, quite so amenable to medical advice as to the health precautions necessary for those resident in tropical Africa as are Government officials. This, I think, may safely be assigned as the probable cause of the marked difference in the incidence of cases among the two classes of individuals."

REPORT ON CASES OF BLACKWATER FEVER IN NORTHERN NIGERIA, 1912.

Number of Case.	Locality.		Seasonal Variation.	Personal History.		
	(a) Physical features.	(b) Occurrence of a series of cases.		(c) Insect Fauna.	(d) Medical History.	(e) Previous Movements and Personal Conditions.
Case 8. Death.	Open arable land ...	No recorded cases	Sixth month of harmattan, which was becoming less pronounced.	Mosquitoes very scarce. Biting flies, none. Ticks, bugs, lice, fleas can be excluded.	Several attacks of malaria previously. Dysentery recently. A regular quinine taker.	Lived in a native mud house; had, ten days previous to attack, arrived from a long tour on foot. Was a missionary; second tour of service in the Protectorate.
Case 9. Recovery.	On border of Southern Nigeria. In midst of thick bush. No swamps here.	One case in the Province in 1907. House within 50 yards of native town.	Rainfall very heavy, but case occurred in the dry season.	<i>Glossina palpalis</i> . Mosquitoes numerous.	Several very slight attacks of malaria. A regular quinine taker.	First tour in West Africa. Twenty months' residence. Lived by himself in a small trading station. European-built house.
Case 10. Recovery.	On the summit of a hill — situation healthy. No swamps.	No record for some years.	Case occurred at the end of rainy season. Nothing abnormal to note.	Mosquitoes very scarce, but specimens of <i>Myzomyia</i> and <i>Stegomyia</i> have been found. Sandflies and <i>Stomoxys</i> common.	Two slight attacks of gastritis recently. Did not take quinine regularly.	Had been eleven months in West Africa and five years in India. Strong, healthy, energetic man. Native-built mud house with mosquito room.
Case 11. Recovery.	Bank of River Niger. Swamps. Station well cleared of bush.	No record for years.	During latter part of rainy season.	Mosquitoes numerous. Sandflies and biting flies prevalent.	No previous illness. Did not take quinine regularly.	Residence, eleven months second tour; previous tour three years Southern Nigeria. Native-built house.
Case 12. Death.	Thin bush close to large swamp.	Nil	During rains. Humidity average, 60.	<i>Myzomyia</i> , <i>Stegomyia</i> , <i>Glossina fatigans</i> , ticks, lice, fleas all common.	One attack of malaria and one of dysentery. Doubtful if quinine taken regularly.	Second tour. British N.C.O., strong, healthy, of temperate habits. Native-built mud house.
						Several examinations revealed no parasites.
						Blood examined on 1st, 2nd, and 3rd days. No parasites found.

Case 13. Recovery.	Close to River Niger. Sandy soil. Some swamps. Bush cleared.	Several here (Lokoja Hospital).	Mosquitoes and sandflies very prevalent.	During rains. No- thing abnormal to note.	Yellow fever 20 years ago. Did not take quinine regularly.	Three months' residence in West Africa. Com- fortable European- built house.	No parasites or pigmented leuco- cytes found.
Case 14. Recovery.	Open country ...	Nil ...	Nothing unusual ...	During rains ...	Blackwater once pre- viously. Dysentery one and malaria fever three attacks. Irregu- lar with quinine.	Over two years in residence. Comfort- able, native-built mud house.	As above. Exam- inations made on 2nd, 4th and 8th days.
Case 15. Death.	Close to river bank	One in 1903, two in 1904, one in 1907, one in 1911.	Few mosquitoes. Lived within 100 yards of his la- bours.	During harmattan cold atmosphere.	Malaria in South Africa and South America. Did not take quinine.	Eight months in West Africa. Lived in a grass house. Led a careless, irregular life. Age 63.	No examination possible.
Case 16. Remaining, 31/12/12.	As in 13 ...	As in 13 ...	As in 13 ...	During harmattan...	Malaria on September 12th. Previous attack blackwater, 1911.	Several years' residence in Northern Nigeria. Takes quinine regu- larly. Comfortable house and surround- ings. Missionary.	No parasites or pigmented leuco- cytes found.
Case 17. Recovery.	Open undulating country. House surrounded by long coarse grass. 300 yards from River Nigeria.	No previous case	<i>Stegomyia fasciata</i> . <i>Anoph. funesta</i> , &c., Stomoxys, Hypoboscidae, &c., are all common.	During harmattan, which is very dense here. Daily variation of tem- perature, about 30°.	Typhoid in 1912. Three attacks malaria Sep- tember, October, No- vember, 1912. Irregu- lar with quinine.	Anglo-Indian. Resident in West Africa from early in 1912. House, comfortable wooden bungalow.	Frequent examina- tion gave nega- tive results.
Case 18. Recovery.	High altitude, barren undulating coun- try. No swamps.	No previous case	Mosquitoes very scarce. Flies prevalent.	Latter end of rains.	Severe malaria in Gold Coast some two years previously. Good health during eight months' residence in Northern Nigeria. Ir- regular with quinine.	Strong, healthy, active man, whose em- ployment necessitated much exposure to tropical sun and rains. Mad house in mining camp, situated suitable distance from natives.	Several examina- tions with nega- tive results.
Case 19. Recovery.	The highest altitude in the Protec- torate. Undulat- ing sparsely tim- bered country.	No previous case	Mosquitoes few— <i>Anopheles</i> . Flies numerous.	End of rainy season.	Dysentery recently. Many attacks of malaria dur- ing five years' previ- ous residence on the Gold Coast. Very ir- regular with quinine.	Patient of very slender build. Nature of his employment (mining) subjected him to fre- quent and prolonged exposure to sun and rain.	No examination possible.

UGANDA.

Thirty-two cases of blackwater fever were reported in the Uganda Protectorate during 1912, of which eight proved fatal, giving a death-rate of twenty-five per cent.

The figures for previous years have been as follows:—

1909, 21 cases with 6 deaths, giving a death-rate of 28·5 per cent.

1910, 26 " 6 " " " 23·0 "

1911, 18 " 3 " " " 16·6 "

Sex.—Of the thirty-two cases, twenty-nine were males and three were females.

Age.—This varied from eight years to fifty-five and appears to have no influence.

Nationality.—There were nine Europeans, two Eurasians, one Cape-boy, six Goans, and fourteen Indians.

Deaths.—All the eight deaths occurred in outlying places, and in seven there was either no medical officer or a medical officer did not arrive until the disease was well advanced. These occurred at the following places:—Mabira Forest, 3; Kivuvu, 1; Mityana, 1; and Gondokoro, Gulu, and Chudi-chudi, in the Nile Province, one each. The Mityana case was a motor driver, who was taken into Kampala and died there. The Gondokoro case was the Indian compounder. Of these eight, three were Europeans, of whom one had had two previous attacks, and one had had one previous attack, two were Eurasians, one of whom had had one previous attack, and three were Indians, one of whom had had two previous attacks.

Locality.—As regards locality, no definite relationship of an attack to any particular class of surroundings is shown. In nineteen cases the attack appears to have been acquired in town or station, in eleven in outlying places, *e.g.*, plantations, and in three while travelling.

All the patients had been exposed to the bites of mosquitos, including anopheles, and in some cases there had been exposure to the bites of Simuliidæ, Stomoxys, various other biting flies, fleas, and ticks.

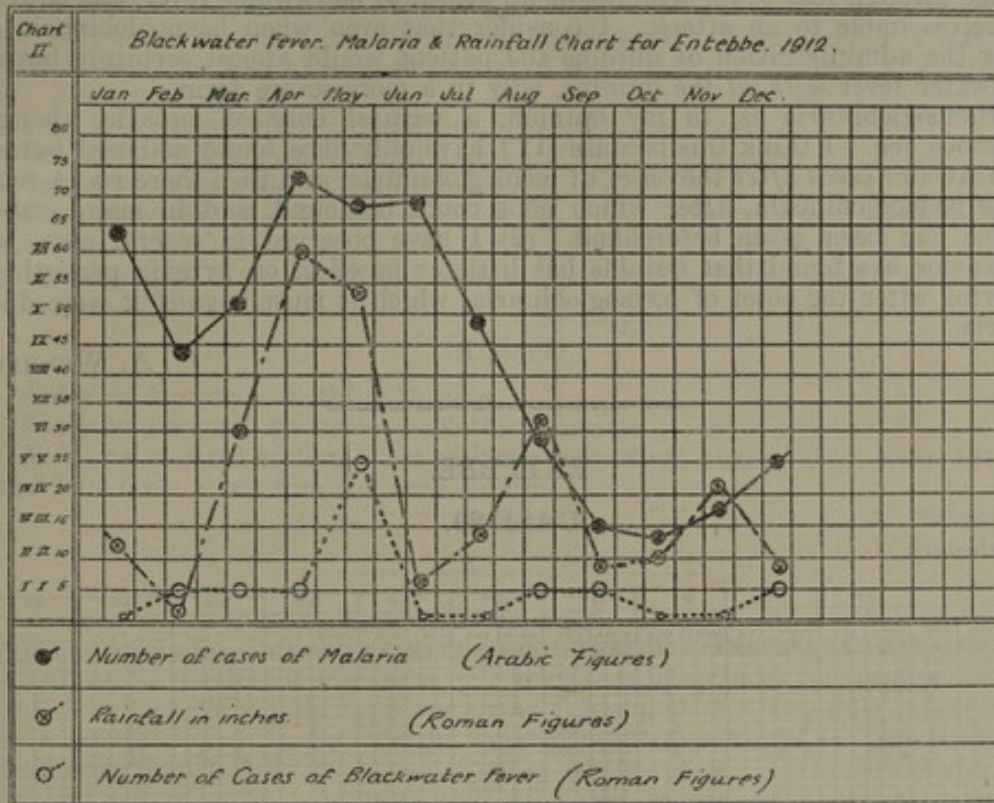
Seasonal variation.—The following chart shows the locality where the cases occurred, and also the season:—

Chart I.

		Blackwater Fever Chart, 1912.													
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	Deaths
Entebbe	...	—	1	1	1	5	—	—	1	1	—	—	1	11	—
Kampala	...	—	—	—	1	—	—	1	1	—	1	—	1	5	—
Jinja	...	—	—	—	1	—	—	1	—	—	—	1	—	3	—
Bombo	...	—	—	1	—	—	—	—	—	—	—	—	—	1	—
Fort Portal	...	—	—	—	—	—	—	—	—	1	—	—	—	1	—
Gondokoro	...	—	—	—	—	—	—	—	—	—	1	—	—	1	1
Guhe	...	—	—	—	1	—	—	—	—	—	—	—	—	1	1
Mbale	...	—	—	—	—	—	—	—	—	—	—	1	—	1	—
Chudi Chudi	...	—	—	—	—	—	—	1	—	—	—	—	—	1	1
Mabira	...	—	—	—	—	—	1	—	—	—	1	1	—	3	3
Lubanyi	...	1	—	—	—	—	—	—	1	—	—	—	—	2	—
Kururi	...	—	—	—	—	—	—	1	—	—	—	—	—	1	1
Mityana	...	—	—	—	—	—	1	—	—	—	—	—	—	1	1
Total cases	...	1	1	2	4	5	2	4	3	2	3	3	2	32	—
Deaths...	...	—	—	—	1	—	2	2	—	—	2	1	—	—	8

N.B.—Deaths shown in heavy type.

The occurrence of eleven cases at Entebbe is not easy to explain. One of these was in a European, who had probably acquired it while travelling in Buddu as the attack developed the day after his arrival here while in hospital. Two of the other ten cases (five Goans and five Indians) developed it within two days of their arrival here, while the other eight were residents in Entebbe. The following chart gives the rainfall, the number of cases of malaria, and the number of cases of blackwater fever for Entebbe during the year. There appears to be a definite relation between all three.



Personal history.—

(a) *Precious blackwater fever.*—Two of the thirty-two cases occurred in the same European child, aged nine years, who had had two attacks previously; three cases occurred in patients who had had two previous attacks, and four occurred in those who had had one previous attack.

(b) *Previous malaria.*—In every case previous attacks of malaria are recorded, and in six, frequent attacks.

(c) *Quinine prophylaxis.*—Of the thirty-two cases, nine had taken quinine prophylactically for a long period, either grs. 5 daily, or grs. 10 or 15 twice a week on consecutive days. The rest had either taken it only when they had fever, or irregularly when they felt run down. It is noteworthy that, according to the statements made by the patients, of the nine who took quinine regularly as a prophylactic, three were fatal cases.

(d) *Quinine as exciting cause.*—In no case can quinine be said to have been the real exciting cause of an attack.

(e) *Exposure as a cause.*—In six, exposure or over-fatigue is recorded as the exciting cause.

(f) *Length of residence in Africa.*—This varied from one year to twelve years, the average being just over five years.

(g) *Presence of parasites.*—In most cases slides had not been taken before the blackwater fever showed itself, either because the medical officer was not called in in time or because the patient was taking quinine at the time. In eight cases subtertian (ring) parasites were found before the hæmoglobinuria manifested itself. In no case were parasites found after the hæmoglobinuria, even during pyrexia.

(h) *Duration of the blackwater.*—This varied from twelve hours to ten days, the average time being just over forty-eight hours. The case which lasted for ten days was a fatal one, in a European, at Gulu, who had almost complete suppression for eight days with constant bilious vomiting and hiccough, and in which hæmorrhage from the gums, and later from the skin, occurred before death.

Relation to malaria.—These cases tend to show that there is a definite relation between malaria and blackwater fever, and also that a second or third attack is more likely to be fatal than a first attack.

My own experience convinces me that blackwater fever is only likely to occur in those persons who do not take adequate doses of quinine during and after attacks of malaria.

I think the theory that quinine is a factor in the etiology of blackwater fever is too much emphasised, as I am convinced that many people do not take enough

quinine through fear of its bringing on an attack of blackwater fever, and so render themselves liable to an attack. I consider that even when hæmoglobinuria does follow the administration of quinine the patient would almost certainly have got blackwater fever *without* the quinine, only in a more severe form.

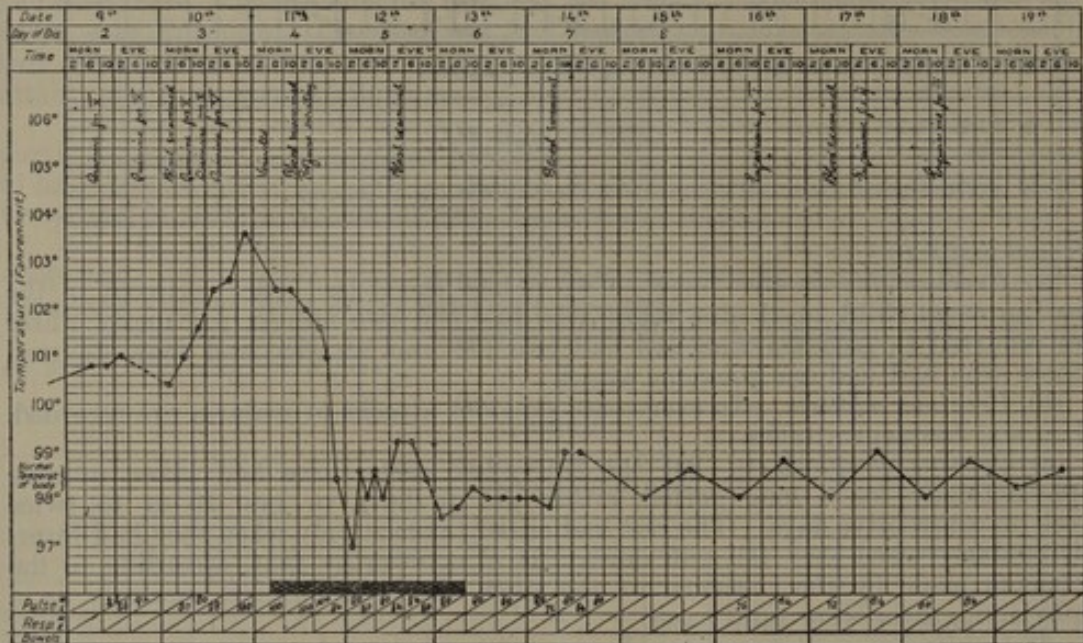
Hæmoglobinuria is, in my opinion, a natural cure of malaria, though a dangerous one. I think this because (1) I have only once found malarial parasites in blackwater cases *after* the onset of hæmoglobinuria, and then there was a relapse of the hæmoglobinuria, after which none could be found, and in many cases no quinine had been given beforehand. (2) I have observed in several cases what Dr. Taylor has found that quinine has little or no effect on pyrexia persisting or recurring after the onset of hæmoglobinuria, which it must have if it were due to malaria.

C. A. WIGGINS.

ENTEBBE.

CASE 20.

February



History of present illness.—On Feb. 8th, 1912, the patient arrived from Bukakata after a long safari in Western Provinces. He stated that he had had a great deal of fever lately, and that he had taken quinine fairly regularly. On the evening of his arrival in Entebbe he had fever again.

He took 20 grs. of quinine this day.

Feb. 9th: The morning he was admitted to hospital. He had taken quinine, grs. 10 that morning. The blood was examined for malaria; the result was negative. In the evening he was given quinine, grs. 10.

On Feb. 10th quinine, grs. 10 at 8 a.m., grs. 10 at 2 p.m., and grs. 5 at 7 p.m., was given. The temperature rose to 103.6° at midnight, when he vomited, and, soon after, hæmoglobinuria appeared, with profuse perspiration.

On Feb. 11th he passed 64 oz. of urine, all dark, but the colour varied, some was thick like porter, some clear like port. Diet, milk and soda only. Blood examination was negative. The temperature came down to normal. No quinine was given.

Feb. 12th: The temperature rose to 99.2°. The same diet was continued. Champagne, 4 oz., was given three times a day. 45 oz. of urine were passed.

Feb. 13th: The urine was now clearing well. Anæmia was showing in his complexion for the first time; there was some jaundice.

Feb. 14th: The urine was clear: it contained hardly a trace of albumen. He felt very weak. The same diet was continued. Blood examination for malaria parasites was negative.

Feb. 17th : He was allowed to sit up in bed. Diet as before. Port wine, 2 oz., three times a day, was now given instead of champagne. Euquinine, gr. 1 was given.

Feb. 18th : He was allowed to get out of bed to use the commode. Progressing well. Euquinine, gr. 2.

Feb. 19th : Light diet. Euquinine, gr. 3.

Feb. 20th : Light diet. Euquinine, gr. 4.

Feb. 21st : Light diet. Euquinine, gr. 5.

From February 21st to March 3rd he was given ordinary diet. Quinine, grs. 5, *omni die*.

March 4th : Discharged from hospital and left for three weeks' sick leave to East Africa Highlands.

Remarks.

Notes on locality.—Nothing to note.

Notes on seasonal variations.—Nothing to note.

Notes on medical history.—No malaria on medical history sheet since 1910, but he had had fever about him for some months.

C. A. WIGGINS.

Civil Hospital, Entebbe, January, 1913.

During the past year ten cases of blackwater fever have been under my care. Six of these were of a mild type, the urine clearing within two days, and with no special complication. In one case the hæmoglobinuria persisted $4\frac{1}{2}$ days, but beyond considerable vomiting there was no further complication. The remaining three cases had all points of interest, and condensed reports of these are therefore appended.

All ten patients completely recovered and, as far as can be ascertained, have since remained in good health.

Eight of the ten cases give a history of having suffered from repeated attacks of malaria. The remaining two state they have only previously had one or two attacks, but this is probably doubtful, as they have both resided in the country about six years. One of the patients had previously suffered from blackwater fever.

Two of the patients state they have taken quinine prophylactically (usually 5 grains daily) for some considerable time, but with both of these there is a history of almost continuous fever treated with altogether inadequate doses.

Three of the cases were seen before the hæmoglobinuria began, and in all of these sub-tertian parasites were found, but repeated re-examinations after the hæmoglobinuria had commenced were negative; the remaining seven cases were only seen after the hæmoglobinuria commenced, and although repeated examinations of the blood were made no parasites were found at any time.

The length of residence in Uganda or East Africa varies in the different patients from one year to twelve years.

In one case exposure to fatigue and sun whilst suffering from malaria appears to have had some part in bringing on the attack of blackwater. In practically all cases there is a definite history of repeated and carelessly treated attacks of malaria with inadequate doses of quinine. Beyond this, in no case does the administration of quinine appear to have had anything to do with the bringing on of an attack.

Notes on locality and seasonal variation are already given in the Principal Medical Officer's report.

CASE 21.

A Goanese clerk, aged 26.

Previous history.—The patient had resided in Uganda for three years. During this time, and especially during the last year, he suffered from almost continual attacks of malaria, for which he treated himself by taking quinine, grs. 10 to grs. 15, daily.

History of present illness.—He had been feeling feverish and out of sorts for three or four days, for which he took quinine, grs. 10, daily.

On May 20th, as the fever still continued, he took quinine, grs. 10.

On May 21st, at 4 a.m., he first noticed that his urine was black. No parasites were found in the blood. He was put on Harsey's mixture. At noon he was admitted to hospital. On admission his temperature was 100.8° . At 9 p.m. the temperature was 99.6° .

On May 22nd the temperature was from 97.6° to 99.4° during the day. The urine was still black, but was clearing.

On May 23rd the temperature was normal all day and the urine quite clear.

On May 24th, at 8 a.m., the temperature was 99° . The urine was still clear. At noon the temperature was 103° and the urine was again black. At 8 p.m. the temperature was 99.6° and the urine was now clearing.

On May 25th, at 8 a.m., the temperature was 100.4° , the urine was now quite clear. At noon the temperature was 101° and the urine was again black. At 8 p.m. the temperature was 102° and the urine was clearing. Quinine, grs. 5, was given by the mouth.

On May 26th, at 8 a.m., the temperature was 99° , the urine was quite clear. At 8 p.m. the temperature was 103° , the urine was still quite clear. Quinine, grs. 10, was injected intramuscularly.

On May 27th, at 8 a.m., the temperature was 99° , the urine was clear. Quinine, grs. 10, was now injected intramuscularly. At 8 p.m. the temperature was 103° , the urine was again black.

On May 28th, at 8 a.m., the temperature was 99.2° , the urine was quite clear. At noon the temperature was 103.2° , and the urine was again black. At 8 p.m. the temperature was 100° and the urine was still black.

The patient passed a restless night.

On May 29th, at 8 a.m., the temperature was 99° and the urine still black. Quinine, grs. 10, was now injected. At noon the temperature was 104.5° and the urine was black. At 8 p.m. the temperature was 101° and the urine was still black.

The patient again passed a restless night.

On May 30th, at 8 a.m., the temperature was 99° and the urine was clearing. At 8 p.m. the temperature was 101.8° and the urine was still clearing.

The patient slept well.

On May 31st, at 8 a.m., the temperature was 99° and the urine quite clear. At noon the temperature was 104.8° and the urine again black. At 8 p.m. the temperature was 102.6° and the urine was still black.

The patient passed a very good night.

On June 1st, at 8 a.m., the temperature was 99° and the urine clearing. At noon the temperature was 101.4° and the urine still clearing. At 8 p.m. the temperature was 100.2° and the urine quite clear.

From June 2nd to June 4th the patient had good nights. The temperature varied between 99° and 100° and the urine remained quite clear.

On June 5th the temperature was normal and remained so. He progressed so favourably that he was allowed to go on leave on June 10th.

From June 5th he was advised to take quinine, grs. 5, daily, and continued to take this on the journey to India.

He has now returned from leave and states that his health remains good.

Notes.—This case is of interest in that:—

- (1) The hæmoglobinuria appeared six separate times, and always synchronised with a rise in temperature.
- (2) The quinine administered appeared to have no effect on the hæmoglobinuria or fever. On the other hand, the highest temperature reached (104.8°) was two days after the last dose of quinine was administered, and the temperature became normal without any further quinine being given.
- (3) During the whole illness there was no vomiting and no complications of any kind.

Blood examination was made on several occasions but no parasites were found.

CASE 22.

An Indian fitter in cotton ginnery, aged 35 years.

Previous history.—He had resided for six years in Uganda and East Africa. He stated that he had only had one bad attack of fever before the present illness.

History of present illness.—From August 29th to September 2nd he had pains all over his body and felt feverish. He took quinine, grs. 10, every day during this time.

On September 2nd he felt worse and took quinine, grs. 15, after which he had several rigors and vomited occasionally. At 6 p.m. the temperature was 103° , and he first noticed the appearance of black urine. No malaria parasites were found on blood examination.

He passed a restless night but without vomiting.

On September 3rd, at 8 a.m., he was removed to hospital. The temperature on admission was 101° , and remained so throughout the day. He was given calomel grs. 5 and put on Hearsey's mixture. During the day he had several rigors and vomited on one occasion.

He passed a fairly good night, without vomiting.

On September 4th the urine was still black. The morning temperature was 103.6° , but had fallen by 9 p.m. to 99.6° . He complained of great pain in the back.

He again passed a restless night, but without vomiting.

On September 5th the urine was found to be clearing. The morning temperature was 99.6° . At 9 p.m. the temperature was 100.8° , but the urine was now quite clear.

He slept well.

On September 6th the temperature during the day ranged between 97° and 99° .

He passed a restless night, during which he had several rigors.

On September 7th, at 7 a.m., the temperature was 102° , rising at noon to 104° . He had several rigors during the day and vomited twice. The urine, however, remained clear. At 9 p.m. the temperature was 103° .

He passed a fairly good night.

On September 8th the morning temperature was 99° . He had several rigors. Quinine, grs. 20, was injected intramuscularly. He vomited once during the day. The evening temperature was 99.6° .

During September 9th and September 10th the temperature remained between 100° and 101° , and there were several rigors. Quinine, grs. 5, was injected intramuscularly each day.

During September 11th and September 12th the temperature remained between 102° and 103° . There were several rigors. Quinine, grs. 20, was injected each day.

On September 13th the morning temperature was 101° , it fell by evening to 99.4° . There were several rigors during the day. Quinine, grs. 20, was injected.

On September 14th the morning temperature was 99.6° . There were several rigors during the day. Quinine, grs. 10, was injected. The evening temperature was 100.4° .

From September 14th to September 28th the temperature varied from normal in the morning to 103° in the evening, with daily rigors. No quinine was injected after the 14th, but Warburg's tincture, 3i, was given three times a day after September 18th.

From September 28th to September 30th the temperature varied between 98° and 99° in the morning and 100° and 101° in the evening. No further rigors occurred, and the general condition improved very much.

On October 1st the temperature was normal and remained so.

On October 15th he returned to work.

Notes.—This case is of interest on account of (1) the large number of rigors continued daily for more than three weeks, (2) the large doses of quinine injected with apparently very little effect on the temperature (3) the non-recurrence of the hæmoglobinuria in spite of the high temperature and large doses of quinine.

The blood was repeatedly examined without any parasites being found.

CASE 23.

A Hindoo clerk, aged 35.

Previous history.—About seven years before his present illness he first came to Uganda, but had been away on leave three times during this period. He had suffered while in Uganda from repeated attacks of malarial fever; he last returned from leave in June, 1911, since when his medical history sheet showed six repeated attacks of fever for which he was placed off duty. He stated that in addition to these attacks he continually felt out of sorts, and that he had had numerous slight

attacks of fever, which, however, did not prevent his going to work. He also stated that for two years he had been unable to take even five grains of quinine without its causing blood to appear in his motions. This statement the medical officer in charge of the case was able to verify on one occasion.

History of present illness.—On Aug. 16th and 17th he had aches and pains all over the body, but no fever.

On Aug. 18th he felt sick. There was considerable pain over the stomach, and he considered that he had had fairly high fever. He took aspirin, grs. 5.

On Aug. 19th the temperature was 98°2'. He felt better in the morning, but later, again felt sick. At noon he was given calomel, grs. 3, and *sodii bicarb.* The bowels were well opened, and he felt better, but complained of pain in both shoulders. He was given the bicarbonate of soda to take with his food. The afternoon temperature was 98°6'.

On Aug. 20th, at 6 a.m., he took a teaspoonful of magnesium sulphate in a tumblerful of water. At 8 a.m. he felt better and attended his office;—so far he had not been off duty. At 10 a.m. he vomited bile and sought medical advice at the dispensary. The temperature was now 98°9'. He was pale and slightly jaundiced. He was sent home to bed, where he vomited several times, bringing up a little bile on each occasion. At 3.30 p.m. the temperature was 102°2'. A blood film was taken and showed, on examination, sub-tertian parasites. He took quinine, grs. 10. He vomited subsequently, but apparently kept the quinine down.

He passed a restless night till 2 a.m.

Aug. 21st: He slept from 2 a.m. till 7 a.m., when there was considerable pain over the stomach. At 8 a.m. the temperature was 101° and the pulse rate 100. He now passed urine containing blood. He was put on Hearsey's mixture. At 4 p.m. the temperature was 105° and the pulse rate 112. He perspired freely, and in the evening the temperature fell to 102°. During the day he passed large quantities of black urine.

He passed a restless night, vomiting constantly.

Aug. 22nd: The morning temperature was 104°, the pulse rate 124. The vomiting continued, and he still continued to pass large quantities of black urine, which, however, began to clear towards evening. The evening temperature had fallen to 102° and the pulse rate to 120.

He vomited all night, and did not sleep.

Aug. 23rd: The morning temperature was 103° and the pulse rate 124. The urine was now quite clear. During the day vomiting continued incessantly. The temperature ranged between 103° and 101°6'. The pulse, 124 beats to the minute, was very weak and irregular. Nutrient enemata were given every two hours. Two injections of strychnine, gr. $\frac{1}{30}$, were given, and at night, on account of the restlessness, an injection of morphia, gr. $\frac{1}{4}$.

He slept a little after the morphia, but the restlessness and vomiting returned later.

Aug. 24th: The temperature during this day ranged between 102° and 104°. Vomiting and retching continued although nothing was given by the mouth except the *acidus hydrocyanicus dilutus*, m 4, in a teaspoonful of water three times during the day. The pulse, 124 beats to the minute, was very weak and irregular, consequently three injections of strychnine, gr. $\frac{1}{30}$, were given. Nutrient and normal saline enemata were given at intervals. There was great restlessness, for which morphia, gr. $\frac{1}{4}$, was injected at night.

He slept well.

Aug. 25th: The pulse was more feeble and irregular. There was less vomiting, but he could keep nothing down. The saline and nutrient enemata were continued. The temperature ranged between 100°8' and 102°, the pulse rate between 104 and 112. Quinine, grs. 20, was given *per rectum*, and the dilute hydrochloric acid continued by the mouth.

He slept at intervals without vomiting.

Aug. 26th: He took a little milk and soda by the mouth. The temperature ranged between 100° and 100°4', the pulse rate varied between 100 and 102. Strychnine was injected intramuscularly.

He passed a restless, sleepless night, without vomiting.

Aug. 27th: The temperature ranged between 101° and 102°; the pulse, 104 to 120 beats to the minute, became more weak and irregular. There was now no vomiting, and the patient was able to take milk and soda water and barley water, by the mouth. Saline enemata were given and quinine, grs. 16, was given by the

rectum. Three injections of strychnine, gr. $\frac{1}{30}$, were given during the day, and an injection of morphia, gr. $\frac{1}{4}$, at night.

He slept well.

Aug. 28th: The temperature ranged between 94.6° and 100° during the day. The pulse rate was 124. There was no vomiting, and he was able to take sufficient nourishment by the mouth. Two injections of strychnine were given, and the saline enemata were continued.

During the night there was some vomiting, the patient had little sleep and became restless and excited, resisting all attempts to give nourishment by either mouth or rectum. He spat out all food put into his mouth, and said that he wanted to die.

Aug. 29th: The morning temperature was 101° , the pulse rate 130. Vomiting occurred several times. Later in the day he became less restless and took a tablespoonful of milk, but spat out the rest. A soap and water enema was given followed, after it had had the required effect, by nutrient enemata. At 4 p.m. the pulse, 140 to 150 beats to the minute, was almost imperceptible. One pint of normal saline solution was injected subcutaneously into the chest-wall, after which the pulse rate came down to 120. At 8.30 p.m. the temperature was 102.8° , the pulse, 140 beats to the minute, stronger. During the evening he took a little milk at intervals. Two injections of strychnine, gr. $\frac{1}{30}$, and one of quinine, grs. 10, were given during the day, and an injection of morphia, gr. $\frac{1}{4}$, was given at night.

(He slept well till 2 a.m.)

Aug. 30th: From 2 a.m. onwards he was restless. He refused to be given nutrient enemata but took sufficient milk by the mouth. The temperature during the day ranged between 101° and 104.5° , and the pulse rate between 130 and 101. The pulse was less irregular. Quinine, grs. 10, was injected. Strychnine, gr. $\frac{1}{30}$, was injected three times. He complained of great pain in the stomach.

He slept well, and there was no vomiting during the night.

Aug. 31st. A soap and water enema was given with good result. The temperature ranged between 99.8° and 100.8° and the pulse rate between 116 and 130. An enema of normal saline solution was given. Strychnine was injected three times. An intramuscular injection of quinine, grs. 10, was given once and morphia, gr. $\frac{1}{4}$, was injected at night.

He slept fairly well till 3.30 a.m.

Sept. 1st: After 3.30 a.m. he became restless and feverish, and vomited several times. The morning temperature was 103.8° and the pulse rate 130. Quinine, grs. 20, was injected intramuscularly. Vomiting continued, and he refused to be given nutrient enemata. The evening temperature was 100.6° , the pulse rate 120. After 9 p.m. he was able to keep down a little milk and soda water. One injection of strychnine was given during the day.

During the night he vomited several times, but slept at intervals.

Sept. 2nd: The temperature during the day ranged between 98.4° and 98.6° ; the pulse rate was 120. Quinine, grs. 20, was injected intramuscularly. He vomited two or three times during the day, but kept down a little milk and soda water. He refused to be given nutrient enemata. Morphine, gr. $\frac{1}{4}$, was given hypodermically at night.

He passed a restless night, vomiting at intervals.

Sept. 3rd: During the day the temperature ranged between 98° and 99° and the pulse rate between 112 and 120. Saline enemata were given. Although there was no vomiting during the day the patient refused to take anything by the mouth.

He slept fairly well.

Sept. 4th: The morning temperature was 99.6° and the pulse rate 130. Respirations 40 to the minute. There were signs of hypostatic congestion at the bases of both lungs. He was propped up in bed at intervals for a few minutes. He began to ramble in talk, and was quite unable to understand and answer questions. In the afternoon the temperature fell to below normal, the pulse became very weak, irregular, and difficult to count. Throughout the day he was given brandy and milk in small quantities, and the *liquor strychninae hydrochloridi*, m 4, by the mouth. There was no vomiting. At 7.45 p.m. the pulse, 124 beats to the minute, was less irregular. He now felt cold, and appeared to be falling into a state of collapse. Brandy and hot milk were given, and hot bottles were applied to the feet and body. At 9.30 p.m. he was in a more or less collapsed semi-conscious condition. Teaspoonful doses of hot milk and brandy were continued. He went

to sleep for an hour and awoke in a delirious condition, talking nonsense and trying several times to get out of bed.

He passed a night of broken sleep with intervals of restlessness and delirium. He continually made attempts to get out of bed.

Sept. 5th: At 7.30 a.m. the temperature was 99.6° , the pulse rate 116. Breathing was heavy and difficult. He now paid no attention to questions, but continued muttering to himself. He swallowed teaspoonfuls of brandy and milk when they were put into his mouth. There was no vomiting. Digitalin, gr. $\frac{1}{100}$, was injected. At noon the temperature was 100.4° , the pulse rate 136. Respirations were 34 to the minute, and he was breathing more easily. He made several attempts to get out of bed. At 2 p.m. digitalin, gr. $\frac{1}{100}$, was injected, the pulse rate was 128. At 9 p.m. the pulse rate was 140. Strychnine, gr. $\frac{1}{30}$, and digitalin, gr. $\frac{1}{100}$, were injected. At 9.30 p.m. he became very restless, trying continually to get out of bed. Morphine, gr. $\frac{1}{4}$, was injected.

He had a fairly good night.

Sept. 7th: He was now more sensible. The temperature was 100.8° , the pulse rate 125. There was less congestion at the bases of the lungs, and the breathing was much easier. Quinine, grs. 10, was injected and *tinct. digitalis* was given by the mouth. There were signs of abscess formation at the site of the intramuscular injection of the saline solution, and poultices were applied. He vomited several times during the day, but kept down sufficient nutriment and stimulants. The evening temperature was 103° , the pulse rate 126.

He slept at intervals.

Sept. 8th: He was now much more sensible. He complained of pain in the back of the head and stomach. At 7.30 a.m. the temperature was 98.6° ; the pulse, 112 beats to the minute, was much more regular and strong. An abscess at the site of the saline injection was opened and a considerable amount of foul-smelling pus escaped. The temperature during the day varied between 99° and 102.5° , and the pulse rate between 120 and 140. Respiration was much easier, and the swelling of the legs was decreasing. Digitalis and strychnine were given by the mouth during the day, and the morphine, gr. $\frac{1}{4}$, was injected at night.

He slept better.

Sept. 9th: He was now much brighter. The temperature was 98° all day, the pulse was regular; its rate varied between 112 and 130.

From this day he continued to make slow but uninterrupted improvement. For a fortnight the temperature rose from 98° or 99° in the morning to 100° in the evening, but there was a daily increase in strength. By the end of the month he was able to walk about the house a little, and on October 13th he was well enough to go to East Africa on "local leave." He returned to work in November and continued to enjoy good health.

Blood films were daily taken and examined from August 20th to September 1st, inclusive, but only in the first one—taken before the hæmoglobinuria had set in—were malaria parasites found.

From the beginning of October he was put on quinine, grs. 5, daily, which was continued without the re-appearance of blood in the motions.

Notes.—The special points of interest in this case are:—

- (1) The presence of malarial parasites in the blood before hæmoglobinuria appeared.
- (2) The complete disappearance of parasites immediately the hæmoglobinuria commenced.
- (3) The persistence of fever, vomiting, cerebral and other serious symptoms long after the disappearance of the hæmoglobinuria and without any indication of suppression; during the whole illness urine was passed in practically normal quantities.
- (4) The large amount of strychnine and digitalis (twenty-five injections in addition to several doses by mouth) necessary to prevent heart failure, at times with remarkably good results.
- (5) The administration of considerable doses of quinine with slight effect on the temperature but without producing any reappearance of the hæmoglobinuria. If there is anything in the quinine theory of black-water, it is difficult to understand how the administration of quinine in the amounts given could fail to produce a recurrence of the hæmoglobinuria.

APPENDIX.

Since writing the above report Dr. J. Howard Cook, of the Church Missionary Society, has kindly sent me notes on the cases of blackwater fever that have come under his care at Namirembe, Kampala, during 1912.

No.	Nationality.	Age.	Sex.	Locality.	Month.	Result.
(i)	Indian	Adult	M.	Kampala	January	Cured
(ii)	"	"	M.	"	February	"
(iii)	"	"	M.	"	March	"
(iv)	"	"	M.	"	April	"
(v)	"	"	M.	"	April	"
(vi)	"	"	M.	"	July	"
(vii)	Goan	"	M.	"	July	"
(viii)	"	"	F.	"	August	"
(ix)	Indian	"	M.	"	September	"
(x)	Goan	"	M.	"	October	"
(xi)	"	11 years	M.	"	October	Died
(xii)	Indian	Adult	F.	"	November	Cured
(xiii)	English	28 years	M.	Congo Safari	November	"

Notes.—In all the cases except (i) and (v) quinine had been taken beforehand.

In all cases except (i) and (ii) the treatment used during hæmoglobinuria was a preliminary dose of calomel, followed by Hearsey's mixture (*sodii bicarb.* gr. 15, *liq. hydrarg. perchlor.* B.P., $\frac{1}{2}$ drm., *aq. ad oz.* 1) every two hours first day, every three hours after that till hæmorrhage stopped. In (iii) there was considerable cerebral excitement, and in (viii) there was a relapse of the hæmoglobinuria.

Number (xi) was the only fatal case. Complete suppression occurred in spite of active treatment; but after exhibiting pituitary extract, strophanthus, digitalis, and especially diuretin, the urinary function was completely restored, but patient got more and more œdematous about the face, and weaker, and died. He was passing over two pints of urine per diem when he died.

Number (xiii) was a very severe case, with unconsciousness and delirium lasting three or more days. Eventually he made a complete recovery.

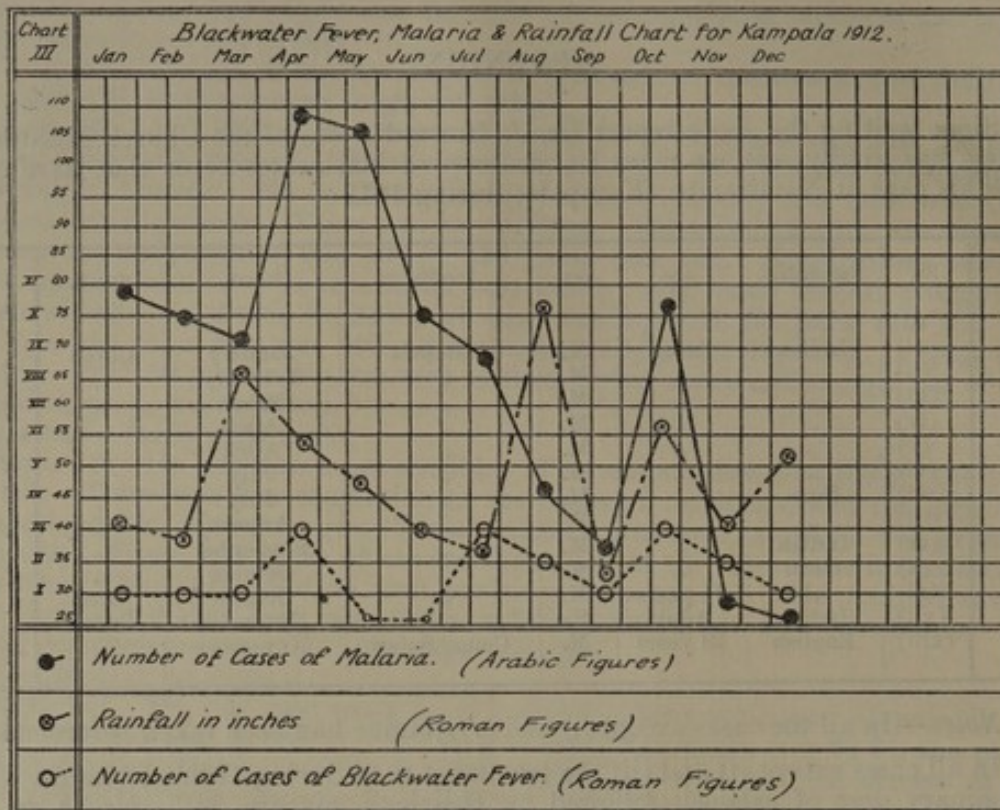
It is a noteworthy fact:—

- (1) All the cases but one (xiii) come from the Indian bazaar at Kampala, which is a hotbed both of malaria and blackwater fever.
- (2) Not a single case occurred amongst the Baganda.
- (3) The cases were mostly mild.
- (4) The notes do not show how long the patients had been resident in the country, but they—so far as my memory serves—were mostly residents of some standing who had had several slight attacks of malaria, and in some cases tick fever, and in a few cases the attack was precipitated by quinine.

J. HOWARD COOK, M.S., M.B., F.R.C.S.

It is noticeable that there are no cases of blackwater fever in Kampala during May, the month during which five cases occurred in Entebbe, 25 miles distant, and one of the months during which malaria is at its worst.

I attach a chart showing malaria, blackwater, and rainfall curves as given above (*vide* Chart II) for Entebbe in the main report.



N.B.—The rainfall is abnormal and more irregular than is usual. The malarial cases shown in the chart represent only those attended at the Government hospitals and dispensaries, but the curve may be taken as representing fairly accurately the incidence of malaria at Kampala. The blackwater fever cases include Dr. Cook's as well as the Government hospital ones, i.e., all the cases which occurred at Kampala.

C. A. WIGGINS.

NYASALAND.

(For the year ending March 31st, 1913.)

In forwarding the annual report on blackwater fever in the Nyasaland Protectorate during the year 1912-1913 the Principal Medical Officer says:—

It will be observed that in the year just ended eleven cases have come under the treatment of medical officers, as compared with five in the year preceding.

A statement is appended which gives in tabular form information under certain headings. The bulk of the cases, it will be noted, has occurred in the Highlands; and a majority of these among planters. The explanation of this is to be found in the fact that by far the larger proportion of Europeans is settled in the Highlands, many of whom are engaged in the planting industry, and resident in proximity to large bodies of native labourers. The opportunities for contracting malarial infections repeatedly are, therefore, greater among this class of the community.

Case.	Occupation.	Under the care of	Station.	Highlands or Lowlands.	Method of Treatment.	Result.
24	Indian Assistant Station-master.	Dr. Old ...	Port Herald.	Lowlands ...	Symptomatic ...	Died.
25	Planter...	Dr. Eldred ...	Cholo ...	Highlands...	Hearsey formula	Recovered.
26	Planter...	Dr. Eldred ...	Limbe ...	Highlands...	Hearsey formula	Died.
27	Surveyor ...	Dr. Eldred ...	Mlanje ...	Highlands...	Hearsey formula	Recovered.
28	Clerk ...	Dr. Eldred ...	Blantyre...	Highlands...	Hearsey formula	Recovered.
29	Planter...	Dr. Eldred ...	Likulezi...	Highlands...	Hearsey formula	Recovered.
30	Planter...	Dr. Eldred ...	Mlanje ...	Highlands...	Hearsey formula	Recovered.
31	Planter...	Dr. Barclay ...	Mlanje ...	Highlands...	Symptomatic ...	Recovered.
32	Planter...	Dr. Stannus ...	Zomba ...	Highlands...	Symptomatic ...	Died.
33	Planter...	Dr. Stannus ...	Mpimbi ...	Lowlands ...	Symptomatic ...	Died.
34	Business ...	Dr. Bury ...	Fort Johnston.	Lowlands ...	Symptomatic ...	Recovered.

PORT HERALD. (LOWER RIVER.)

CASE 24.

There has not been a case of this disease on the Lower River for the last few years until 1913.

On January 20th the Hindu Assistant Station-master was attacked; he did not call in assistance until the next day, when suppression of urine had already set in; he died at the end of the fourth day of the attack.

Locality.—(a) *Physical features.*—His two-room quarters were in a row of brick buildings occupied by the Indian employees of the railway, one or two hundred yards from the station.

Short jungle-grass surrounded the buildings almost to the walls, but there is practically no bush or forest tree near. It is a couple of hundred yards from the Shire River.

There was an extensive swamp, formed by the December rains, to the south of that side of the township, and directly north-east of the station and Customs Office. The land is water-logged and the grass marshy.

(b) *Occurrence of a series of cases in any one place.*—There has been no other case. Native employees live quite close.

(c) *Insect fauna.*—Mosquitoes are very numerous at the place. A sample of these has been collected and forwarded by themselves. *Musca domestica* is numerous and a few tabanus and hæmatopota may occasionally be seen. There were said to be no domestic biting insects besides.

Seasonal variation.—The month of December gave the highest rainfall ever recorded here, namely, 20·63 inches. January and February were hot and practically rainless (4·73 and 3·41 inches, respectively).

The hot, dry months of November and December gave a maximum temperature of 115° in verandah shade (iron and grass roof).

Personal history: (a) *Medical history.*—He had had small-pox, but no malaria in India; whilst in Port Herald, on the contrary, he had been constantly getting fever during the twelve months, about once every fortnight; for these attacks he did not seek medical advice. He stated that he took 10 grains of quinine in solution four times a week; this dose three times a day when he had fever, followed by twice daily. Three daily doses were taken on the 18th and 20th, fever having started on the night of the 19th, preceded by a week's malaise.

(b) *Previous movements and personal conditions.*—He came to the Protectorate a year ago, and, with the exception of a week-end trip to Blantyre, had been all his time at his station.

His quarters were two very small rooms. The window aperture had gauze shutters, but there were open spaces between the roof and the tops of the walls, and the door was not mosquito-protected. A bed-net was in use.

(c) *Microscopic examination of the blood.*—Smears were taken from the finger (blood droplet got with difficulty), and shortly after death from bone marrow (fluid) of tibia, and by an exploring syringe from the region of the liver and the spleen, and forwarded to England for examination.

ADDITIONAL NOTE. January 21st.—I received a message to see him at 9 a.m. His urine the previous evening was said to have been like porter, also during the night and the following early morning. All had been thrown away. He was perspiring, with a temperature of 105°, restless, and vomiting severely. Bowels acted freely on 20th after Eno's fruit salt. Tongue very dry. Dark, coffee-coloured urine, 49 c.c., passed at 4.30 a.m. on the 22nd. Heart was normal, and pulse 128. Temperature dropped to 103° on evening of 21st and 102° during the next morning. The following evening it was below 100°, above which it did not again rise. At 7 a.m. of the 23rd, 230 c.c. of coffee-coloured urine was passed. Vomiting continued, very severe and bilious. Hiccough was most troublesome throughout. Insomnia constant. Morphia gr. $\frac{1}{3}$, with atropine, was given twice daily. No urine was passed except the small quantities on the two occasions mentioned.

Treatment: Copious drinks were given. Blue pills and "Eno's" were administered daily, and he had a mixture of digitalis and arsenic. (I have found that calomel sometimes produces stomatitis in these cases.)

Delay in getting under medical treatment is often fatal in this disease, even although "suppression" is not yet complete. Treatment of suppression cases seems hopeless. In two other cases (Europeans) of this condition that I have had each lived for ten days; this man had only the physical strength to hold out for some four

days. My success with cases, during about twelve years, has been as satisfactory as with other methods of treatment. Dr. Hearsey's well-known treatment is, perhaps, the only other really good one, and has certain advantages. The palatinoid form of that prescription should be kept by planters.

I have been in the habit of giving quinine in very small doses, three times daily, soon after the "red water" ceases, increasing the dose daily, according to circumstances. Sometimes the urine again gets a claret tinge, but it usually has no bad effect. Such patients, too, if they continue correct quinine-taking, do not require invaliding merely on account of the blackwater, or get another attack. Considering everything, I am still of the opinion that blackwater fever is a combination of the toxic effects of chronic malaria and quinine, reacting the one on the other during a certain state of the blood, which it is for the modern bacteriologist to describe and explain.

J. E. S. OLD,
Medical Officer.

CHOLO. (SHIRE HIGHLANDS.)

CASE 25.

A planter, living at Cholo.

History of present illness.—The attack commenced on the afternoon of the 25th of April. Had fever on the 23rd; was normal on the 24th. He took quinine bisulphate, gr. 10.

On April 25th, at 2 p.m., the temperature was 106.2° ; he passed urine and went to bed. At 4 p.m. he passed a porter-coloured urine, normal in quantity, which became solid on boiling. I saw him at 12 noon on the 26th. He had taken castor oil; the bowels had acted freely. He was sweating profusely; pulse good, 70. Temperature 100.5° ; respirations good; there was a great deal of bilious vomiting. He was passing a large amount of practically black urine. The urine continued the same till next morning, then gradually began to clear; and on morning of 28th (fourth day of disease) was quite clear; albumen nil.

During the first 30 hours the stools were fluid and contained a large amount of either blood or hæmoglobin. (I had no means of determining which.)

Treatment.—Normal salines were commenced at once per rectum, and Hearsey's formula given in doses of *liq. hyd. per.*, m 40, and *sod. bic.*, gr. 10, every two hours, gradually decreasing to every four hours.

On May 11th (seventeenth day of disease) he was admitted to hospital, as he had apparently recovered sufficiently to stand the journey, and lived too far off for the Medical Officer to be constantly visiting him.

On admission he said that he felt as if he was in for a "go of fever." Had slight temperature, which continued to rise.

Quinine was commenced on morning of 13th—gr. 5 hydrochlor. by mouth. At 6 p.m. on same day he again passed hæmoglobinuric urine. At 1 a.m. on the 14th the temperature suddenly fell from 101° to 95° ; he had a very severe rigor with vomiting and collapse; became almost pulseless; very rapid breathing.

After a hypodermic injection of strychnine and brandy by mouth he rallied. Original treatment was recommenced on 13th, and on the 15th the urine was clear again, and he was progressing well. He maintained a steady improvement, and was discharged convalescent on June 3rd.

Remarks.

1. *Locality.*—From Cholo, Shire Highlands.

(a) *Physical features.*—Thickly wooded plateau; elevation about 3,000 feet. Misty and hot in the valleys, but patient's house was on the bare hill-top.

(b) *Occurrence of a series of cases in any one place.*—Case 3 of 11th October, 1911, was from this place, in a house lower down the hill; it ended fatally.

Case 2, of 19th February, 1911, was also from this district, and ended fatally.

A mild case is said to have occurred in a European living near the patient, just previous to his attack. The houses are well away from any native dwellings, except house servants quarters.

(c) *Insect fauna.*—Larvæ of anopheles were found in pools on both sides of

the patient's house, about 400-500 yards from the house. Adult specimens appeared to be *Funestus*.

2. *Seasonal variation*.—Nothing of note.

3. *Personal history*: (a) *Medical history*.—Was a regular quinine taker—sulphate in tabloids, gr. 5 daily. Previous diseases: dysentery 1900; some heart trouble previous to that; no present signs of cardiac disease.

(b) *Previous movements and personal conditions*.—He had lived in the present house for over a year; before that he was living in house lower down the hill. For a week before this attack of blackwater he had been working day and night erecting machinery in a new rubber factory. He had been out six years, interrupted by two short trips to the Cape.

(c) *Microscopic examination of the blood*.—Blood examination was negative for malarial parasites at all stages.

A. G. ELDERED,
Medical Officer.

LIMBE. (SHIRE HIGHLANDS.)

CASE 26.

A planter, living at Limbe.

The attack commenced on May 2nd with a rigor, bilious vomiting, and passage of about 4 ounces of port wine coloured urine. Had felt feverish the night before and taken quinine bisulph. gr. 10. The temperature when seen on May 2nd was 99°, pulse 100; bowels had acted twice.

Treatment was commenced with rectal salines and Hearsey's formula. Abundant fluid diet by mouth. He continued to pass a very large quantity of porter-coloured urine (6-8 pints in twenty-four hours), full of albumen, till the fourth day of the disease; the urine then cleared, and by the evening was normal in reaction.

The pulse, respirations, and temperature continued to increase, however, till, on the evening of the fourth day, the temperature was 106°, with feeble pulse of 120-130, and respirations of 48.

Intramuscular injections of quinine and cold sponging reduced the temperature to 101°, but he continued very restless and sometimes delirious. Strychnine and digitalis were given for the heart symptoms. He continued to pass a large amount of normal urine, but otherwise his condition did not improve; the pulse rate ranged from 110-130; respirations always over 40; lungs clear; no heart murmur. Spleen slightly enlarged. Very drowsy; extreme anæmia.

Quinine intramuscular injections were continued, and an apparent improvement resulted, but was not maintained, and the patient died, presumably of heart failure, on the 8th day of the disease.

A peculiar feature was the very large amount of urine passed from the very beginning—6-8 pints daily.

This was the second attack of blackwater. He had a previous attack eighteen months before at Chinde.

Remarks.

1. *Locality*.—Taken ill at Limbe, but had recently come up from the Zambesi.

(a) *Physical features*.—Zambesi River.

(b) *Occurrence of a series of cases in one place*.—Living on a Zambesi steamer, with native passengers and crew, and an abundant variety of mosquitoes, all in close proximity.

(c) *Insect fauna*.—Mosquitoes abundant.

2. *Seasonal variations*.—Nothing of note.

3. *Personal history*: (a) *Medical history*.—Blackwater eighteen months ago at Chinde; a severe attack. Very vague as to previous malarial attacks, but had probably had a good deal of fever. Was not a regular quinine taker. Confessed to a large consumption of $C_2H_5(OH)$.

(b) *Previous movements and personal conditions*.—Up to about three weeks before this last attack had been either on a Zambesi steamer or living on the lowlands, near Port Herald. Had been out five or six years.

(c) *Microscopic examination of the blood.*—Blood examinations made on the 2nd and 3rd days were negative for malaria parasites; some polynuclear increase.

A. G. ELDRED,
Medical Officer.

MLANJE. (SHIRE HIGHLANDS.)

CASE 27.

Surveyor, Public Works Department.

The attack commenced on August 16th, while the patient was in camp in the Luchenza District.

He was admitted to hospital on August 17th.

On admission the temperature was 104°, the pulse rate 100. There was some tenderness and slight enlargement of spleen; vomiting.

His general condition was fairly good. He was passing a rather scanty amount of porter-coloured urine, about half albumen on boiling.

Treatment.—Calomel, gr. 3, on admission; normal salines commenced at once, and Harsey's formula given every three hours. Urine steadily cleared, and by the morning of the 4th day was normal, and a good quantity was being passed. Patient made an uninterrupted recovery. Was put on an iron and arsenic mixture during second week, and on 12th day was allowed to sit up.

Discharged convalescent on September 5th.

Remarks.

1. *Locality.*—For the past few months had been working under canvas in the Mlanje and Luchenza Districts. Before that was at Port Herald.

(a) *Physical features.*—Fairly thickly wooded country, numerous streams; elevation about 2,000-3,000 feet.

(b) *Occurrence of a series of cases in any one place.*—Vide Case 1, of 25th April, 1912, and Cases 2 and 3, of 19th February, 1911, and 11th October, 1911, also Case 1 for year ending 31st March, 1912.

(c) *Insect fauna.*—No facilities for obtaining such details, but it is probable that mosquitoes and other biting insects were abundant.

2. *Seasonal variations.*—Nothing of note.

3. *Personal history:* (a) *Medical history.*—First attack of blackwater. Had a lot of slight fever during the last few months. Was a regular quinine taker—10 gr. *quin. hydrochlor.* twice weekly. A man of regular habits.

Eleven years of service, out this tour two years.

(b) *Previous movements and personal conditions.*—Living under canvas, exposed to extremes of temperature.

(c) *Microscopic examination of the blood.*—Blood examination on the day of admission was negative for parasites; some pigmented white corpuscles were seen; polynuclear count 85 per cent.

A. G. ELDRED,
Medical Officer.

BLANTYRE. (SHIRE HIGHLANDS.)

CASE 28.

Aged about 40. First attack.

Previous history.—Out eight or nine years. C_2H_5O up to a year ago; specific history. Had been living in Blantyre for last three months, before that was at Chiromo. Was not a regular quinine taker. No fever lately, but used to get a fair amount of slight fever when in Chiromo.

History of present illness.—Blackwater commenced on the morning of October 2nd. Had been feeling seedy the day before, and took 10 gr. of quinine hydrobromide and a similar dose a few hours after; also took calomel and a saline on the morning of the 2nd.

On admission (2nd October, 1912), temperature 101°, general condition good,

passing a fair amount of port wine coloured urine, full of albumen. Spleen only slightly enlarged, tender; liver not enlarged, other organs appeared normal.

Treatment.—Hearsey's formula every three hours, and rectal salines every four hours; fluid diet. The bowels had acted freely before admission.

3rd October, 1912.—Urine much darker, but he still passed a good quantity. Temperature rose to 103° during the night, and he had a very slight rigor. Slightly jaundiced, and complained of nausea.

5th October, 1912.—Urine much clearer; as the salines were causing him a lot of discomfort and excessive bowel action, they were discontinued, and as the urine continued to clear and be of good quantity, they were not resumed.

7th October, 1912.—Urine quite normal, general condition good. From this date the patient continued to make a good recovery, and he was discharged convalescent on October 18th, 1912.

Remarks.

1. *Locality.*—Had been resident in Blantyre for the last three months, and before that had been living at Chiromo.

(a) *Physical features.*—Blantyre is situated at about 3,000 feet; Chiromo at a little above sea level.

(b) *Occurrence of a series of cases in any one place.*—I believe that very few cases of blackwater have occurred among people who have been resident in Blantyre for any long period; in most cases it has been elicited that they have recently been travelling.

(c) *Insect fauna.*—*Funesta* appears to be the commonest mosquito in Blantyre, other biting insects are not abundant.

2. *Seasonal variation.*—Nothing of note.

3. *Personal history:* (a) *Medical history.*—Not a regular quinine taker; history of C_2H_6O up to a year ago, also specific history a few years ago. Very little fever while in Blantyre, but fairly frequent attacks while at Chiromo. Had been engaged in an office while in Blantyre.

(b) *Previous movements and personal conditions.*—Nothing of note.

(c) *Microscopic examination of the blood.*—Blood examination, second day, parasites absent; differential count as follows:—

	Per cent.
Small mononuclears	7.1
Large mononuclears	12.1
Polymorphonuclears	80.0
Eosinophiles	.8

A. G. ELDRD,
Medical Officer.

LIKULEZI. (SHIRE HIGHLANDS.)

CASE 29.

A planter. Second attack.

Previous history.—Out here two years this tour, and seven years in all.

Had been in South America before and had one attack of yellow fever.

His house is on a bad site, and swarms with anopheles. He was not a regular quinine taker.

History of present illness.—Was called to see the patient on January 6th, 1913, at Bruce Estate, Likulezi.

I was informed that the attack had commenced nine days before.

The urine was hæmoglobinuric, a good quantity was being passed; temperature 101° ; respiration normal; patient anæmic; bowels constipated; liver normal; spleen much enlarged, reaching to below umbilicus. Blood examination: malaria parasites present.

Was given Hearsey's formula, and usual general treatment.

Urine cleared on 10th day; condition otherwise improved, but temperature rose every afternoon to between 101° and 102° .

Had a return of hæmoglobinuria in 3rd week, lasting twenty-four hours; after that convalescence proceeded; spleen still remained enlarged; given tonic; quinine,

5 gr., daily; complained greatly of headache, probably complicated by old fracture of vault of skull. This was second attack of blackwater in last 14 months.

Remarks.

1. *Locality: (a) Physical features.*—A flat tract of country close to Mlanje Mountain; not thickly wooded near house.
- (b) *Occurrence of a series of cases in any one place.*—None reported.
- (c) *Insect fauna.*—*A. funesta* exceedingly abundant.
- (d) Few stegomyia and culex.
2. *Seasonal variation.*—Nothing of note.
3. *Personal history: (a) Medical history.*—Yellow fever in South America; probably had had a lot of malaria (spleen very enlarged, long standing). Not a regular quinine taker. Second attack of blackwater in 14 months.
- (b) *Previous movements and personal conditions.*—Out two years, and before for four years. Careless about personal health I should imagine.
- (c) *Microscopic examination of the blood.*—Blood 10th day—parasites present.

A. G. ELDRED,
Medical Officer.

MLANJE. (SHIRE HIGHLANDS.)

CASE 30.

A planter. Second attack.

Previous history.—He had been in this country for a total of seven years, with no furlough home. Before that he was one year in West Africa, and was invalided for blackwater fever. Was of regular habits, not a quinine taker. There was a history of getting wet through and not changing into dry things.

History of present illness.—This present attack commenced at 3 p.m. on February 10th, 1913. He had had fever the day before and taken 10 gr. quinine. He had been getting attacks of "low fever" for two months past. At 3 p.m. came in from his work feeling ill, with backache, and passed six ounces very dark urine. Temperature 105°, spleen +, went to bed. I saw him at 6 p.m. sweating freely. Temperature 103.5°; urine as before; condition otherwise good.

Routine treatment; continued to pass hæmoglobinuric urine till 4 a.m., when temperature fell to normal; urine became quite clear.

No further symptoms, and urine remained clear, but on the 18th day, after he had been up and about for several days, and a few hours after taking 5 gr. quinine bisulphate, the temperature rose again to 105°, and there was a recurrence of the blackwater, lasting about nine hours; the temperature then fell to normal again, and the urine cleared up, not gradually, but from one specimen deeply hæmoglobinuric to the next of amber colour.

After this a normal convalescence.

Remarks.

1. *Locality: (a) Physical features.*—Fairly thickly wooded country, close to Mlanje.
 - (b) *Occurrence of a series of cases in any one place.*—Several cases of blackwater have occurred in the immediate locality in recent years.
 - (c) *Insect fauna.*—*A. funesta* found. Jiggers abundant.
 2. *Seasonal variation.*—Nothing of note.
 3. *Personal history: (a) Medical history.*—Blackwater seven years ago in West Africa; had had plenty of malaria on West Coast, but says he had very little in Nyasaland until a few months ago, when he came to this locality, since when he has had many slight attacks.
- He was previously living near Blantyre (3,000 feet). Spleen +.
- (b) *Previous movements and personal conditions.*—Out seven years, and only out of the tropics for a few months for sixteen years.
- Hardly ever takes quinine.
- After working out of doors all day (occupation planter) and exposed to sun and rain.

(c) *Microscopic examination of the blood*.—Blood examined three hours after attack commenced. No parasites found.

A. G. ELDRED,
Medical Officer.

MLANJE. (SHIRE HIGHLANDS.)

CASE 31.

A planter.

1. *Locality*: (a) *Physical features*.—Fifteen miles from Mlanje Road Station; open bush country; in relation to no particular swamp.

(b) *Occurrence of a series of cases in any one place*.—The house is not a year old. It is wattle and daub.

(c) *Insect fauna*.—There appear to be plenty of mosquitoes, but as Mr. L. was an uneducated Italian it was difficult to get much information from him.

2. *Seasonal variation*.—The weather had been hot and stuffy in the middle of the rains.

3. *Personal history*: (a) *Medical history*.—The patient appears to have had much malaria whilst on the Lower River; he took quinine, but none since he came up to the highlands about a year ago (grs. 5 daily).

(b) *Previous movements and personal conditions*.—The patient has been 10 years in Africa, viz., 2 in South Africa, 7 on the Lower River (sugar plantations), and 1 in the neighbourhood of Mlanje Road. Like most of his compatriots he has lived as cheaply as he could, and therefore probably never had sufficient nourishing food. As a planter he would be much exposed to the climate.

History of the present illness.—Admitted 22nd December, 1912, discharged 15th January, 1913. He stated that he had been seized with illness (rigor) $2\frac{1}{2}$ days previously, in the evening, and passed black water. This cleared up after two days, but as he still had fever he took grs. 5 quinine when the blackwater returned.

On admission he had a jaundiced appearance. Liver and spleen slightly enlarged, and the latter tender. Pulse 88 and strong. Temperature 102° .

Put on salines, one pint, per rectum every four hours.

Dec. 23rd: His urine cleared up; evening temperature 102.4° ; condition satisfactory.

Dec. 24th: Passed 36 ounces clear urine. Temperature dropped.

Dec. 25th: Passed clear urine, but temperature 100° ; took milk and soup quite freely. Blood examined, no parasites found.

December 26th: Temperature rose in evening to 101° . Otherwise patient well and took nourishment freely: Benger, soup, and some light wine.

Dec. 27th: Given half an ounce castor oil. At 11 a.m. had a slight rigor and vomited. At 1.30 p.m. temperature rose to 103.4° and he passed 7 ounces port wine coloured urine. Salines restarted. Urine cleared up same evening. Blood taken, no parasites.

Dec. 28th: Patient well: salines continued.

Dec. 29th: Temperature rose to 104° , and he had another rigor and hæmoglobinuria returned. Blood examined, no parasites, but profound anæmia and hæmoglobinæmia.

Dec. 30th: Though I could find no parasites, determined to give quinine, grs. 6; quinine bihydrochlorate given into buttock. Some hours later temperature fell to 98° . At 3 p.m. temperature rose to 103° , and he had an attack of syncope: gr. $\frac{1}{4}$ strychnine sulphate given hypodermically and salines pushed. Later very restless, and gr. $\frac{1}{4}$ morphin. sulph. given. At 9 p.m. grs. 9 quinine given into buttock.

Dec. 31st: Patient better. Temperature between 99° and 100° ; grs. 9 again given.

Jan. 1st: Highest temperature 100° . Quinine injections continued and also salines.

Jan. 2nd: From now on patient made a gradual but complete and uninterrupted recovery and was discharged on the 15th.

A. H. BARCLAY,
Medical Officer.

ZOMBA. (SHIRE HIGHLANDS.)

CASE 32.

A planter, aged 34, living 10 miles from Zomba.

1. *Locality*: (a) *Physical features* of country the same as reported in case reported last year.

(b) *Occurrence of a series of cases in any one place*.—The case reported last year came from the same district about 7 miles further from Zomba.

(c) *Insect fauna* as recorded last year.

2. *Seasonal variation*.—No unusual climatic conditions.

3. *Personal history*.—

(a) *Medical history*; and (b) *Previous movements and personal conditions*.—Patient had been in the country for some seven years, had had dysentery in South Africa before coming to Nyasaland, and amœbic hepatitis in this country, cured by ipecacuanha, some five years ago. Since then he had had "fever" from time to time and had had indifferent health for many months, chiefly complaining of digestive troubles.

No history of syphilis, but $C_2H_5(OH)$ in some excess.

He lived in a temporary grass house without efficient protection from mosquitoes.

Irregular taker of quinine. Previous attack unknown. During the three weeks immediately preceding the blackwater the patient had had rises of temperature in the evening, headache and loss of appetite, with epigastric pain and nausea, relieved sometimes by vomiting, also diarrhoea with watery non-offensive motions without blood or mucus. He had taken 3-5 grains of quinine per diem in form of sulphate, as sugar-coated tablets.

Symptoms more marked during three days preceding attack, and nothing had been taken by mouth except soda-water.

The day before onset of blackwater fever he complained of right hemi-anæsthesia with burning sensations in hands and feet lasting some hours. At 9 p.m. on July 13th, 1912, he was more comfortable; temperature 99.6° F., pulse 80, fair; a little tenderness in epigastric region. No enlargement of spleen.

Systolic murmur at apex: patient thin and anæmic. Seen by me on this date.

Blood showed no malarial parasites and no evidence of malaria.

One hour later without further symptoms patient passed "black water" and within a short time icterus was apparent. Admitted to Zomba Hospital at 1 a.m., 14th instant. On admission, marked icterus; signs of dilatation of heart more marked, no abdominal signs or symptoms. Temperature 100.4° F. Pulse 88.

Urine.—1005 sp. gr.; albumin 20; of slightly brownish colour, spectroscopically showing presence of methæmoglobin; guaiacum test positive; microscopically no blood cells, no casts; a little granular debris present.

Blood.—Anæmia marked. No malarial or other parasites.

Progress of case.—By mid-day on the 13th the urine was clear of hæmoglobin. Patient taking fluid well and urine passed freely. Temperature fallen to normal.

In the succeeding six days until death, patient went gradually downhill. The anæmia was rapidly progressive, a drop of blood was almost colourless. Red cells estimated at 1,000,000; microscopically they appeared as irregularly-shaped bodies hardly staining at all, with many "ghost" forms. Leucocytosis developed but no malarial or other parasites were seen. Urine remained clear of hæmoglobin but contained a small amount of albumin; passed in large quantities, 51, 74, 90, 79, 63, 130, 92, 70 ounces being passed on successive days. Patient sleepless and restless; complained of throbbing in head and intense feeling of weakness. He "wandered" at night.

Nourishment and liquids were well taken all along. On the day before death the spleen became palpable. The temperature, which had risen after the first fall to normal, remained between 100° and 101° F.

Treatment.—15th: mustard leaf to epigastrium to relieve vomiting.

16th: Morphine and atropine injected to ensure rest; repeated on the 18th; water and soda given freely by mouth and, later, intravenous saline. An attempt at transfusion was made but found to be impossible, owing to lack of apparatus. Strychnine and digitalin were used for the heart failure. Cascara given as necessary to open bowels, followed by *sod. sulph.* Milk, chicken-tea, arrow-root, Benger's Food constituted nourishment given.

Remarks.—A typical history previous to attack of blackwater—irregular "fever," irregular quinine taker—in a man not living under good conditions. The actual

blackwater was of short duration, but the hæmolytic was progressive and death was due to actual loss of blood substance.

Fluids were well taken by mouth and amount of urine kept "up," so that there was no indication for treatment except transfusion, which was impossible.

The failure to find malarial parasites in the peripheral blood one hour before onset of blackwater is noteworthy.

H. S. STANNUS,
Medical Officer.

MPIMBI. (UPPER SHIRE.)

CASE 33.

A planter, æt. 25 years, living at Mpimbi, on the mid-Shire River, 25 miles from Zomba.

1. *Locality: (a) Physical features.*—Low-lying country in the Shire plain; marshes; very hot.

(b) *Occurrence of a series of cases in any one place.*—I do not know of other cases from neighbourhood lately, but believe there were others in past years.

(c) *Insect fauna.*—Not known to me by personal observation; mosquitoes numerous.

2. *Seasonal variation.*—I have no personal knowledge.

3. *Personal history: (a) Medical history; and (b) Previous movements and personal conditions.*—The patient was brought into Zomba hospital in a serious condition and previous movements were not elicited in great detail.

Previous history.—He had returned from England to his employment on a cotton estate nine months before, and during this period had been in the habit of taking 10 grains of quinine sulphate in tabloid form each Wednesday and Thursday. About a month before the blackwater, however, he had an attack of "fever," but did not take any extra quinine. He had never had blackwater fever before, and was of temperate habits, being a total abstainer and non-smoker.

I think, however, he was probably not very particular in protection against mosquitoes.

History of present illness.—On the previous Wednesday and Thursday he had taken his usual doses of quinine; on the Friday he felt very well, but on Saturday, November 3rd, he felt feverish and took 10 grains of phenacetin, followed an hour later by 10 grains of tabloid quinine sulphate. Half-an-hour later (11.30 a.m.), blackwater appeared accompanied by rigor, icterus, vomiting and diarrhoea.

He remained on the plantation till the night, and was then carried 25 miles in a hammock and admitted to Zomba Hospital on the 4th at 11.30 a.m., not having passed any urine for two or three hours.

On admission—temperature 100.6° F., pulse 108, respiration 15; a man of good physique, icterus marked. No signs in chest or abdomen except heart-beat rather of a tic-tac rhythm; vomiting and diarrhoea troublesome. A catheter passed found the bladder absolutely empty.

Treatment.—Mustard leaf to epigastrium, starch and opium enemata to relieve abdominal symptoms. Eight ounces of fluid containing 30 grains of sodium bicarbonate every hour by mouth, saline under the skin, cupping over the loins and digitalis without relief of the suppression.

On the arrival of assistance, forty-eight hours after the establishment of suppression, I performed right nephrotomy, under chloroform anaesthesia, by the usual loin route, splitting the tense capsule from pole to pole and incising the bulging gray kidney along the middle of the free border. The patient's condition was satisfactory after the operation but necessitated an injection of morphia for restlessness. On the following day it was found there had been free oozing from the wound, and twelve ounces of brown fluid containing brown granular matter were withdrawn from the bladder.

During the remaining three and a-half days till death, small amounts of urine were passed naturally or drawn off by catheter, but the general condition progressed unfavourably.

Urine measurements in ounces:—November 3rd, 0; 4th, 0; 5th, 4½; 6th, 1; 7th, 2½; 8th, 2½; 9th, ¼. Flatulence, abdominal distension and hiccough were

troublesome, and diarrhoea recommenced. The temperature rose again on the 6th; there was oedema of the face and increasing signs of heart failure. Symptomatic treatment and intravenous saline given.

On the 9th there was a series of uræmic seizures, followed by coma and death.

Microscopic examination of the blood.—On admission and subsequently no malarial or other parasites were found in the peripheral blood.

Remarks.—This is the first case of early suppression in blackwater fever I have seen, and though operative measures after the failure of other means were followed by a fatal termination, the facts of the case warrant the inclusion of nephrotomy among the modes of treatment of suppression. It is a method which, I think, is warranted by the known underlying pathological conditions, but in my own case carried out too late.

H. S. STANNUS,
Medical Officer.

FORT JOHNSTON. (SOUTH OF LAKE NYASA.)

CASE 34.

Aged 47; was admitted to Fort Johnston Hospital on September 9th, 1912, and discharged on September 21st, 1912.

Previous history.—Patient had been about four years in the Nyasaland Protectorate, but had lived for a considerable number of years in tropical countries. He had typhoid fever in Queensland and also malaria in that country.

He had five attacks of malaria since coming to Nyasaland. For the first two years of his residence in this country he was in the habit of taking 10 grains of quinine daily; since then, however, he had only taken it when he felt attacks of fever coming on. Some history of $C_2H_5(OH)$.

History of present illness.—Patient went to Blantyre ten days before onset of attack, and when there, not feeling well, was given a hypodermic injection of quinine.

He returned to Fort Johnston three days before onset of attack still feeling out of sorts.

During the morning of September 8th he felt ill and vomited, but continued to go about all day; in the evening he took ten grains of phenacetin and ten grains of quinine. About midnight he had a rigor, and during the morning of the 9th took another ten grains of quinine. At midday on the 9th he had another rigor, and, soon after, his wife noticed his urine was dark and sent for the Medical Officer. He was then admitted to hospital, his temperature being 104.2° F. and his urine typically hæmoglobinuric.

Patient, a big strong man, complained chiefly of headache and vomiting and retching. He had no lumbar or hypogastric pain. He was extremely restless. His spleen was not palpably enlarged, but his liver came about half-an-inch below the costal margin in the nipple line. There was no abdominal tenderness. Some epigastric pain and tenderness developed later on from the persistent vomiting and retching.

On the morning after admission, about 16 hours after the onset of the "black-water," blood slides were taken and examined, but no parasites of any sort were detected.

Patient had been constipated for some time previously. Vomiting was persistent for first three days and recurred from time to time until after the patient left hospital.

The treatment adopted was purely symptomatic, the vomiting being the most distressing persistent symptom; for this, *sodii bicarb.* in 15 grs. doses was given two-hourly, then *tinct. iodi* in m 11 doses quarter-hourly; *acid. hydrocya. dil.* in m 6 doses hourly, and sips of champagne were tried. None of these drugs seemed to have the slightest effect.

The constipation was relieved by enemata.

The restlessness at night was found to be relieved by 20 grs. doses of trional.

Mustard plasters were used for the epigastric pain following the retching and met with some success.

Saline rectal injections were regularly administered, about eight ounces being given every four hours.

After admission, patient had one rigor, about noon, on the second day of the disease.

The urine became apparently free from hæmoglobin on the fourth day of the illness.

The amount of urine passed was as follows:—

1st day, 8 ozs.

2nd „ 6 „

3rd „ 9½ „

4th „ 15 „ after which it increased regularly.

When patient left hospital, at his own request, he was still very weak, and from time to time for about a fortnight afterwards was troubled by headaches, probably due to anæmia, and occasional vomiting attacks.

Great difficulty was experienced during his convalescence in getting him to take sufficient nourishment.

The gastric irritability and distaste for milk, &c., may, in a great measure, be attributed to his habits.

Remarks.

Locality: (a) Physical features.—Fort Johnston is situated on the bank of the Upper Shire River, about 6 miles south of Lake Nyasa, on a sand bank somewhat higher than the surrounding river bank. The houses are about 20 to 30 feet above river level according to the season and consequent height of the water level. The subsoil is sandy and permeable.

The surrounding bush consists chiefly of large and small palm trees; no very dense bush or large forest in the immediate neighbourhood. No large swamps close by, but there is weedy and swampy ground just across the river.

(b) Occurrence of a series of cases in any one place.—There have been no series of cases of blackwater fever in the locality lately.

(c) Insect fauna.—Biting flies of many sorts are numerous in the locality—*Tabanidæ*, *Stomoxys*, *Culicidæ*, *Anophelinæ*, &c.

The tick *Ornithodoros moubata* is also common in native dwellings near the township.

The subject of the present report states that before settling in Fort Johnston, while prospecting through Nyasaland, he was frequently much bitten by tsetse fly.

Seasonal variation.—There were no unusual conditions for the locality and time of year.

R. BURY,
Medical Officer.

EAST AFRICA PROTECTORATE.

Station or Place.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Race of Patient.	Mode of termination of case.
Voi	—	—	—	—	—	1	—	—	—	—	—	—	European	Recovery.
Ngabotok	1	1	—	—	—	—	—	—	—	—	—	—	African ...	Death.
Mumias	—	—	—	—	—	—	—	—	1	—	—	—	Goan ...	Death.
Kisii	—	—	—	1	—	—	—	—	—	—	—	—	Goan ...	Recovery.
Kwaratek River Camp; Trans-Nzoia.	—	—	—	—	—	—	1	—	—	—	—	—	European	Death.

The above table sets forth the recorded distribution of blackwater fever in regard to time and place, together with certain other details for the year 1912. Of the total number two were Europeans, two Asiatics, and two Africans. In respect of professional attendance one case was seen by a medical man, four by junior members of the department, and one by laymen. All the patients were males.

1. *Locality. (a) Physical features.*—So far as locality is concerned, Kisii and

the Kwaratek River Camp have an altitude each of over 5,000 feet, while Voi, Ngabotok, and Mumias lie at lower levels.

Kisii, though in high country (5,700 feet, approximately), is not far from the lower altitudes surrounding the Victoria Nyanza and tracks provide means of communication between it and the lake.

The Kwaratek River Camp has an elevation of 6,100 feet and is situated on a low ridge near swampy ground at the junction of the trade route between Abyssinia and Mumias with the river in question.

Mumias, with an altitude of some 4,500 feet, is situated on a small hill in a thickly populated country and surrounded by rivers.

Voi (1,830 feet) is situated in bush country, a swamp existing close to the camp whereat one of the cases occurred.

Ngabotok (2,400 feet) is an outlying station to the south-west of Lake Rudolph. It is situated on the top of a small hill about 1,500 yards from the Turkwell River. The surrounding country is open thorn bush on sandy soil, except near the river itself, where there is a well-defined belt of vegetation consisting of large trees and dense undergrowth varying from 200 to 400 yards in width. When travelling in the district water is usually obtained from water holes or hot springs as the Kerio and Turkwell are the only rivers that flow. These water holes are often polluted owing to the number of stock watered at them.

All these localities, except that of the Kwaratek River Camp, are classed as unhealthy.

(b) *Occurrence of a series of cases in any one place*.—None of the cases reported, so far as is known, forms part of a series. The disease has, however, before now manifested itself at Mumias, Voi, and Ngabotok.

(c) *Insect fauna*.—In view of the nature of their employment, it can, I think, be safely assumed that all of the persons under review in this report as having suffered from blackwater fever have been exposed to the attacks of mosquitoes. One was a surveyor, one an engineer, one a trader, one an agent of a trading firm, and two native soldiers.

Anophelines and tabanids have been found in the Voi and Mumias regions, and mosquitoes—some of them with spotted wings—are stated to exist in the country through which the Kwaratek flows. As to Ngabotok, while the results of investigation at one period of the year would seem to have failed to secure any specimens of *Culicidæ* either in the station itself or close to the river (although one was heard at the former place) yet, towards the close of 1912, it is asserted that they were very plentiful. Tsetse fly are present on the Turkwell River.

No information is available to hand concerning the insect fauna of Kisii.

2. *Seasonal variation*.—Four of the cases occurred in the cool season of the year, *i.e.*, between the months of April and September, at the commencement of which period the heavy rains usually set in.

3. *Personal history*. (a) *Medical history*.—In four of the patients previous attacks of malaria are stated to have occurred, and, of this number, but one would appear to have attempted prophylaxis and that in an inefficient manner.

No information is available regarding the previous history of the remaining two of the total. So far as the Europeans are concerned, one had had a little over four years' service in the country and the other but six months'. There is no record of previous hæmoglobinuric manifestations having been observed in any of the cases.

(b) *Previous movements and personal conditions*.—At the time of the onset of their illnesses two of the sufferers (Europeans) were engaged in out-door work and living in camp. A native servant of one of them is stated to have coincidentally developed an illness which was characterised by vomiting and the passage of blood in the urine. The remaining patients were in residence at their respective stations when overtaken by the disease.

(c) *Microscopic examination of the blood*.—In blood smears taken from one of the patients malaria parasites (rings) were found on the sixth and seventh days of the illness, and, in those taken from a second, none were found. No record is available to show that blood examinations were made in the remaining cases.

From a consideration of the information available in regard to the cases which are the subject of this report it would appear that the patients—

- (1) followed occupations which rendered them specially liable to exposure to malarial infection,

and that the majority of them

- (2) have no record of having taken quinine systematically,
- (3) had had attacks of malaria prior to the development of blackwater,

and

- (4) manifested the disease in localities rated as unhealthy.

In conclusion I have the honour to enclose herewith the report of the Voi case, made by the Senior Medical Officer, European Hospital, Mombasa, under whose care the patient came on admission to that institution.

J. HARAN,

Acting Principal Medical Officer.

CASE 35.

Railway Engineer, aged 25. *Residence in country*: 6 months.

1. *Locality*: (a) *Physical features*.—Voi, situated on a stream of the same name under the Ndara Hills, elevation 1,830 feet, at a distance of 103 miles from the coast. General character of country is bush, but with a large swampy area close to the site of the patient's camp. This was generally stationary, but occasionally moved to accommodate the necessities of his work, viz., engineer-in-charge of a new water-supply for the township.

(b) *Occurrence of a series of cases in any one place*.—His tent was situated in places immediately associated with numbers of native and Indian workmen, his food supply could not be described as good in quality, or capable of much variety, unless he dined at the Dák Bungalow, situated about 2 miles away, necessitating travelling in a railway trolley at all seasons. He appears to have led an austere life, and there is absolutely no reason to suppose that he had any intercourse with native women.

It may here be said that the locality is known to be very unhealthy, and its reputation for malaria is most unenviable. Many cases contracted there have come under my own observation, as well as one other case of blackwater.

(c) *Insect fauna*.—Among others the following insects are known: Anophelinae, Tabanids, *Glossina fusca*, *austeni*, *longipennis*, etc.

2. *Seasonal variation*.—The rainfall is practically identical with that of the coast, i.e., March-May and October-January. Average for the year: 18 to 22 inches. Occasionally the district is visited by severe thunderstorms, and large tracts of surrounding country inundated.

3. *Personal history*: (a) *Medical history*.—Patient had no experience of tropical countries prior to his appointment here; his general health appears to have been excellent; he had taken systematically 5 gr. of the sulphate of quinine since his advent at Voi, once a week, and more during his attacks of malaria, of which there appear to have been three recorded, one necessitating his removal to Nairobi for a period of ten days. His history of malaria on admission contains these words, "I have had fever on or off for months"; and, having regard to the fact that his attack of blackwater supervened within six months of his arrival in the country, it can be assumed that his first infection of malaria occurred soon after his arrival, when he was immediately stationed at Voi.

(b) *Previous movements and personal conditions*.—The conditions of life to which he was subjected were those obtaining in a construction camp—tent life, rough-and-ready conveniences, food none too good or regular—but he took the precautions of sleeping under a mosquito-net and boiling his drinking-water. That he was unduly exposed to malaria infection cannot be questioned, as the nature of his work and his own zeal called him out into the district at all hours.

Present attack.—Came under observation on June 25th, and was brought into hospital at 8.30 a.m. with a history of six days' illness, ushered in by vomiting, rigors, and headache. He did not know his temperature limit; on the 20th he noticed his urine was port wine coloured, and did not remember anything for some days; he was found on the 24th, by the Permanent-Way Inspector, ill, and brought into hospital.

On admission.—Very anæmic, herpes on lower lip, slight jaundice, complained of headache and pain in the back, very restless, much thirst.

A blood examination showed crenation of the blood corpuscles, some malaria (ring) parasites. No blood count was made. The pulse rate was from 84 to 104;

the respirations 28 to the minute. The spleen could not be felt. Twenty-eight and a half ounces of a dark, smoky albumen were passed during the twenty-four hours. At 7 p.m. there was a rigor, during which the temperature rose to 102.6° . The urine now became very dark (porter coloured) and the jaundice increased. There was no vomiting. Absolute rest in bed was prescribed and large quantities of fluid were given during the day. Potassium bicarbonate and the *liquor hydrarg. perchloridi* were given, and after the rigor an effervescing mixture containing quinine (gr. 5) was given twice a day.

During the night the urine was darker but not as thick. The patient did not sleep at all.

June 26th: The temperature fell to normal at daybreak. During the day the pulse varied between 88 and 120 beats to the minute; in character it was unsatisfactory. The urine cleared a little, but the general condition of the patient did not improve; he was very restless; there was much dyspnoea and pain in the loins and thighs. A further examination of the blood showed an increased number of malaria ring parasites. Quinine, grs. 30, every twenty-four hours was prescribed. Twenty-seven and a half ounces of urine were passed during the twenty-four hours.

June 27th: The temperature fell to normal in the morning after a good sleep. The urine became clearer. At 7.45 p.m. the patient had a severe rigor, which was followed by the passage, immediately afterwards, of very dark urine. Before the shivering fit had quite subsided the patient was given a hypodermic injection of quinine, grs. 10. The total amount of urine passed during the twenty-four hours was fifty-one ounces.

He had a good night.

On June 28th he was better. The hypodermic injection of quinine, grs. 10, was repeated. The temperature rose to 99.2° . The urine was now clearing.

He again passed a good night.

On June 29th he was better. The hypodermic injection of quinine, grs. 10, was repeated, and two doses of an effervescing mixture of quinine (grs. 10) were given by the mouth. The diet was increased. The pulse-rate was from 68-80, and the temperature rose to 99.8° , dropping to subnormal at night.

June 30th: From now onwards the patient made an uninterrupted recovery. He was convalescent, and was given tonics.

July 13th: He was now allowed to sit out in the verandah. The urine was normal, and of better colour. It contained a few white urates.

July 17th: The patient was discharged from hospital.

Remarks.

As appears, this case was treated as a double tertian infection with hypodermic injection of quinine, in spite of the fact that hæmoglobinuria was present, and that the patient was in a most critical condition.

The presence of rings and pigments in the corpuscles, and the daily varying range of the temperature, indicated the lines on which the treatment was to be directed, and, as it appears, with the happiest result.

Dr. Haran, C.M.G., also saw the case, and agreed that the condition was one calling for the energetic treatment that was adopted; and in the course of a long experience in malaria and its many evidences, I cannot recall any case which called so clearly for a definite course of treatment, unless it be those of so-called dysentery coming from the same district, which yielded in the same manner to the hypodermic exhibition of the hydrochlorate of quinine.

On reviewing the history of the case it will be noticed that within twenty-four hours of admission quinine in small doses was given by the mouth, and pushed until 30 grs. daily were so taken on the third day as well as the hypodermic dose.

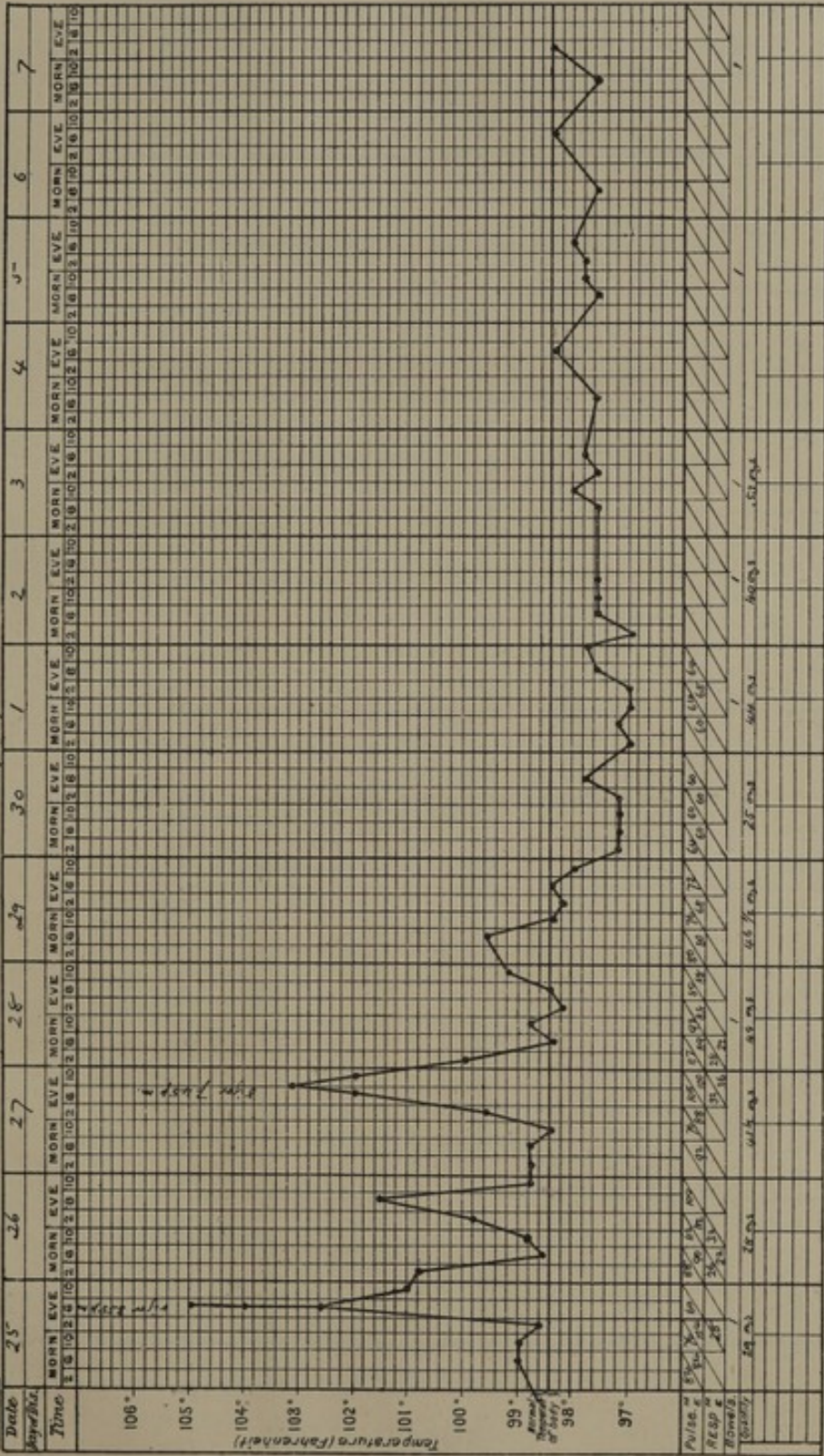
The defining factor in the case was the presence of rings and pigment in the corpuscles, demonstrable from the first, and, indeed, persisting until the first hypodermic injection, after which no trace could be found in any specimen drawn from the peripheral blood.

It is a point of interest that the recognition of the rings was confirmed by the bacteriologist, Dr. Ross, whose opinion was not received until long after the treatment was decided on and applied, on account of the distance between the coast and Nairobi.

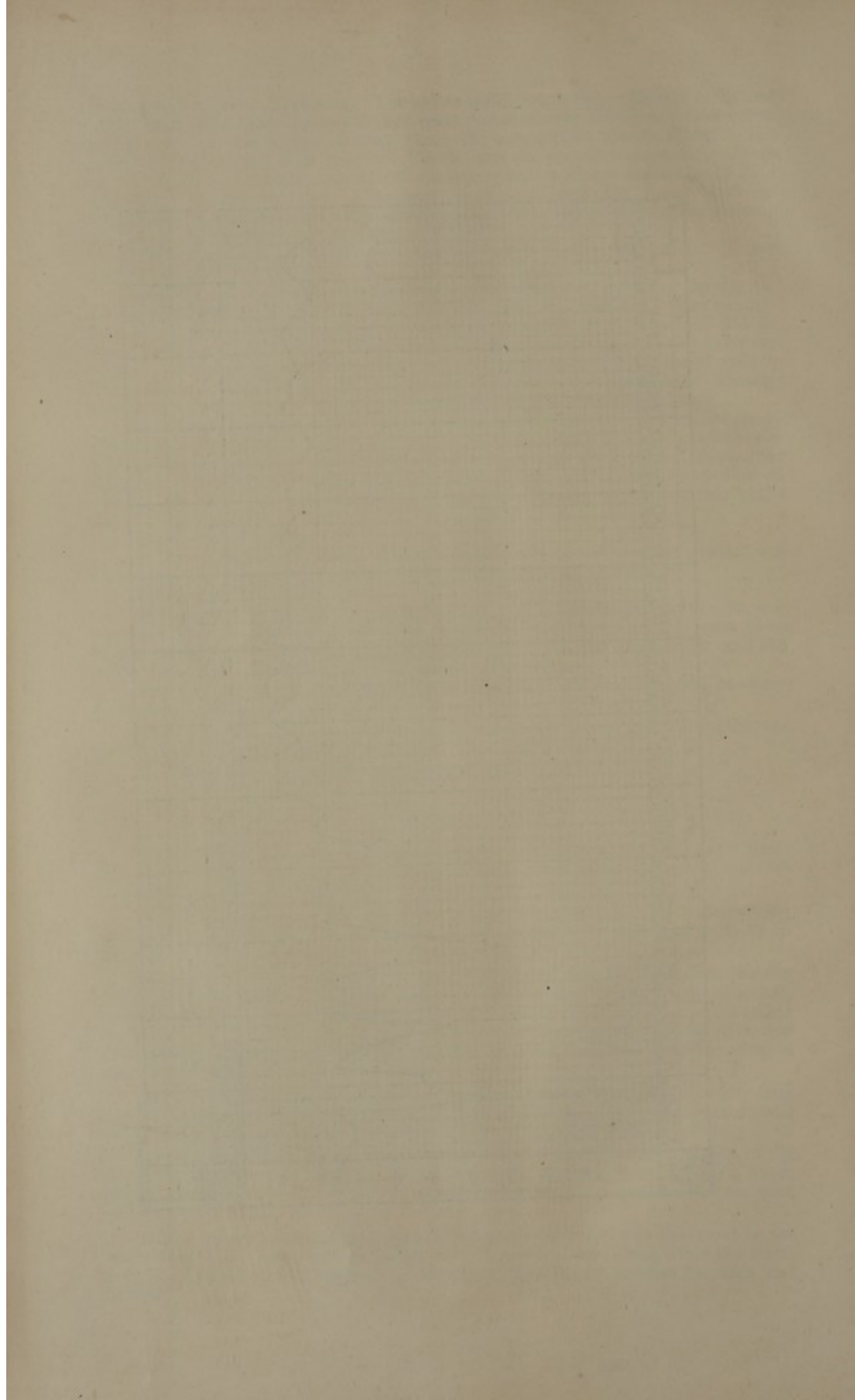
GABE 33.

June

July



24623/116, H.B.B. 10.13



URINE QUANTITY.

Case 35.	Time.				Quantity.	Total.	Total, twenty-four hours.
					Ounces.	Ounces.	Ounces.
June 25th, 1912 ...	8.45 a.m.	...	...	...	1½		
	2.0 p.m.	...	...	...	3½		
	4.0 "	...	...	...	5½		
	6.30 "	...	...	...	4	14½	
	9.0 p.m.	...	...	...	8		
	12.0 "	...	...	...	7	15	29½
June 26th, 1912 ...	2.50 a.m.	...	...	...	7½		
	6.0 "	...	...	...	8		
	12.0 "	...	...	...	6	21½	
	4.0 p.m.	...	...	...	6½	6½	28
June 27th, 1912 ...	4.0 a.m.	...	...	...	13		
	6.0 "	...	...	...	8		
	8.0 "	...	...	...	6		
	11.55 "	...	...	...	7	34	
	2.30 p.m.	...	...	...	6		
	4.0 "	...	...	...	7		
	7.30 "	...	...	...	½		
	10.0 "	...	...	...	4	17½	51½
June 28th, 1912 ...	12.30 a.m.	...	...	...	7½		
	2.30 "	...	...	...	8		
	5.45 "	...	...	...	8		
	9.0 "	...	...	...	4		
	11.0 "	...	...	...	4½	32	
	4.0 p.m.	...	...	...	8		
	10.0 "	...	...	...	9	17	49
June 29th, 1912 ...	4.0 a.m.	...	...	...	13		
	7.30 "	...	...	...	7½		
	11.50 "	...	...	...	12	32½	
	3.30 p.m.	...	...	...	8		
	6.30 "	...	...	...	7		
	12.0 midnight	...	...	...	9	24	56½
June 30th, 1912 ...	5.30 a.m.	...	...	...	8		
	12.0 noon	...	...	...	5	13	
	4.0 p.m.	...	...	...	7		
	6.0 "	...	...	...	5	12	25
July 1st, 1912 ...	3.0 a.m.	...	...	...	10		
	6.0 "	...	...	...	4		
	9.15 "	...	...	...	9	23	
	2.0 p.m.	...	...	...	8		
	4.0 "	...	...	...	1		
	11.50 "	...	...	...	12	21	44
July 2nd, 1912 ...	6.0 a.m.	...	...	...	12		
	12.0 noon	...	...	...	13	25	
	6.0 p.m.	...	...	...	9		
	11.50 p.m.	...	...	...	16	25	50

GOLD COAST.

The Principal Medical Officer, in forwarding the report, states:—

"I have the honour to submit, in triplicate, reports on the cases of blackwater fever, which were brought to my notice during the year by the members of the West African Medical Staff serving in this Colony.

"In many details they are far from being complete, which I regret, but it is

to be explained by the reports being called for originally (by Circular, March, 1911) at the end of each year and not at the time the cases occur.

"Medical officers are continually changing owing to leave and invalidings; thus it came about that the officers who actually attended the cases did not write the reports.

"This, I may state, has now been altered, and I trust for the future the reports will be strictly in accordance with the instructions as laid down in circular despatch from the Secretary of State, of January 24th, 1911.

"Excluding the mines, from which I have no details, thirteen cases occurred in the Colony, Ashanti, and Northern Territories.

Towns.	No. of cases.	Nationality.	Deaths.
Accra	1	Syrian.	1
Cape Coast	1	British.	1
Saltpond	1	"	0
Seccondee	3	2 British, 1 West Indian.	1 British 0
Axim	2	2 British.	2
Quittah	1	"	0
Akuse	1	Mulatto.	1
Dunkwa	1	British.	0
Ejura (Ashanti)... ..	1	"	0
Wa (Northern Territories)	1	"	0
	13	British 10 West Indian 1 Mulatto 1 Syrian 1	British 4 Mulatto 1 Syrian 1

Officials : 6.

Non-officials : 5.

Syrian and Native : 2.

"No details are available in the case of the mulatto and Syrian in the Colony, or the official, a sapper, in Ashanti, as he had not medical attention until convalescent."

CAPE COAST.

CASE 36.

European Merchant.

No clinical notes available. The case was a fatal one.

1. *Locality: (a) Physical features.*—The patient arrived in Cape Coast from Accra on the 8th February. In Accra, the quarters occupied by him for at least a month before the attack of blackwater were in the African Association factory facing the main road, and in close proximity to native habitations on three sides. It was in this locality that an outbreak of yellow fever occurred in June, 1911.

(b) *Occurrence of a series of cases in any one place.*—No other cases of blackwater fever to my knowledge in that locality, at or previous to the time in question.

(c) *Insect fauna.*—An abundance of mosquitoes, numerous breeding-places of stegomyia. No details known.

2. *Seasonal variation: Unusual climatic conditions.*—Early February. No rains. Best and healthiest season of year.

3. *Personal history: (a) Previous history.*—The patient was invalided to England at end of last tour. He was then thought to be suffering from a disease of the blood (Hodgkin's disease). He returned to this Colony in October, 1911. Not a constant quinine-taker. He took occasionally when he felt out of sorts. For a month previous to last illness he suffered frequently from malaria, hardly a day without a temperature; not under treatment; took quinine, 10 or 15 grains, occasionally.

(b) *Previous movements and conditions to which patient has been subject.*—Left Accra about 6th February by small branch boat. States that he caught a chill on the boat.

(c) *Microscopic examination of the blood.*—No parasites.

C. V. LE FANU,
Medical Officer.

SALTPOND.

CASE 37.

European Merchant.

History of present illness.—The patient, an agent for one of the business firms at Saltpond, sent for his medical attendant on the night of 28th July. He stated that he had been suffering from attacks of fever, and that he had been losing weight and strength for the past few months. He was very jaundiced, and his tongue was very dirty. His temperature was 104° and pulse 120. Two blood smears were taken. Five grains of calomel followed by a dose of magnesium sulphate were prescribed. Blood examination showed a severe infection with sub-tertian parasites.

Ten grains of quinine bi-hydrochloride were given intermuscularly on the morning of the 29th, and repeated in the afternoon.

July 29th.—Temperature 101° , pulse 120. He stated that the calomel had acted three times. The temperature in the afternoon was 100° .

July 30th.—Temperature normal. No parasites were found on examination. Ten grains of quinine were given intermuscularly. The patient was advised to take five grains of quinine daily, and to try to manage to get home for a change.

August 1st.—I was sent for urgently this morning to see the patient. He complained of vomiting, headache, pains in the back; and stated that his water was very dark in colour. Temperature 104° , pulse 100.

Blood examination:—

- (a) Parasites, nil.
- (b) Lymphocytes, 15.3 per cent.
- (c) Large mononuclears, 18.5 per cent.
- (d) Polymorphonuclears, 65 per cent.
- (e) Eosinophiles, 2.4 per cent.

Urine:—

- (a) Dark, looking like porter.
- (b) Alkaline in reaction.
- (c) Sp. gr. 1014.
- (d) Spectroscopic absorption bands of oxy-hæmoglobin.

August 1st.—10 a.m.; both Plehn's and Christopher's reactions were present. The patient was placed at once on the Hearsey treatment, and advised to drink as much barley water as he could possibly manage; milk and Perrier water diet. 5 p.m.: temperature 103° , pulse 103. He stated that he felt very comfortable. Passed about ten ounces of urine of an intensely black colour. 10 p.m.: patient sleeping soundly.

August 2nd.—8 a.m.; patient stated that he slept very poorly. Temperature 102° , pulse 100. Patient passed nearly twenty ounces of urine, very dark in colour. Treatment continued. 9 p.m.: He stated that he slept during the afternoon. Temperature 100° , pulse 90, he passed about forty ounces of urine; this was much lighter in colour than that passed in the morning.

August 3rd.—7 a.m.: He stated that he slept all night. Temperature normal, pulse 76; passed about twenty ounces of urine, which was almost clear in colour. The treatment was continued. 5 p.m.: temperature normal. He was now passing large quantities of very pale-coloured urine.

August 4th.—7 a.m.: temperature normal. Urine normal in colour. Hearsey treatment discontinued. Patient placed on chicken diet. Patient had a relapse at 9 p.m. this evening, starting with a severe rigor. 10 p.m.: temperature 104° , passed about six ounces of very dark coloured urine. The former treatment was commenced immediately.

August 5th.—6 a.m.: temperature 100° , pulse 90. Patient passed about ten ounces of urine of a dark colour. Blood examination: no parasites found.

9 p.m.: temperature 99° . Patient passed about thirty ounces of urine almost clear in colour; treatment continued.

August 7th.—9 a.m.: temperature normal; urine light and clear in colour; treatment continued. 5 p.m.: temperature normal; urine normal.

August 8th.—Temperature normal, treatment discontinued. Patient placed on iron and arsenic tonic. Patient strictly warned on no account to get out of bed, and to make arrangements with his firm to be relieved at earliest possible date with a view to proceeding to England.

August 9th.—2 p.m.: patient, who, it seems, spent the morning with his clerk going over accounts books, was seized with fainting fit about 1 o'clock. His pulse was 120, and very irregular. Heart sounds weak and irregular. A hypodermic injection of strychnine was given, and patient warned to keep perfectly quiet. A mixture of digitalis and strychnine was prescribed, and a couple of ounces of brandy, all to be taken in twenty-four hours.

August 10th.—Patient stated that he felt all right again, but was very weak.

August 11th.—Patient getting on well. Temperature normal, pulse normal.

August 12th.—Patient convalescent, and is proceeding home on the 15th.

August 14th.—Proceeding to Cape Coast by hammock with patient.

Remarks.

1. (a) *Locality*.—The bungalow is skirted by a range of hills covered with low, thick bush, which comes almost right up to the compound at the rear. For three months of the year (during the rains) the whole of the ground at the rear of the bungalow is under water.

N.B.—For the past three months a considerable amount of bush clearing has been done by the sanitary squad in this locality.

(b) *Prevalence of the disease*.—No other case has occurred here for the past six years.

(c) *Insect fauna*.

(a) *Mosquitoes*. Anopheles.—Both *Myzomyia funesta* and *Pyrethrophorus costalis* have been found in the locality, but are in the whole rare. The two commonest species found here are *Mansoni uniformis* and *Stegomyia fasciata*, the former constituting 70 per cent.

(b) *Biting flies*.—Most of the blood-sucking muscidæ are represented in this locality—Chrysops, Stomoxys, and *Glossina morsitans*; of these *G. morsitans* is the commonest.

Both bugs, fleas, and lice are extremely common amongst Kroo boys employed here by the traders, the commonest being *Pulex irritans* and *Phthirius inguinalis*.

2. *Seasonal variation*.—Usual climatic conditions. Rainy season from June to September with occasional tornadoes.

3. *Personal history*: (a) *Medical history*.—Patient served twelve years on the coast both in Southern Nigeria and Gold Coast. Had an occasional "go" of fever. Took quinine pretty regularly. Temperate in his habits.

(b) *Previous movements*.—Patient spent the previous year in this station with the exception of a few occasional visits to Appam, Winnebah, and Accra in connection with his business.

(c) *Microscopic examination of the blood*.—On the morning of the attack there was a severe infection of sub-tertian parasites, but, on making a subsequent examination twelve hours after, no parasites could be found in the peripheral blood.

Parasites. Severe sub-tertian infection:—

	Per cent.
Lymphocytes	17.6
Large mononuclears	20.5
Polymorphonuclears	65.0
Eosinophiles	1.8

Although careful search was made, no cell inclusions were found, although the writer had an opportunity of examining Sir William Leishman's original specimens.

D. J. F. O'DONOGHUE,
Medical Officer.

SECCONDEE.

CASE 38.

Gold Coast Constabulary.

A West Indian official. He had his first attack of blackwater fever in Tarkwa, April, 1906. He had then been out twelve months of his second tour. He did not remember having any attack of remittent fever before this. Had not been taking quinine. After convalescence was transferred from Tarkwa to Cape Coast.

Remained there nineteen months, till November, 1907; then transferred to Secondee, and went home to the West Indies six months after. Remembered an attack of blackwater fever in Dunkwa before going home, but it was a slight one. Was on leave eight months and returned in March, 1911.

Had a third attack blackwater fever in October, 1912. Had no attack of remittent fever before this, and had not taken any quinine. Was invalided six weeks to the Canary Islands, and had since been taking quinine bisulphate, gr. 5, every other morning.

Had dysentery in October, 1904.

Remarks.

1. *Locality: (a) Physical features.*—Secondee, a large town on the sea coast.
- (b) *Occurrence of a series of cases in any one place.*—Three cases occurred during 1912. One in January, one in October, and one in December. Cases occurred in different parts of the town. Lived in close proximity to native town.
- (c) *Insect fauna.*—Mosquitoes—*stegomyia* and *anopheles*.
2. *Seasonal variation.*—Cases occurred during dry season.
3. *Personal history: (a) Medical history.*—This is his third attack of blackwater fever. He was not in the habit of taking quinine.
- (b) *Previous movements and personal conditions.*—Stationed in Secondee for some time. Lives very carefully.
- (c) *Microscopic examination of the blood.*—Not available.

E. W. GRAHAM,
Senior Medical Officer.

CASE 39.

European—non-official.

He was admitted on 31st January, 1913, and discharged on 14th February, 1912. No record of his illness had been kept. He appears to have been a derelict. He had been taken on temporarily by the railway, but the railway would take no responsibility for his hospital fees, and he is signed on the hospital books as a pauper. Of his previous history there is no record. I have no doubt he had been in some privation previous to this illness. He recovered.

Remarks.

1. *Locality: (a) Physical features.*—Secondee, a large town on the sea coast.
- (b) *Occurrence of a series of cases in any one place.*—Three cases occurred during 1912—one in January, one in October, and one in December. Cases occurred in different parts of the town. He was in only temporary employment, so presume he lived in native portion of the town.
- (c) *Insect fauna.*—Mosquitoes—*stegomyia* and *anopheles*.
2. *Seasonal variation.*—These occurred during the dry season.
3. *Personal history: (a) Medical history.*—There is no record of his personal history beyond the fact that he was admitted to hospital as a pauper patient.
- (b) *Previous movements and personal conditions.*—Should say he had suffered from want before this illness.
- (c) *Microscopic examination of the blood.*—Not available.

E. W. GRAHAM,
Medical Officer.

CASE 40.

European official.

History of present illness.—He was admitted to hospital, Secondee, on December 2nd, 1912, suffering from fever. Two days previously he had come from Accra. He had been taken ill at Accra, and hoped that the sea trip to Secondee would put him all right. He developed hæmoglobinuria at 2.30 a.m. on December 3rd, 1912. From what I can gather, he has had five previous attacks of blackwater: two in

French territories, and three in Accra. This is subject to correction. The last attack appears to have been in Accra, five months ago. The treatment adopted during the first forty-eight hours was as follows:—

Saline injections every hour to hour and a half, ice *ad lib.*, to relieve thirst and check vomiting, bland fluids to drink *ad lib.*

Medicinally he was given *Mist. sodii bicarb.* and *Liq. hydrarg. perchlor.*, every two hours.

The urine at first was heavily charged with blood, but was passed in large quantities. There was at times a slight tendency to, but no vomiting. He had a very restless night, the first night, the temperature rose to 105°; as the result of wet packing the temperature came down to 98° next morning, December 4th.

On December 5th temperature rose again to 103·4°, was 100° at noon, and now continued between 100° and 101° for some time. The first urine passed this morning was clear for the first time, though still full of albumen. At 7 a.m. the pulse was 120, respirations 36, and he was inclined to be drowsy; at 8 a.m. a hypodermic injection of digitalis and strychnine for heart failure. The saline injections were continued, and every hour a few teaspoonfuls of milk with a little Brand's Essence were given by the mouth and retained. At 11.30 he was still very somnolent, but could be roused. Urine continued to be passed in fair quantity, was still clear and almost free from albumen. Pulse 120 and weaker. Respirations 48. The hypodermic injection of digitalis and strychnine was repeated and a little brandy and water was given by the mouth. At 4 p.m. he seemed a little better; he could move his arms and, though he could not talk, was quite conscious of what was said. At 6.30 there was again a falling off, very gradually progressing. Feeding by the mouth was stopped. The saline injections were continued, plus the addition of brandy and strychnine. A double hæmic murmur had now developed over the heart. The saline enemata were now intermitted with nutrient enemata. He continued to fail. In view of the large quantity of salines injected and retained in my opinion it was absolutely useless to try transfusion.

On December 6th at 3.30 p.m. temperature rose to 105·4°; wet packing was tried, but was of no avail and resisted by the patient as he feebly could. He was put in a cold bath for 10 minutes. The temperature rapidly came down to 103° and later to 99°. With a view of counteracting the poisoning by the products of decomposition, his rectum was douched out.

At 2.30 a.m. on December 7th the temperature again rose to 104°. At 4.30 a.m. with ice packing, temperature came down to 99°. Patient was now obviously dying. There was a further rise of temperature at 10 a.m., again subdued by ice packing. Just before death, at 4.30 p.m., there was a final rise of temperature to 106·4°.

Remarks.

1. *Locality:* (a) *Physical features.*—Seccondee, a large town on the sea coast.
(b) *Occurrence of a series of cases in any one place.*—Three cases occurred during 1912—one in January, one in October, and one in December. Cases occurred in different parts of the town. No previous case from his house. No swamp or bush adjacent to house.

(c) *Insect fauna.*—Mosquitoes variable, but generally scarce. The house itself is kept very clean.

2. *Seasonal variation.*—Case occurred during dry season.

3. *Personal history.*—Suffered a good deal from malaria fever, and succumbed to his fourth attack of blackwater. A very irregular quinine taker; owing to the nature of his work he was much exposed to the sun. Had blackwater in French Guinea in 1904.

(c) *Microscopic examination of the blood.*—Malarial parasites not demonstrated.

Polymorphonuclears	...	...	...	...	55·8
Lymphocytes	...	...	...	...	13·0
Mononuclears	...	...	...	...	20·0
Eosinophiles	...	...	...	...	2·8
Transitionals	...	...	...	...	7·6
Mast cells	...	...	...	...	0·8

A few fairly-pigmented large mononuclears.

E. W. GRAHAM, M.B., C.M.,
Senior Medical Officer,
Seccondee.

AXIM.
CASE 41.

European official.

History of present illness.—Patient, male, 29 years of age, was beginning his fourth tour of service in the Colony. He was tall, of slight build, and not very robust looking; a total abstainer, and a clean-living man.

Employed in the Public Works Department, he occupied a house on the outskirts of the town at an elevation of about four hundred feet above sea level, and usually went to and from his work in hammock. On a few occasions when he walked home in the evening he is known to have complained of the exertion of the long climb.

He arrived in the Colony about six weeks previous to his fatal illness, and apparently enjoyed good health. It appears that while he was on leave this last time he suffered from a severe rigor and vomiting, from which he made a speedy recovery. About eight and eleven days prior to the onset of blackwater fever he had two separate attacks of rigor accompanied by vomiting, the ill effects of which passed so quickly that he apparently did not consider it worth his while to mention the matter to the medical officer.

About a week after his last attack he got caught in a downpour of rain, and remained for a considerable time in his wet clothes before having a bath and a change into dry garments. On the following day, 29th October, he went about his work as usual, and retired to bed at about 9.30 p.m.

About midnight he was awakened by a rigor, and soon afterwards vomited; the stomach contents were slightly tinged with bile.

He then began to complain of severe abdominal pain and headache, and observed on passing water that it was darker than usual; the pain continuing, he sent for medical assistance, which arrived at 2.30 a.m.; this was on the 30th of October. The patient was found to be suffering considerable pain of a colicky nature and a tendency to vomit. He eventually ejected about a pint of highly bile-stained matter, and afterwards experienced some relief. Purgatives were administered, which acted some five times before 10 a.m. Hot cloths were applied to the abdomen. Temperature 101° , pulse 80; urine, port wine colour. He was seen again at 10 a.m. His rest had been disturbed by the action of the purgative, but otherwise he felt much better. The urine passed in the interval was darker in colour. The aspect of the patient was good, except for a mild degree of icterus, principally noticed in the conjunctivæ. He had had slight attacks of bilious vomiting. A pint and half of saline solution was given per rectum and repeated again at 10.15 a.m. and 1 p.m. He had instructions to drink plenty of water. He was admitted to hospital at 5 p.m. on October 30th. The journey tired him somewhat, but otherwise there were no prominent symptoms. Temperature 102.4° , pulse 100; blood films were taken at this stage of the case. No malaria parasites were found in the fresh specimens examined, but leucocytes containing malarial pigment were numerous.

October 31st.—Patient passed a good night. He had only one slight attack of vomiting. Bowels moved three times. He had numerous draughts of water, and three saline injections of a pint and a half each. The icterus was much more intense, and he complained of feeling weak. The urine at this stage was very little darker and was freely passed—seventy-two ounces being voided in the first twenty-four hours; when allowed to stand in a test tube the solids occupied about one-third of the volume. During the day the saline injections were continued; large quantities of fluid were taken by the mouth, and Brand's essence of chicken given, a few teaspoonfuls at a time at varying intervals. During the night the patient slept well, waking at intervals, in which saline injections were given, also drinks, and occasionally Brand's Essence.

November 1st.—His appearance was little altered beyond a further deepening of the icterus and somewhat anxious countenance. The urine became lighter in colour, and the amount of solids occupied about one-tenth of the volume; one hundred and eight ounces were passed in the twenty-four hours. During the morning, however, his mind began to wander, and he became restless. Saline solution was given under the skin. At mid-day his temperature reached 102.4° , pulse 128, thready. His general condition improved towards the evening, and he spoke quite rationally at 5 p.m. The urine, which had steadily been clearing all day, was now the colour of malt vinegar, and the amount of solids was reduced to a comparatively small quantity.

Between 5 and 7 p.m. he took five teaspoonfuls of Brand's Essence and seven ounces of saline solution was given. He was left in charge of the nurse, who made the following notes:—7 p.m.: passed urine, bowels moved once. 8 p.m.: saline injection, one pint; temperature 101.4° . 9.28 p.m.: patient's condition became suddenly bad; strychnine hypodermic given; patient died 9.30 p.m., November 1st.

Post-mortem examination.—An autopsy was made twelve hours after death. The liver and spleen were enlarged, the latter to about twice its normal size, and was engorged with blood.

The kidneys, except for their pale colour, were normal in appearance; the heart was enlarged, and there was fatty degeneration of the muscle fibre.

Remarks.

1. *Locality: (a) Physical features.*—Axim is on a rocky sea coast, and the land rises immediately behind the town into hills with deep valleys between.

Forest and bush on the hills, and swampy, bushy land in the valleys.

(b) *Occurrence of a series of cases in any one place.*—As far as can be ascertained no other cases occurred in this locality, but in the town, one-quarter of a mile away, two cases occurred in 1911, one of which was fatal, and another fatal case in 1912.

(c) *Insect fauna.*—Anopheles, stegomyia, and *Glossina palpalis*.

2. *Seasonal variation.*—This case occurred at the beginning of the tornado season.

Axim is a very wet place, and rain falls every month. Heaviest in May and June.

3. *Personal history: (a) Medical history.*—Arrived in West Africa in 1908. Four distinct attacks of malaria are recorded against him, but, being a foreman of works, and often away from medical aid, he might have had others. The patient himself admitted having two sharp attacks during the six weeks previous to his fatal illness. He was very irregular in taking quinine.

(b) *Previous movements and personal conditions.*—Previous tour spent in Ashanti and Accra. Exposed to sun and weather.

(c) *Microscopic examination of the blood.*—Malaria parasites were not demonstrated, but his blood was in a malarious condition. Autopsy revealed a spleen double the normal size. Liver enlarged one-third, and fatty degeneration of the muscle fibre of the heart.

R. O. WHITE,
Medical Officer

CASE 42.

European—non-official.

History of present illness.—The patient, a male, aged about 45 years, had been associated with the West Coast of Africa for over 14 years as a contractor. He was in the habit of remaining in the country for periods varying between one and three years; a man of robust constitution, and used to "roughing it"; he was constantly exposed to malaria infection, and, as an old "coaster," looked upon fever with an indifference born of familiarity.

He had completed thirty months of unbroken residence in the Colony at the time of his last illness, and to my knowledge was suffering from malaria for a week prior to the onset of blackwater fever. During this period he was not under treatment, and went about his work as usual. On the evening preceding his illness he played two hard sets of tennis, and afterwards expressed himself as feeling "done up." He went home shortly afterwards, retired to bed at 11 p.m., and was awakened an hour later by the symptoms of a severe rigor. Between three and four hours later he passed a large quantity of urine, the colour of a very strong solution of permanganate of potash. This was found to contain hæmoglobin, albumen, and a small percentage of red blood corpuscles. Examination of his blood revealed malarial infection. During the first three days of his illness he had to be treated in his quarters as the hospital was full. His condition during this time calls for no special comment beyond the fact that the urine maintained its quantity, and that the colour lightened towards the end of the third day. The only unfavourable symptom was an irritable cough, which made the patient inclined to vomit and disturbed his rest.

The treatment during this period consisted of saline injections every three hours during the day; large quantities of water were taken by the mouth, chicken broth and barley water were given at frequent intervals. The coughing was controlled by a mustard leaf over the epigastrium, and the patient was given small pieces of ice to suck. On the evening of the third day the patient was removed to hospital. On the following day his urine was free from hæmoglobin, but contained a considerable amount of albumen; 68 ounces of urine were passed. The quantity of albumen decreased considerably on the 5th day, and was entirely absent on the 6th. The temperature during the first five days oscillated between 100° and 103° , rising on the morning of the 6th day to 105.2° . A hypodermic injection of strychnine and digitalin reduced the temperature in three hours to 100° . During the next two days it varied between 102° and 103° , only rising above this point on the 9th day to 106° , just before death. Throughout his illness the patient took and retained nourishment exceedingly well. He got an egg-flip, containing a teaspoonful of brandy, every three hours, and chicken broth about every half hour. During the six days he was in hospital he was more or less delirious all the time, with short intervals of rest. His condition was one of toxic anæmia, in which the destruction of the red corpuscles was so excessive that a sufficient number could not be restituted in time to maintain life.

Remarks.

1. *Locality:* (a) *Physical features.*—Axim, a town on the sea coast.
 (b) *Occurrence of a series of cases in any one place.*—One other case occurred during 1912. Owing to his work he was constantly working amongst natives.
 (c) *Insect fauna.*—Mosquitoes—*stegomyia*, *anopheles*, and *Glossina palpalis*.
2. *Seasonal variation.*—Dry season.
3. *Personal history:* (a) *Medical history.*—Patient had been coming to the Coast for 14 years, and had completed thirty months unbroken residence in the Colony at the time of his last illness; took quinine irregularly.
 (b) *Previous movements and personal conditions.*—Had been thirty months in Axim.
 (c) *Microscopic examination of the blood.*—None.

R. O. WHITE,
Medical Officer.

ADDAH (QUITTAH).
CASE 43.

Government official.

History of present illness.—Onset mid-day, Wednesday, November 6th. He passed a small quantity of very dark-coloured urine; feeling of general malaise, burning in legs and hips, and heaviness in loins. Bowels were opened and urine clear two hours later. Went to bed during the afternoon; but left for Cape St. Paul on bicycle about 4.30 p.m. Felt very tired; took some soup and quinine, grs. 10, on arrival, and then went to bed. Woke up in night with a rigor; took some brandy. A little later vomited (watery), and passed very dark-coloured urine (port wine colour). Vomited three or four times during night, and felt very ill. During day, November 7th, did not vomit, but urine continued port wine colour. Left Cape St. Paul 4.30 p.m. in hammock; vomited on arriving at Quittah. Was put to bed by the District Commissioner and fainted twice; vomited during night; temperature was 101.6° .

On November 8th vomited whenever anything tried to be taken; urine still port wine coloured.

On November 9th I saw the patient. He was very thin and "drawn" in the face; skin and scleræ a deep yellow tint. Mouth very sore from septic teeth; had vomited just before my arrival.

Temperature 99° , pulse 100, respiration 14. Urine port wine colour, acid, sp. gr. 1018, and, on standing, separated into two well-marked layers. Albumen present. Hæmoglobin present (by spectroscope). The urine was passed without difficulty. On examining the blood no malaria parasites were found. Calomel grs. 5 given alternate days, and frequent drinks of soda water. Mouth wash given. He had no more vomiting. Bowels were kept open, and on November 11th urine was much clearer. Temperature remained normal and patient felt easier, but very weak; was put on to light diet, which he retained. Went on improving during next two weeks, when he was convalescent and invalided to England.

Remarks.

1. *Locality:* (a) *Physical features.*—Quittah is situated on a narrow strip of sandy beach, varying from a quarter to half a mile wide, with a large freshwater lagoon on the land side. Bush and swamp.

(b) *Occurrence of a series of cases in any one place.*—No record.

(c) *Insect fauna.*—Anophelines and *Stegomyia fasciata* plentiful.

2. *Seasonal variation.*—Dry season.

3. *Personal history:* (a) *Medical history.*—Good health record Had malaria at Axim in 1911. Irregular quinine taker.

(b) *Previous movements and personal conditions.*—Had been stationed in the Colony most of his service; lived in the native town at Quittah in poor quarters.

(c) *Microscopic examination of the blood.*—No malaria parasites.

R. MUGLISTON,
Medical Officer.

DUNKWA.

CASE 44.

European (non-official)—Mines.

Previous history.—This patient, aged 53 years, had hæmoglobinuric fever twice before, and although not in the habit of taking quinine, had very few attacks of malaria.

History of present illness.—I saw him on the 18th December last with temperature of 102° F.; tenderness over the lumbar region with some vomiting; tongue moist and furred; urine claret-coloured and scanty. A good dose of *hydrarg. subchlor.* given opened the bowels, and then he was placed on *liq. hydrarg. perchlor.* m. 15 c. *sodii bicarb.*, grs. 5, every few hours. Under this treatment the urine somewhat cleared up, but it became very dark coloured and inky again the following afternoon. The urine, on examination, was found to contain much albumen and a few casts with large quantity of hæmoglobin. No parasites were found in his blood, but a great number of leucocytes were pigmented. For five days his temperature kept up from 100° F. to 102° F. in the afternoon, the urine passed becoming very dark in the afternoons. His bowels were kept free all the time, and he was placed on liquid diet, and salicylates were also given internally. His temperature came down by lysis, and he was convalescent on the 10th day, the attack having been of a mild nature.

This is the only case that came under my notice, native or otherwise, during the year 1912.

Remarks.

1. *Locality:* (a) *Physical features.*—Dunkwa, an important station in the Secondee-Coomassie Railway. The town is situated in forest country.

(b) *Occurrence of a series of cases in any one place.*—No other cases.

(c) *Insect fauna.*—Mosquitoes—*stegomyia* and *anopheles*; numerous in wet season. *Tabanus*. No fleas, lice, or bugs.

2. *Seasonal variation.*—Dry season when case occurred.

3. *Personal history:* (a) *Medical history.*—No history obtainable except that he had two previous attacks of blackwater, but little malaria. Did not make a practice of taking quinine.

(b) *Previous movements and personal conditions.*—Did most of his work in the bush.

(c) *Microscopic examination of the blood.*—No parasites, albuminuria, casts nor pigmented leucocytes.

P. M. TOBIT,
Medical Officer, Dunkwa.

WA.

CASE 45.

On the 18th August, 1912, at Wa, Northern Territories, I passed through a typical attack of ague, commencing at noon and characterised by intense headache

and vomiting. I had been only three weeks in the station on returning from leave home. (On the road up from Coomassie I had two similar attacks, commencing and lasting the same identical time, but which never prevented me from continuing my journey next morning.)

On the morning of the 19th August, 1912, feeling all right, I attended hospital as usual and walked round the native town, returning at noon, when I again went down. This time the symptoms never abated, afterwards the vomiting becoming incessant, and at 12 o'clock midnight I passed urine of a very dark colour. I had no sleep during the night, and on passing urine next morning at 6 a.m. found it of a jet-black colour. I asked the Provincial Commissioner, Major B. Moutray Read, to come and see me, and he immediately sent for Drs. Storey and Thompson, stationed at Lorha and Bole. The symptoms increased, the vomiting being very distressing, never ceasing during the day or night.

On the morning of the 21st August, 1912, I was in a very weak condition; the muscles of my vocal cords becoming paralysed, I could not speak. The symptoms continued in severity. I was absolutely unable to retain any nourishment taken by the mouth. The only sleep I got, I believe, was through the aid of sulphonal, every other drug I tried having no effect.

On the 22nd August, at 4 p.m., thinking everything was finished, as I was passing only a very small quantity of urine, and that of the consistency of thick jelly, I pointed out my quinine bottle and took 15 grs. I had one hour's interval before I vomited again. At 12 p.m. I passed quite a large quantity of thin black urine. I took another 15 grs. of quinine, and at 6 a.m. my urine was just of the ordinary high colour you would expect with any fever. I continued 20 grs. of quinine a day for a week afterwards, then 15 grs. for a week, then 10, and finally 5 grs., which I have kept up ever since. I don't think I would risk the same treatment with quinine to anybody else. I never took my own temperature, as I never could; knowing I had fever I did not want to know the degree. The Provincial Commissioner took my temperature all through, and also notes on my case, which he handed over to Dr. Thompson.

Drs. Storey and Thompson examined my blood, but could find no parasites present; also my urine, with a like negative result.

I would like to inform you that after my first tour, towards the end of 1910, when I was taking out the course at the Liverpool Tropical School, one day I was not feeling very well, and had my blood examined, with the result that every man in the class, together with the teachers, found it teeming with "crescents."

Remarks.

1. *Locality: (a) Physical features.*—Open orchard, flat, ironstone country; no swamp within two miles of station.

(b) *Occurrence of a series of cases in any one place.*—I know of no other case of blackwater in the district.

(c) *Insect fauna.*—*Stegomyia*, *Culex pipiens*, anopheles, sand-flies.

2. *Seasonal variation.*—No unusual climatic conditions. No rains whatever during my three weeks in station.

3. *Personal history: (a) Medical history.*—During my first tour, 1909-10, had two attacks of sub-tertian malaria. Had another attack during my leave home towards the end of 1910.

During my second tour, 1911-12, beyond feeling slightly indisposed on a couple of occasions, no trouble whatever. On returning from home, and proceeding from Coomassie to Wa, Northern Territories, had two attacks on the road, of apparently sub-tertian. Three weeks after reaching my station, Wa, had another which ended up with blackwater. Been very regular in taking quinine, but neglected doing so somewhat during my journey home, and also on the trek from Coomassie to Wa.

(b) *Previous movements and personal conditions of patient.*—Just returned from leave home, and three weeks arrival in station after about a three weeks' trek from Coomassie. My third tour in the Colony.

(c) *Microscopic examination of the blood.*—No Medical Officer in attendance; on the point of convalescence when two Medical Officers arrived after forced marches night and day; nothing abnormal could be found in my blood after repeated examinations, except loss of hæmoglobin.

E. BRABAZON,
Medical Officer.

SOUTHERN NIGERIA.

During the year 1912 twenty-three cases of blackwater fever were reported to have occurred in Southern Nigeria, a number considerably below the average for the last five years, which was, in round figures, thirty-five. Of these cases, twenty-one were in Europeans, and two in West Indians. With the exception of one European missionary all the patients were males. Five cases terminated fatally.

Age.—The ages of the patients ranged between twenty-two and forty-seven. The majority occurred in persons between thirty and forty years. The average age of the European residents, amongst whom most of the cases occurred, should, however, be borne in mind in considering the possible significance of this fact.

Age.	Cases.	Deaths.
Under 30 years	5	2
30 to 40 years	13	3
Over 40 years	5	0
Totals	23	5

Occupation.—Of the twenty-one Europeans who suffered from the disease, five were Government officials (including the West African Frontier Force and the Nigerian Railways), two were missionaries, and the remaining fourteen were merchants, miners, &c.

Occupation.	Cases.	Census of 1911.	Per cent.
Government Officials	5	630	0.79
Merchants, &c.	14	798	1.75
Missionaries	2	191	1.04

According to the census of 1911 there were in Southern Nigeria 630 Government officials, 798 merchants, &c., and 191 missionaries. Assuming that the relative proportions remained approximately the same in 1912, it will be seen that the percentage of merchants suffering from blackwater fever was considerably higher than that of officials, and higher, but to a lesser degree, than that of missionaries. This fact must, no doubt, be correlated with the better conditions and shorter tour of service enjoyed by officials.

Locality.

Station.—Ten of the twenty-three cases occurred in the Central Province, seven in the Western Province, and six in the Eastern Province. One of the cases in the Eastern Province (Case 20), and one in the Central Province (Case 55), commenced on board ship, and cannot with justice be referred to any particular locality.

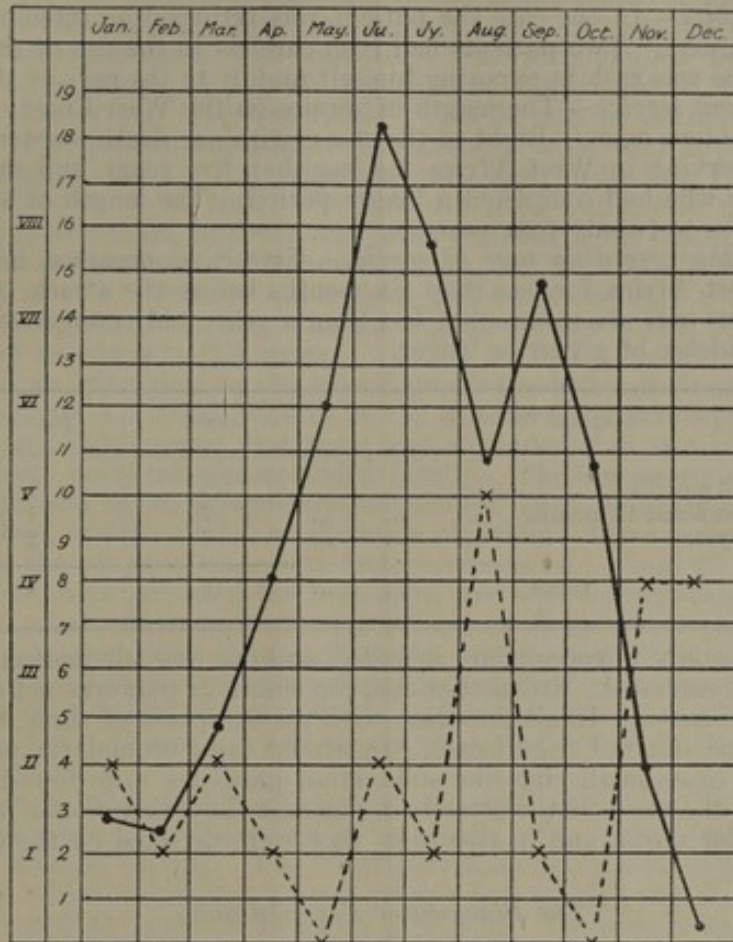
In the synopsis of cases appended to this report, a description of the physical features of each locality will be found, together with a note on the insect fauna so far as it is at present known, and any significant facts relating to the previous movements and personal conditions of the patients, and the nature of the quarters occupied by them.

Season.—The climate of Southern Nigeria is of the equatorial type. The dry season lasts from the end of October to the beginning of March, and the rainy season occupies the remaining eight months. The heavy rains fall during the months of April, May, June, and July, and the light rains during August, September, and October.

The year 1912 was, however, an exceptional one, inasmuch as the rainfall was unusually small. At Lagos, for instance, the rainfall in March was only 0.20 inch, whereas the average amount for this month during the last five years was 4.84 inches.

The chart given below shows graphically the distribution over the months of the year of the cases of blackwater fever in 1912, and the combined average rainfall for the last five years at the three headquarter stations, Lagos, Warri, and Calabar. The majority of the cases occurred during the dry season, and the highest number was in August, a month which covers the period of lull in the middle of the wet season, when but little rain falls.

BLACKWATER FEVER AND THE RAINFALL.



Continuous line and arabic figures indicate combined average rainfall for the three headquarter stations, Lagos, Warri, and Calabar, in inches.

Dotted line and roman figures indicate blackwater fever cases.

Occurrence of a series of cases in any one place.—Five cases of blackwater fever occurred at Lagos in 1912, four at Warri, and three at Sapele. All these three places may be described as low-lying and swampy, and although but little is known definitely about the entomology of Warri and Sapele, there can be little doubt that all three towns are the haunt of innumerable biting insects. The two cases recorded from Eket are noteworthy, as both patients were members of the Qua Ibo Mission. The first case occurred on August 20th, the second on November 22nd. A third case has recently been reported from the same mission station, on April 4th, 1913. Case 53, which occurred at Calabar on June 22nd, was that of a medical officer who had recently been stationed at Eket. He had been living in a bush hut, and in the course of his work had undertaken a large amount of travelling. Although this series of cases is too scattered in time to suggest an epidemic of blackwater fever, it does lend support to the view that there exists at Eket some particular character that predisposes to the disease. Primitive quarters and extensive travelling may have been contributory or predisposing causes.

Personal History.

Medical history of the patient.—In every case, except Cases 46 and 55, of which the histories are unavoidably incomplete, the patient had suffered from malarial fever before the attack of blackwater fever. As a rule the history was to the effect that the patient had had repeated attacks of "fever," and that for some weeks before the onset of the hæmoglobinuric attack he had been feeling slightly unwell.

In only one case (Case 58) was there a definite history of a previous attack of blackwater fever, and this had occurred twelve years earlier.

Quinine prophylaxis.—Quinine was not taken at all as a prophylactic, or was taken irregularly, in over half the cases. Euquinine had been taken regularly in

one case, and in two others the prophylactic doses of quinine had been 10 grs. a week, and 5 grs. every other day, respectively.

General habits.—In one case the patient was returned as intemperate. Three were total abstainers. Two patients had been careless in the use of their mosquito-curtains, and one was rash in exposing himself unduly to the rays of the sun.

West African service.—The length of service on the West Coast of Africa was recorded in seventeen cases. Eight of the cases (with one death) occurred in persons who had been serving in West Africa for less than five years, and nine (with two deaths) in those who had completed a longer period. The length of service ranged from four months to twenty-four years.

Length of the preceding tour of service.—Five cases occurred in persons who had been in West Africa for less than six months before the attack, seven in those who had been out over six months but less than a year, and seven in those who had completed a residence of a year or longer.

Length of Tour.	Cases.	Deaths.
Under 6 months	5	1
Between 6 and 12 months	7	1
Over a year	7	2
Totals	19	4

In this table only Europeans are included, and one case, the master of an ocean-going steamer, is excluded. In another case the length of tour was not stated.

Blood examination.—In all the cases, with the exception of three, the blood was examined at some stage of the disease. In fifteen cases no malaria parasites were found. In two cases small ring-like sub-tertian parasites were found in the blood taken just after the onset of the attack; in one case they were found just before the onset of hæmoglobinuria, and in two cases they were detected on the day after the attack began.

The Blackwater Fever attack.

The dose of quinine immediately preceding the attack.—The dose of quinine immediately preceding the attack of blackwater fever was seldom a large one, generally 5 or 10 grs. only. In one case (Case 58) no quinine at all had been taken as the patient was unable to tolerate the drug.

In those cases in which the onset of hæmoglobinuria appeared to be precipitated by an unaccustomed or unusually large dose of quinine (Cases 49, 52, &c.), the interval elapsing between the dose and the subsequent blackwater was usually about five hours.

Hour of onset.—The onset occurred at any time from early morning to late at night in the twenty-two cases in which the hour was noted. There was, however, a decided majority of cases commencing in the afternoon and evening. In eight cases the hour of onset lay between 1 a.m. and 12 noon, and in fourteen between 1 p.m. and 12 midnight. In this respect the cases of blackwater fever differed from attacks of malarial fever, two-thirds of which, according to Sir Patrick Manson, "come off between midnight and midday."

Jaundice.—In almost every case in which the symptom was recorded, jaundice was noted to have been present on the second day. In one case it was observed fifteen hours after the onset, and in five cases it appeared at the same time as, or immediately after the hæmoglobinuria. In only three cases was jaundice noted as absent, and in one of these the patient's skin "acquired a peculiar lemon tinge." The jaundice, therefore, appeared early, unlike the icterus of yellow fever, which is a comparatively late manifestation.

General symptoms.—The general symptoms, in the order of their frequency, were rigor, vomiting, severe pains in the abdomen and back, headache, and restlessness. In some cases diarrhœa was a feature, in others constipation. The spleen was slightly enlarged in a few, and intense thirst, tracheitis, and cardiac bruits were also observed. Diminution of the amount of urine excreted was always a grave symptom. Anæmia and debility marked those severe cases that recovered. Details of each case will be found in the synopsis.

The duration of the hæmoglobinuria varied from a few hours in some cases to five days in others. The urine generally continued to contain albumen for a day or

so after the blackwater had cleared. In three cases (Cases 48, 50, and 56) there were two or three distinct periods of hæmoglobinuria in the course of the attack.

The cases fall naturally into two main groups. In those belonging to the first group the hæmoglobinuria was transitory, was accompanied by relatively mild symptoms, and appeared as a grave phenomenon supplanted on a typical malarial attack. No case of this type was fatal. Case 53 may be considered as typical of this group. The patient was admitted to hospital with what appears to have been a typical malarial attack. His urine was quite clear, acid, free from albumen, and with a specific gravity of 1020. He passed a good night, and next morning was better. In the afternoon, however, the fever returned, with vomiting and hæmoglobinuria. The temperature did not remain high, but fell rapidly, and within twelve hours the urine was once more quite clear, and contained only a trace of albumen. The further progress of the case was uneventful. Cases 47, 51, 58, 59, and 64 also would appear to belong to this group.

In the cases belonging to the second group the hæmoglobinuria was of longer duration, and was a marked feature of the disease. The accompanying symptoms were correspondingly severe, and there was a tendency to develop suppression of urine. In three cases the disease ended fatally. The less severe cases of this type were characterised by an irregularly maintained fever, hæmoglobinuria persisting for several days, and an abundant excretion of urine. After a somewhat prolonged convalescence the patients made satisfactory recoveries. Case 67 was of this type. The hæmoglobinuria persisted for four days, and was accompanied by an irregular temperature, which did not come down to normal until the urine had cleared. Abundant urine was passed throughout the attack, and when once the hæmoglobinuria had cleared up the patient pursued an uninterrupted course to convalescence. Cases 46, 52, 60, 63, and 66 were of this type. Case 68 is an example of the more severe form of the disease, in which suppression of urine intervened and a fatal termination resulted.

The onset of the attack was, in this case, very sudden, and was ushered in by a severe rigor, vomiting, and pains in the chest. The urine was quite black, and went nearly solid on boiling. The hæmoglobinuria and the fever persisted for four days, during which urine was passed freely; but on the fifth day suppression of urine set in, and the patient collapsed and died. In some cases the tendency to suppression was exhibited from the beginning of the attack.

Two cases (Cases 57 and 62) offer an interesting comparison. Both were severe cases, with high fever and well-marked hæmoglobinuria, and both were complicated by dysenteric diarrhoea. In the former case suppression of urine was a conspicuous feature from the beginning, and, although the last few drachms of urine excreted were free from hæmoglobin, the patient died. In the latter case urine was passed freely, and the hæmoglobinuria cleared up soon after the temperature began to fall, and the patient made a satisfactory recovery.

Without entering on the vexed question of the cause of the disease, and limiting oneself strictly to the consideration of the twenty-three cases which occurred in Southern Nigeria in 1912, there can be no doubt that blackwater fever may appear with an acute malarial paroxysm. The mild cases already referred to which were characterised by transient hæmoglobinuria were apparently of this nature. In several cases ill-health was a predisposing cause. For example, Case 48 was complicated by cardiac disease, Case 57 by dysenteric diarrhoea, Case 62 had just recovered from a severe attack of dysentery, and Case 66 had a chronic colitis. The majority of the cases had a history of ill-health extending over the last few weeks, and not a few had suffered recently from repeated slight attacks of "fever." In practically every case there was evidence of repeated malarial infections.

An attempt to correlate the cases with the prevalence of malaria in the various localities was inconclusive. It was found impossible to trace any connection between the occurrence of blackwater fever and the percentage of the cases treated at the various stations that had been returned as malarial. The number of cases dealt with was probably insufficient, and, in any case, there is no question but that malaria is very prevalent all over Southern Nigeria.

Considering the very definite histories attached to such cases as Cases 49, 52, 54, and 56, there can be little doubt that an attack of blackwater fever may be precipitated by a dose of quinine. Muscular effort, as in Case 68, may also bring on the attack.

The marked distinction, referred to above, between the cases in which hæmoglobinuria was transitory and those in which it was more persistent, suggests the possibility that the factor which determines the hæmolysis may sometimes remain



in the blood after the case has come under treatment. Such as it is, the evidence in this report is in support of the view that blackwater fever is a manifestation of malarial toxicity. The customary treatment of blackwater fever in Southern Nigeria does not include the administration of any quinine, and in fact this drug was given during the hæmoglobinuric attack in only one case (Case 63) of this series. Malaria parasites which had played a part in the production of the disease might therefore remain in the blood, and continue to excite hæmolysis. It is worthy of note, in this connection, that all the four cases in the series in which the blood was found to contain malaria parasites *after* the onset of the attack were of the severer type. The persistence of the fever and hæmoglobinuria in them may have been due to the presence of these parasites. The fact that they were not found in every case of this type does not necessarily discredit this suggestion, as the detection of malaria parasites is often a tedious and difficult business under the most favourable conditions, and the busy life and primitive appliances of an out-station seldom permit of such accurate investigations. The few cases, such as Cases 47, 53, and 59, which developed blackwater fever in hospital whilst undergoing treatment which included the administration of quinine, were, moreover, of the mild type. It would, perhaps, be good practice, under these circumstances, to administer quinine with caution in those cases in which the fever and hæmoglobinuria persist.

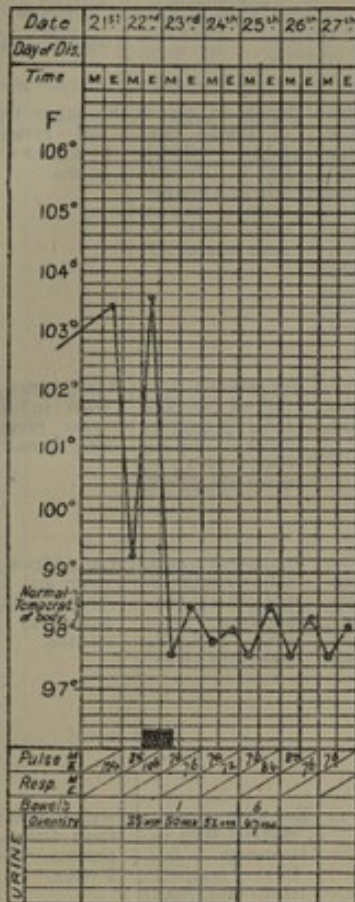
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SYNOPSIS OF CASES OF BLACKWATER FEVER, SOUTHERN NIGERIA, 1912.

						<i>Cases.</i>
Western Province :—						
	Ibadan	..	...	...	...	1
	Lagos	...	...	...	...	5
	Oshogbo	...	...	...	...	1
Central Province :—						
	Benin City	...	...	...	...	1
	Onitsha	...	...	...	...	2
	Sapele	...	...	...	...	3
	Warri	...	...	...	...	4
Eastern Province :—						
	Calabar	...	...	...	...	2
	Eket	...	...	...	...	2
	Ikom	...	...	...	...	1
	Ogoja	...	...	...	...	1
Total						<hr/> 23

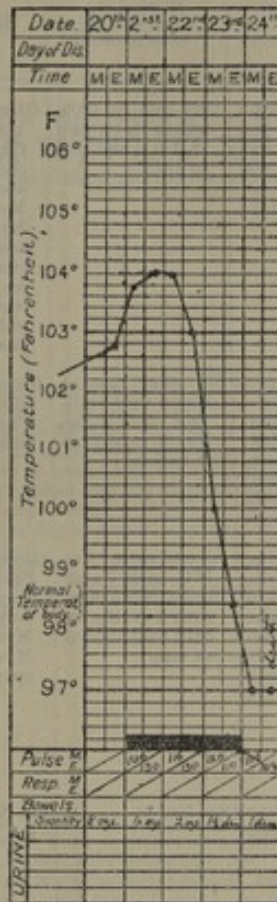
CASE 53.

June



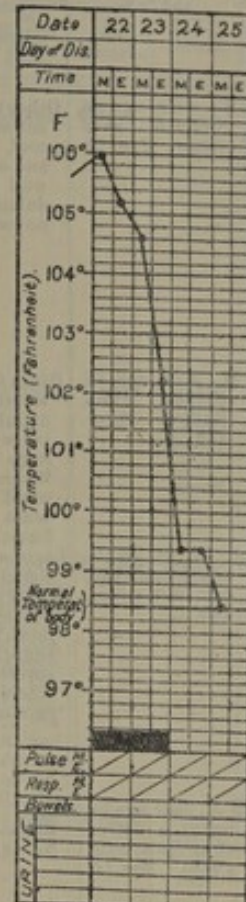
CASE 57.

August



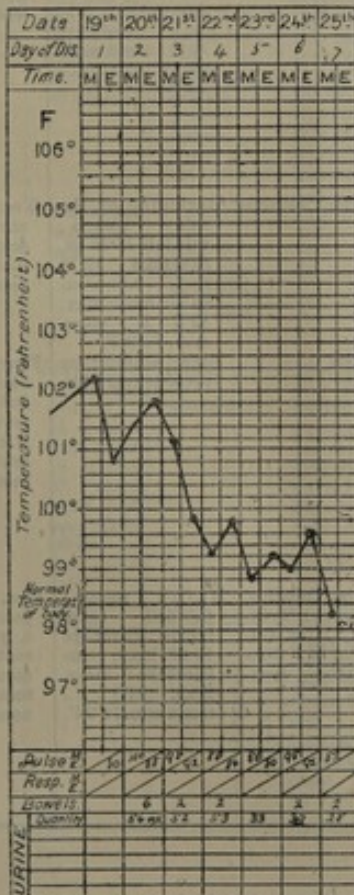
CASE 62.

November



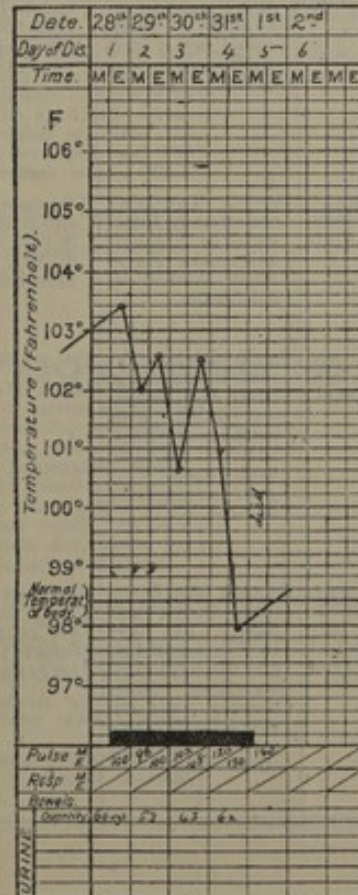
CASE 67.

December



CASE 68.

December



Case No.	Name, Description and Date.	Locality.			Seasonal variation and Climatic Conditions.	Per Service and General Habits.
		Station, Quarters and Physical Features.	Multiplicity of cases in the same place.	Insect Fauna.		
46	S., male, age 36, German, merchant. Jan. 20.	Oshogbo, a mud house with a pan roof, thick bush and oil-palm trees, well watered undulating country; no swamps.	One case in 1909, one in 1910, two in 1911, and one in 1912.	Glossina, Stomoxys, Tabanus, Chrysops, Hippocentrum, Haematopota; Culex, Myzorrhynchus, Myzomyia Mansonoides, Culicomyia, Stegomyia, &c. Otenocephalus, Boophilus, Rhipicephalus, &c.	Dry season; month of lowest rainfall: 0.25 in. (average 0.18 in.), temperature: mean max. 91°6 F., mean min. 67°8 F.	No other tropical service; temperate habits.
47	M., male, age 35, British, fair, medical officer. Jan. 21.	Benin City, but previously at Sapele, undulating country, with a gradual slope to the sea. Where not cultivated covered by a dense overgreen forest.	No other case at Benin City since 1908, but see case No. 51 in regard to Sapele.	Glossina, Stomoxys, Tabanus, Chrysops; Rhipicephalus.	Dry season; rainfall nil (average 1.97 in.), temperature: mean max. 84°5 F., mean min. 62°8 F.	West Africa 8 years; in India 1 year; present tour 1 month.
48	J. W. C., male, age 34, European, fair, saw-miller. Feb. 1.	Lagos, on a low-lying island in a lagoon, mangrove swamps to the west. To the north the land rises slightly and is covered with bush where it is not cultivated.	Several cases (6 to 11) each year since 1905, 5 cases with 2 deaths in 1912 (not shown on map).	Glossina, Tabanus, Stomoxys, Stegomyia, Culicomyia, Culex, Myzorrhynchus, Myzomyia, Xenopsylla, &c.	Dry season; rainfall 1.87 in. (average 1.19 in.), temperature: mean max. 88°8 F., mean min. 76°6 F.	West Africa 1 year and 11 months; present tour 11 months.
49	E. J., male, age 30, negro, a native of Antigua, train guard. Mar. 14.	Lagos. Lived at Ebute-Metta. See No. 48.	See No. 48 ...	See No. 48 ...	End of dry season; rainfall 0.20 in. (average 4.84 in.), temperature: mean max. 90°9 F., mean min. 77°8 F.; rainfall at Ebute-Metta 0.05 in.	Twelve years in Cape Colony; present tour 2 years.
50	?, male, age 26, German, merchant. Mar. 30.	Warri. Good quarters. Low-lying and exceedingly swampy. Intersected by a network of rivers and creeks.	One case in 1906, one in 1909, and one in 1910. In 1912 there were four cases with two deaths.	Glossina, Tabanus	End of dry season; rainfall 4.17 in. (average 5.10 in.), temperature: mean max. 94°6 F., mean min. 73°0 F.	West Africa 3 years; present tour 18 months.
51	C. S., male, age 22, German, fair, merchant. April 26.	Sapele. Low-lying and swampy. Intersected by innumerable creeks. Forest much thinned by cultivation.	Two cases in 1907, two in 1909, four in 1910, and four in 1911. In 1912 three cases.	Glossina, Chrysops	Beginning of the rainy season; rainfall 13.58 in. (average 10.76 in.), temperature: mean max. 82°6 F., mean min. 72°3 F.	West Africa 11 months; present tour 11 months; temperate.
52	A. G., male, age 35, British, fair, colour-sergeant. June 2.	Ogoja, bush hut. On the left bank of the River Aiyi, broken and hilly, with patches of thick bush; on the right bank open level grass country, well watered.	One previous case, in 1911.	Glossina ...	Rainy season; no records available.	Four tours of one year each in West Africa; served in South Africa; present tour 5 months.
53	R. W. G., male, age 47, British, eyes grey, hair dark, Medical Officer. June 22.	Calabar, also Benin City, Opobo and Eket. At Eket lived in a bush hut and was constantly travelling. Hilly country densely covered with forest much intersected with creeks.	Two cases in 1905, eight in 1906, five in 1907, and three in 1908. In 1912 two cases.	Glossina, Tabanus, Chrysops; Myzomyia, Culex, Culicomyia, Ochlerostatus, Hodgesia.	Rainy season; rainfall 15.90 inches (average 16.37 ins.), temperature: mean max. 94°1 F., mean min. 71°9 F.	West Africa 9 years; in India 8 years; present tour 9 months. Teetotaler and non-smoker.

Personal History.			Blackwater Fever.					
Previous illnesses, Malaria, &c.	Previous attacks of Blackwater Fever.	Quinine Prophylaxis and dose taken just before attack.	Hour of Onset and Onset of Jaundice.	General Symptoms.	Duration of Hemoglobinuria.	Duration of Albuminuria.	Blood Examination.	Duration of illness and result.
—	None ...	5 grains daily. 5 grains ...	6 p.m. ... Second day of illness.	Onset with severe headache, hot dry skin, pulse 90, temperature 101°F, urine scanty. Next day only 3 ozs. of urine passed, haemoglobinuria, slight icterus, no vomiting.	5 days	5 days	—	7 days ; recovery
Three or four short attacks of malarial fever each year.	None ...	Irregular or not at all ; 10 grains and 30 grains on each of the two preceding days.	11 a.m. ... Second day of illness.	On January 19th there was a simple attack of fever. No fever on January 20th. Return of fever on January 21st at 11 a.m. with haemoglobinuria. The urine cleared during the next 24 hours, and the temperature fell rapidly. Spleen slightly enlarged on January 22nd, and cardiac asthenia noted on the following day and until January 29th. No vomiting.	12 hours	4 days	Negative at the height of the attack.	15 days ; recovery ; invalidated.
Several slight attacks of malarial fever.	None ...	Regular ...	7 p.m. ... Second day of illness.	Fever, vomiting, "porter-like" urine, rapid feeble pulse. Complicated by myocardiac debility.	Three separate attacks covering 16 days, namely, on the 1st, 2nd, 7th, 8th, 9th and 16th day of the illness.	21 days	Negative.	21 days ; recovery ; invalidated.
Suffered much from fever.	None ...	Quinine taken only when feverish ; 5 grains.	11 a.m. ...	Onset at 5 a.m. on March 14th, feverish, vomiting. Took 5 grains of quinine. At 11 a.m. passed dark-coloured urine. Thereupon took 20 grains more quinine. Admitted to hospital next day. Temperature 99·6°F.; pulse 68, strong, regular. Spleen not palpable. No improvement on 16th. On 17th urine clear, but very scanty. Died from heart failure on 18th.	4 days	5 days	Negative on second day.	5 days. Death.
Several short attacks of malarial fever.	Uncertain; possibly two previous attacks.	None. Also the use of amosquito curtain neglected. Probably 20 grains.	11.30 a.m.... Never jaundiced, but the patient's skin acquired a peculiar lemon tinge.	Initial fever on March 30th, 103·8° F., with copious dark-coloured urine. Later on same day clear urine passed, and temperature fell rapidly to below normal. Return of fever on the afternoon of March 31st, rose to 103° F., but fell rapidly to nearly normal. No haemoglobinuria. Return of fever with rigor and blackwater on April 2nd. From this date partial suppression of urine. On April 8th tracheitis developed and the patient's condition became worse. Died April 10th.	First attack, 4 hours; second attack, 3½ days.	First attack, 18 hours; second attack, 9 days.	Negative on first day.	12 days. Death.
Three attacks of malarial fever.	None ...	9 grains just before attack.	Probably about 12 p.m. Present on second day of illness.	Pains in the head and back, constipation, urine dark but passed in fair quantities. Fever fell rapidly and was nearly normal on the third day of illness.	—	8 days	Negative.	10 days. Recovery.
Slight attack of remittent fever in February.	None ...	Equinine taken regularly. 15 grains equinine; 10 grains of same drug had been taken earlier in the same day.	10 p.m. ... Immediate.	Slight malaise previous to the onset. Onset very sudden. At 7 p.m. seemed well, but feeling feverish took 15 grains equinine. At 10 p.m. delirious, vomiting incessantly, intense thirst, agonising pains in loins, epigastrium, and legs. Temperature 104° F., pulse 100. At midnight passed dark urine. The fever fell rapidly and reached 99° F. next day; urine passed freely, but dark coloured until the fourth day, when, but for his weakness, the patient seemed well.	3 days	3 days	Films taken soon after the onset showed subtertian rings.	3 days ; recovery ; invalidated.
Four attacks, malarial fever during present tour of service.	None ...	Irregular... 5 grains ...	5 p.m. ... No jaundice	Admitted on 21st June with malarial fever, headache, T. 103·2° F., urine clear and free from albumen, crescents and ring parasites in blood. Temperature fell rapidly and next morning was 99·6°, but at 5 p.m. the fever returned, the patient vomited once, and a few minutes later passed 10 ozs. haemoglobinuric urine. No tendency to suppression and urine quite clear, and with only a trace of albumin by 4.15 a.m., June 23rd.	A few hours only.	18 hours	Both crescents and young rings in blood just before the onset of haemoglobinuria.	18 hours ; recovery ; invalidated.

Case No.	Name, Description and Date.	Locality.			Seasonal variation and Climatic Conditions.	Per Service and General Habits.
		Station, Quarters and Physical Features.	Multiplicity of cases in the same place.	Insect Fauna.		
54	J. E. T., male, age 42, West Indian (Jamaica), black hair, yellow complexion, clerk. July 29.	Warri. See No. 50	See No. 50 ...	See No. 50 ...	Rainy season; average rainfall 14.56 in.	West Africa 17 years, of which 6 months spent at Warri, and the rest at Sierra Leone. One year in British Honduras and three months at St. Helena. Present tour 14 years.
55	J. B., male, age 33, European, hair dark, complexion ruddy, miner. Aug. 2.	Onitsha, but had just arrived from the Gold Coast.	As this patient had not resided at Onitsha observations under these heads are not relevant.			Over three years on the Gold Coast; present tour 5 months. Intemperate.
56	J. C., male, age 33, European, grey eyes, light hair, merchant. Aug. 11.	Lagos. See No. 48...	See No. 48 ...	See No. 48 ...	Rainy season; period of diminished rainfall in the middle of the wet season; rainfall 0.23 in. (average 1.68 in.), temperature: mean max. 83° F., mean min. 73° F.	West Africa 7 years; present tour 7 months; very temperate.
57	H. P. W., male, age 34, European, dark hair, florid complexion, marine superintendent. Aug. 20.	Lagos. See No. 48...	See No. 48 ...	See No. 48 ...	See No. 56 ...	West Africa 10 years; present tour 6 months; very temperate.
58	Mrs. B., female, age 45, European, missionary. Aug. 20.	Eket. Close to the Qua Ibo river, surrounded by dense, swampy forest.	No record of previous cases. Two cases in 1912, both missionaries; and a third, also a missionary, has occurred since (April 4th, 1913). See also case No. 53, in a patient who had recently been at Eket.	Glossina, Tabanus, Chrysops.	Rainy season; period of diminished rainfall in the middle of the wet season. No records available.	West Africa 22 years; present tour 15 months.
59	G. D. R., male, age 28, British, dark hair, fresh complexion, inspector of telegraphs. Aug. 25.	Ibadan. "A rolling plateau, with low hills and hardly any virgin land." "North of Ibadan there is little real forest."	One case or more each year since 1907. One case in 1912.	Glossina, Tabanus, Hæmatopota, Myzomyia, Culiomyia, Culicoides, &c.	Rainy season; period of diminished rainfall in the middle of the wet season; rainfall nil (average 2.89 in.), temperature: mean max. 85° F., mean min. 58° F. (?)	West Africa 4 years; 2 years in eastern Transvaal; present tour 11 months; totaler.
60	M. P., male, age 26, German, grey eyes, brown hair, merchant. Sept. 8.	Sapele, but lived at Koko, about 30 miles distant. See No. 51.	See No. 51 ...	See No. 51 ...	Rainy season; rainfall 15.98 in. (average 13.99 in.), temperature: mean max. 85° F., mean min. 65° F.	West Africa 2 years; present tour 2 years.
61	D. B., male, age 30, British, merchant. Nov. 15.	Ikom, to the north and north-east dense forest, to the west undulating and grass covered, to the south and south-east hilly.	No record of any previous case.	Glossina, Tabanus, Chrysops, Subpangonia, Hippocentrum, Hæmatopota, Mansonioides, Myzomyia, Rhipicephalus.	Dry season ...	West Africa 6 years; present tour 1 year.

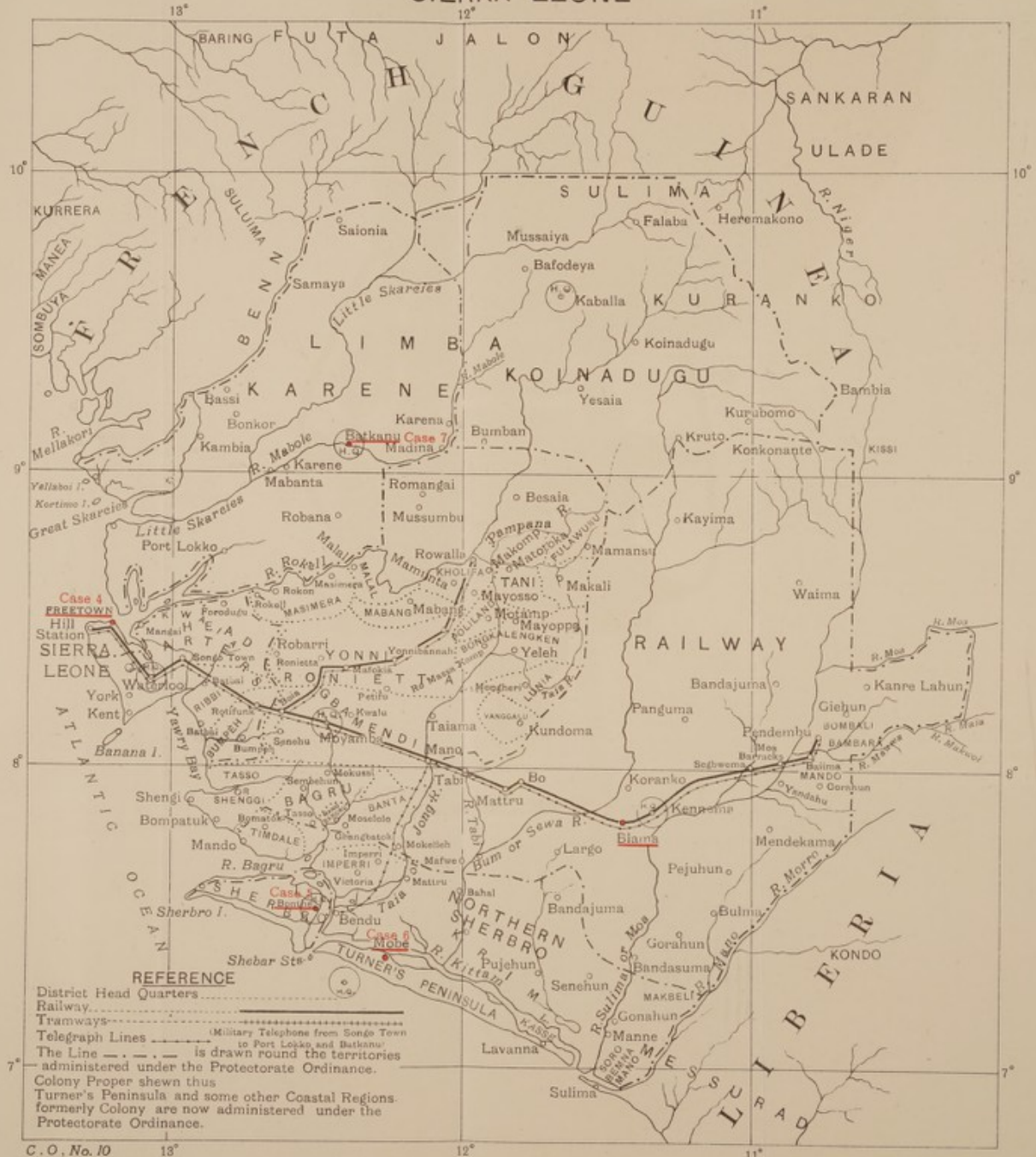
Personal History.			Blackwater Fever.					
Previous Illnesses, Malaria, &c.	Previous attacks of Blackwater Fever.	Quinine Prophylaxis and dose taken just before attack.	Hour of Onset and Onset of Jaundice.	General Symptoms.	Duration of Hæmoglobinuria.	Duration of Albuminuria.	Blood Examination.	Duration of Illness and result.
Severe attack of malaria at Sierra Leone in 1908.	None ...	10 grains just before attack.	10 p.m. ... Second day of illness.	Fever and vomiting on July 28th; later took 10 grains quinine, which he vomited. At 10 p.m. a rigor, and some black urine said to have been passed. Next morning urine was normal. At 6 p.m. 10 grains euquinine taken and retained; at 10 p.m. another rigor and hæmoglobinuria; headache, severe vomiting, pains in the stomach, but no diminution of urine.	2 days	6 days	Negative.	7 days. Recovery.
—	None ...	Doubtful if any quinine taken as a prophylactic. 10 grains.	3 p.m. ... Immediate.	On August 2nd, when on board ship, an attack of "ague." Much better next day. Return of fever on August 4th with vomiting, and at 3 p.m. passed a large quantity of black urine. Admitted to Onitsha hospital on August 5th. Severe pains in loins, fever, hæmoglobinuria and marked suppression of urine.	3 days	3 days	A few young parasites in the blood on Aug. 5.	5 days. Death.
Several attacks of malarial fever.	None ...	Irregular... First attack 6 grains; second attack 10 grains.	4 p.m. ... Slight jaundice after the second attack.	No severe symptoms. Hæmoglobinuria on August 11th, but urine cleared on the same day and remained clear until August 16th, when, after a dose of 10 grains quinine, the hæmoglobinuria returned, but only for a few hours.	A few hours on Aug. 11 and again on Aug. 16.	13 days	Negative.	14 days. Recovery.
Slight attacks of fever during last two weeks, and diarrhoea.	None ...	10 grains weekly. 15 grains a day for the last few days.	3 a.m. ... About 15 hours after the onset of hæmoglobinuria.	Admitted on August 20th, complaining of fever and diarrhoea. Hæmoglobinuria began at 3 a.m. on August 21st, and was accompanied by vomiting, rapid pulse, and laboured respirations. Suppression began at once and finally became complete. The last specimen of urine passed (on August 23rd) was clear. Profuse diarrhoea throughout, dark foul stools containing, latterly, blood and mucous shreds.	3 days	4 days	A few small ring-like subtertian parasites in a blood film taken just after the onset of the blackwater.	5 days. Death.
Many attacks of malarial fever.	One previous attack 12 years ago. The hæmoglobinuria lasted only a few hours.	Unable to take quinine regularly owing to its toxic effects. None.	11 p.m. ...	Onset of fever at 7 p.m. Temperature 103°F., shivering and vomiting. Hæmoglobinuria at 11 p.m. All symptoms disappeared within 24 hours.	24 hours	—	Negative.	48 hours; recovery; returned to Europe.
A good deal of "fever" during the last three months.	None ...	5 grains daily. 5 grains ...	12 p.m. ... —	Under treatment for fever with gastric symptoms from August 21st to 24th. On August 25th felt a little "chilly," and at midnight passed 10 ozs. of dark brown urine. Nausea, but no vomiting. Urine clear by noon on August 26th, and albumen free on August 27th. No tendency to suppression of urine.	12 hours	24 hours	Negative.	24 hours; recovery; invalided.
A slight attack of "fever" about once every four months.	None ...	Quinine taken only when unwell. 10 grains ...	4 p.m. ... Second day of illness.	Fever lasted 7 days, never above 101.5° F. Bowels rather free.	5 days	8 days	Negative.	9 days; recovery
Slight attacks of "fever," lasting a day or two, for the last few months.	None ...	Irregular... 20 grains...	Early morning. —	Fell ill on November 13th, temperature 104° F., took 20 grains quinine, but vomited during the night. November 14th—Again took 20 grains quinine and later vomited. Rigors all night. November 15th—In the morning urine observed to be black. The hæmoglobinuria cleared up in about four hours.	A few hours only (four)	—	—	14 days; recovery; invalided.

Case No.	Name, Description and Date.	Locality.			Seasonal variation and Climatic Conditions.	Per Service and General Habits.
		Station, Quarters and Physical Features.	Multiplicity of cases in the same place.	Insect Fauna.		
62	D. N., male, age 30, British, grey eyes, hair dark brown, missionary. Nov. 22.	Eket, no fixed residence, but working at various places on the Qua Ibo river. Low lying, swampy, covered by virgin forest.	See No. 58	...	Glossina, Tabanus, Chrysops.	Dry season; no records available. West Africa 16 months; 6 months in South Africa; present tour 16 months.
63	F. L. C., male, age 30, European, hair black, complexion sallow, merchant. Nov. 24.	Onitsha, hilly and open country, patches of forest. The town is situated on Ozala hill on the River Niger, at an elevation of 200 feet.	One or more cases each year since 1907. No cases in 1911. One in 1912 (Case No. 55). Only incidentally at Onitsha.	...	Glossina, Tabanus; Culex, Mansonioides, Myzomyia, Tæniorthynchus, Phlebotomus, Ctenocephalus, Rhipicephalus, &c.	Dry season; rainfall 0.47 in. (average 0.80 in.), temperature: mean max. 92° F., mean min. 74° F. Present tour 2½ years; careless in exposing himself in the sun without proper head covering.
64	W. M. C., male, age 43, British, eyes brown, hair and complexion dark, planter. Nov. 30.	Sapele. See No. 51	See No. 51	...	See No. 51	Dry season; rainfall 2.80 in. (average 2.65 in.), temperature: mean max. 88° F., mean min. 65° F. West Africa 2 months in 1911; 4 years in India; 8 years in West Indies; present tour 4 months.
65	J. T., male, age 46, British, mercantile marine, master, s.s. "Mendi." Dec. 4.	Calabar. See No. 53	See No. 53	...	See No. 53	Dry season; the month of lowest rainfall; rainfall 1.32 in. (average 0.46 in.), temperature: mean max. 89° F., mean min. 73° F. Had sailed to and from the West Coast for 24 years; had also sailed to India, &c. Present tour, a few days only this voyage.
66	H. S. T., male, age 30, European, blue eyes, fair complexion, merchant. Dec. 5.	Lagos. See No. 48	See No. 48	...	See No. 48	Dry season; the month of lowest rainfall; rainfall nil (average 1.32 in.), temperature: mean max. 88° F., mean min. 74° F. West Africa 7 years; present tour 9 months; temperate in every way.
67	P. G. W., male, age 37, European, hair dark brown, eyes brown, foreman. Dec. 19.	Warri. See No. 50	See No. 50	...	See No. 50	Dry season; the month of lowest rainfall (average 0.47 in.). Present tour 5 months; teetotaler.
68	C. M., male, age 29, British, eyes brown, hair dark brown, complexion sallow, merchant. Dec. 28.	Warri. See No. 50	See No. 50	...	See No. 50	Dry season; average rainfall for December 0.47 in., the lowest for the year. West Africa 9 years; present tour 20 months. Very temperate in every way, but careless in his use of a mosquito curtain.

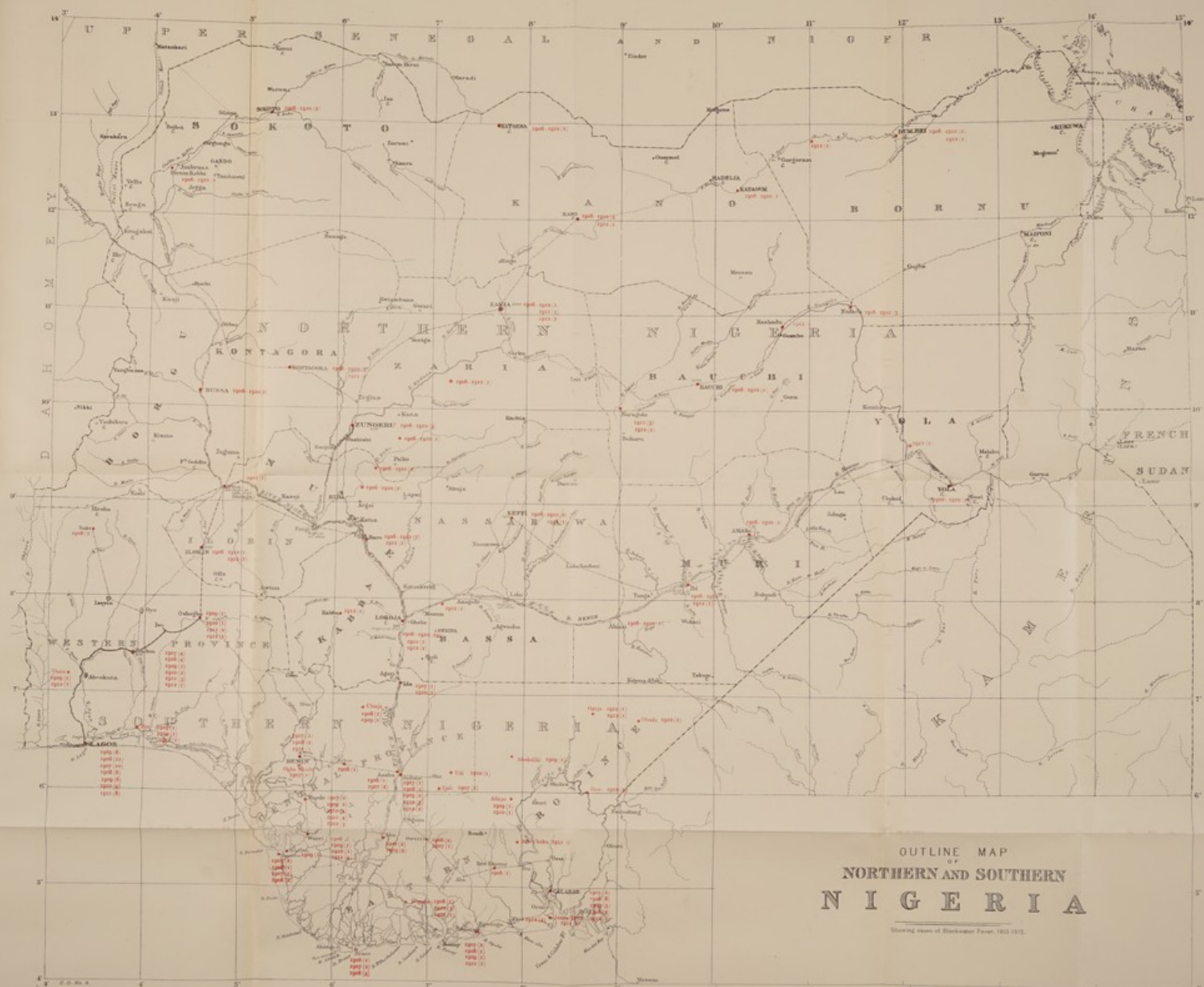
Personal History.			Blackwater Fever.					
Previous Illnesses, Malaria, &c.	Previous attacks of Blackwater Fever.	Quinine Prophylaxis and dose taken just before attack.	Hour of Onset and Onset of Jaundice.	General Symptoms.	Duration of Hæmoglobinuria.	Duration of Albuminuria.	Blood Examination.	Duration of Illness and result.
Typhoid and dysentery in South Africa; several mild attacks of malaria and one attack of dysentery in West Africa.	None ...	5 grains daily. 5 grains ...	8 a.m. ... Just after the initial rigor.	Patient just recovering from a severe attack of dysentery. Severe rigor at 8 a.m. on November 22nd, temperature 106° F., vomiting, hæmoglobinuria at 11 a.m. Temperature remained high until 23rd, when it fell, and was accompanied by a clearing of the urine.	36 hours	60 hours	Negative.	Recovery. Returned to Europe.
Many minor attacks of malarial fever.	None ...	Irregular... 5 grains ...	4 p.m. ... Second day of illness.	For the last three months has not enjoyed good health. Took 5 grains quinine on the morning of November 24th, at 4 p.m. passed 20 ozs. dark-coloured urine, but nevertheless went out and played golf. On his return he passed 8 ozs. of urine the colour of stout. Complained only of a heavy feeling in the pit of the stomach. November 25th—Restlessness, vomiting, and hæmoglobinuria, but no reduction of the amount of urine passed. November 26th—Urine began to clear.	38 hours	4 days	Parasites found on the second day of the disease. Marked anaemia.	4 days; recovery; invalided.
Many attacks of malaria in the West Indies; some slight fever for three weeks before this attack.	None ...	5 grains daily. 15 grains in 2 doses, and 30 grains the day before.	2.30 p.m. ... Second day of illness.	November 29th—Fever, vomiting and diarrhoea. November 30th—Seemed better, but at 2.30 p.m. black water was passed. November 31st—The urine began to clear at 10 a.m., and was passed freely.	24 hours	26 hours	—	7 days; recovery
Several slight attacks of "fever"; had been feeling unwell for 3 months before attack.	None ...	A fairly regular quinine taker.	—	Unwell for three months. On December 4th had a rigor, with vomiting and hæmoglobinuria. On December 9th removed from his ship, R.M.S. "Mendi," to Calabar hospital. Recovery uninterrupted.	5 days	5 days	No malarial parasites found; pigmented leucocytes present.	20 days; recovery; returned to England.
Suffers from chronic colitis; several attacks of fever during the last month.	None ...	Only takes quinine when he has fever. 10 grains.	Early morning. Second day of illness.	Vomiting and diarrhoea during the night, noticed the blackwater in the morning. diarrhoea troublesome, due to an old-standing colitis.	3 days	5 days	Negative.	24 days; recovery
Seven short attacks of fever.	None ...	5 grains every other day. 5 grains.	6 a.m. ... Coincident with the onset of hæmoglobinuria.	No initial rigor, but sleepless and restless. Vomiting never severe. Abundant urine passed throughout. Urine began to clear at once after the first passage of blackwater, but became worse again the next day before finally clearing.	4 days	5 days	No malarial parasites. Leucocytosis at first. Hæmoglobin 80%.	5 days; recovery; invalided.
Several severe attacks of malarial fever.	None ...	Refused to believe in quinine as a prophylactic.	6 p.m. ... Deeply jaundiced on admission, and said to have been jaundiced the day before he fell ill.	Severe rigor just after playing golf, with vomiting and black urine. Fever did not fall until just before death. Urine abundant until the early morning of January 1st, 1913, when suppression set in. Collapse and death at 11.15 a.m.	5 days	5 days	No malarial parasites. Some leucocytosis. Hæmoglobin 60%.	5 days. Death.

No.	Name	Rank	Company	Regiment	Service
1	John A. Smith	Private	1st	1st	1861-1862
2	James B. Jones	Private	2nd	2nd	1862-1863
3	William C. Brown	Private	3rd	3rd	1863-1864
4	Robert D. White	Private	4th	4th	1864-1865
5	Thomas E. Black	Private	5th	5th	1865-1866
6	Charles F. Green	Private	6th	6th	1866-1867
7	Henry G. Hall	Private	7th	7th	1867-1868
8	George H. King	Private	8th	8th	1868-1869
9	Edward I. Lee	Private	9th	9th	1869-1870
10	Frederick J. Miller	Private	10th	10th	1870-1871
11	William K. Davis	Private	11th	11th	1871-1872
12	Robert L. Evans	Private	12th	12th	1872-1873
13	Thomas M. Foster	Private	13th	13th	1873-1874
14	Charles N. Gibson	Private	14th	14th	1874-1875
15	Henry O. Hill	Private	15th	15th	1875-1876
16	George P. Jackson	Private	16th	16th	1876-1877
17	Edward Q. Kelly	Private	17th	17th	1877-1878
18	Frederick R. Lamb	Private	18th	18th	1878-1879
19	William S. Martin	Private	19th	19th	1879-1880
20	Robert T. Nelson	Private	20th	20th	1880-1881
21	Thomas U. Owen	Private	21st	21st	1881-1882
22	Charles V. Parker	Private	22nd	22nd	1882-1883
23	Henry W. Quinn	Private	23rd	23rd	1883-1884
24	George X. Reed	Private	24th	24th	1884-1885
25	Edward Y. Shaw	Private	25th	25th	1885-1886
26	Frederick Z. Stone	Private	26th	26th	1886-1887
27	William A. Taylor	Private	27th	27th	1887-1888
28	Robert B. Turner	Private	28th	28th	1888-1889
29	Thomas C. Vance	Private	29th	29th	1889-1890
30	Charles D. Webb	Private	30th	30th	1890-1891
31	Henry E. Wood	Private	31st	31st	1891-1892
32	George F. Wright	Private	32nd	32nd	1892-1893
33	Edward G. Young	Private	33rd	33rd	1893-1894
34	Frederick H. Zane	Private	34th	34th	1894-1895
35	William I. Adams	Private	35th	35th	1895-1896
36	Robert J. Baker	Private	36th	36th	1896-1897
37	Thomas K. Clark	Private	37th	37th	1897-1898
38	Charles L. Evans	Private	38th	38th	1898-1899
39	Henry M. Foster	Private	39th	39th	1899-1900
40	George N. Gibson	Private	40th	40th	1900-1901
41	Edward O. Hill	Private	41st	41st	1901-1902
42	Frederick P. Jackson	Private	42nd	42nd	1902-1903
43	William Q. Kelly	Private	43rd	43rd	1903-1904
44	Robert R. Lamb	Private	44th	44th	1904-1905
45	Thomas S. Martin	Private	45th	45th	1905-1906
46	Charles T. Nelson	Private	46th	46th	1906-1907
47	Henry U. Owen	Private	47th	47th	1907-1908
48	George V. Parker	Private	48th	48th	1908-1909
49	Edward W. Quinn	Private	49th	49th	1909-1910
50	Frederick X. Reed	Private	50th	50th	1910-1911
51	William Y. Shaw	Private	51st	51st	1911-1912
52	Robert Z. Stone	Private	52nd	52nd	1912-1913
53	Thomas A. Taylor	Private	53rd	53rd	1913-1914
54	Charles B. Turner	Private	54th	54th	1914-1915
55	Henry C. Vance	Private	55th	55th	1915-1916
56	George D. Webb	Private	56th	56th	1916-1917
57	Edward E. Wood	Private	57th	57th	1917-1918
58	Frederick F. Wright	Private	58th	58th	1918-1919
59	William G. Young	Private	59th	59th	1919-1920
60	Robert H. Zane	Private	60th	60th	1920-1921
61	Thomas I. Adams	Private	61st	61st	1921-1922
62	Charles J. Baker	Private	62nd	62nd	1922-1923
63	Henry K. Clark	Private	63rd	63rd	1923-1924
64	George L. Evans	Private	64th	64th	1924-1925
65	Edward M. Foster	Private	65th	65th	1925-1926
66	Frederick N. Gibson	Private	66th	66th	1926-1927
67	William O. Hill	Private	67th	67th	1927-1928
68	Robert P. Jackson	Private	68th	68th	1928-1929
69	Thomas Q. Kelly	Private	69th	69th	1929-1930
70	Charles R. Lamb	Private	70th	70th	1930-1931
71	Henry S. Martin	Private	71st	71st	1931-1932
72	George T. Nelson	Private	72nd	72nd	1932-1933
73	Edward U. Owen	Private	73rd	73rd	1933-1934
74	Frederick V. Parker	Private	74th	74th	1934-1935
75	William W. Quinn	Private	75th	75th	1935-1936
76	Robert X. Reed	Private	76th	76th	1936-1937
77	Thomas Y. Shaw	Private	77th	77th	1937-1938
78	Charles Z. Stone	Private	78th	78th	1938-1939
79	Henry A. Taylor	Private	79th	79th	1939-1940
80	George B. Turner	Private	80th	80th	1940-1941
81	Edward C. Vance	Private	81st	81st	1941-1942
82	Frederick D. Webb	Private	82nd	82nd	1942-1943
83	William E. Wood	Private	83rd	83rd	1943-1944
84	Robert F. Wright	Private	84th	84th	1944-1945
85	Thomas G. Young	Private	85th	85th	1945-1946
86	Charles H. Zane	Private	86th	86th	1946-1947
87	Henry I. Adams	Private	87th	87th	1947-1948
88	George J. Baker	Private	88th	88th	1948-1949
89	Edward K. Clark	Private	89th	89th	1949-1950
90	Frederick L. Evans	Private	90th	90th	1950-1951
91	William M. Foster	Private	91st	91st	1951-1952
92	Robert N. Gibson	Private	92nd	92nd	1952-1953
93	Thomas O. Hill	Private	93rd	93rd	1953-1954
94	Charles P. Jackson	Private	94th	94th	1954-1955
95	Henry Q. Kelly	Private	95th	95th	1955-1956
96	George R. Lamb	Private	96th	96th	1956-1957
97	Edward S. Martin	Private	97th	97th	1957-1958
98	Frederick T. Nelson	Private	98th	98th	1958-1959
99	William U. Owen	Private	99th	99th	1959-1960
100	Robert V. Parker	Private	100th	100th	1960-1961

SKETCH MAP OF SIERRA LEONE





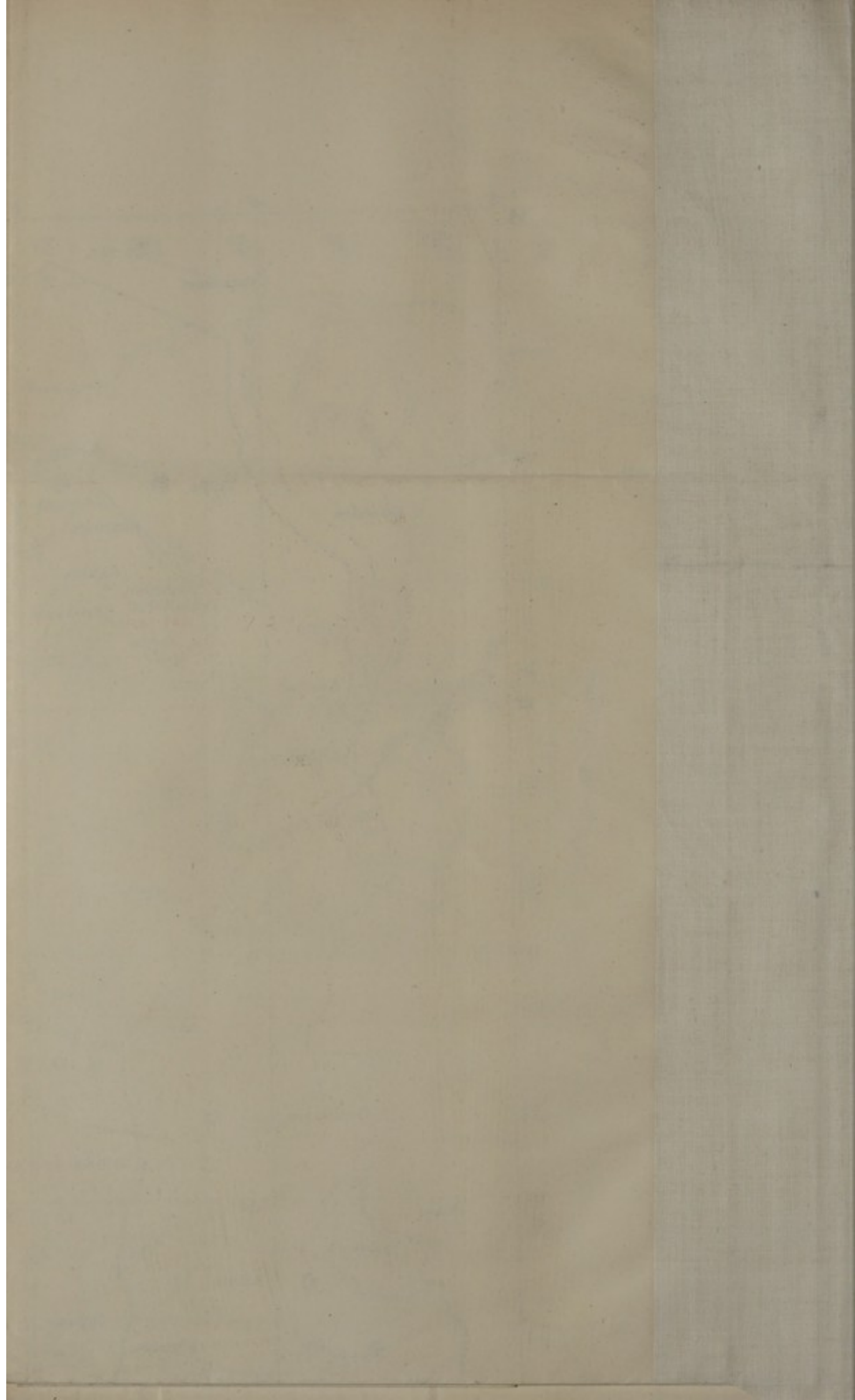


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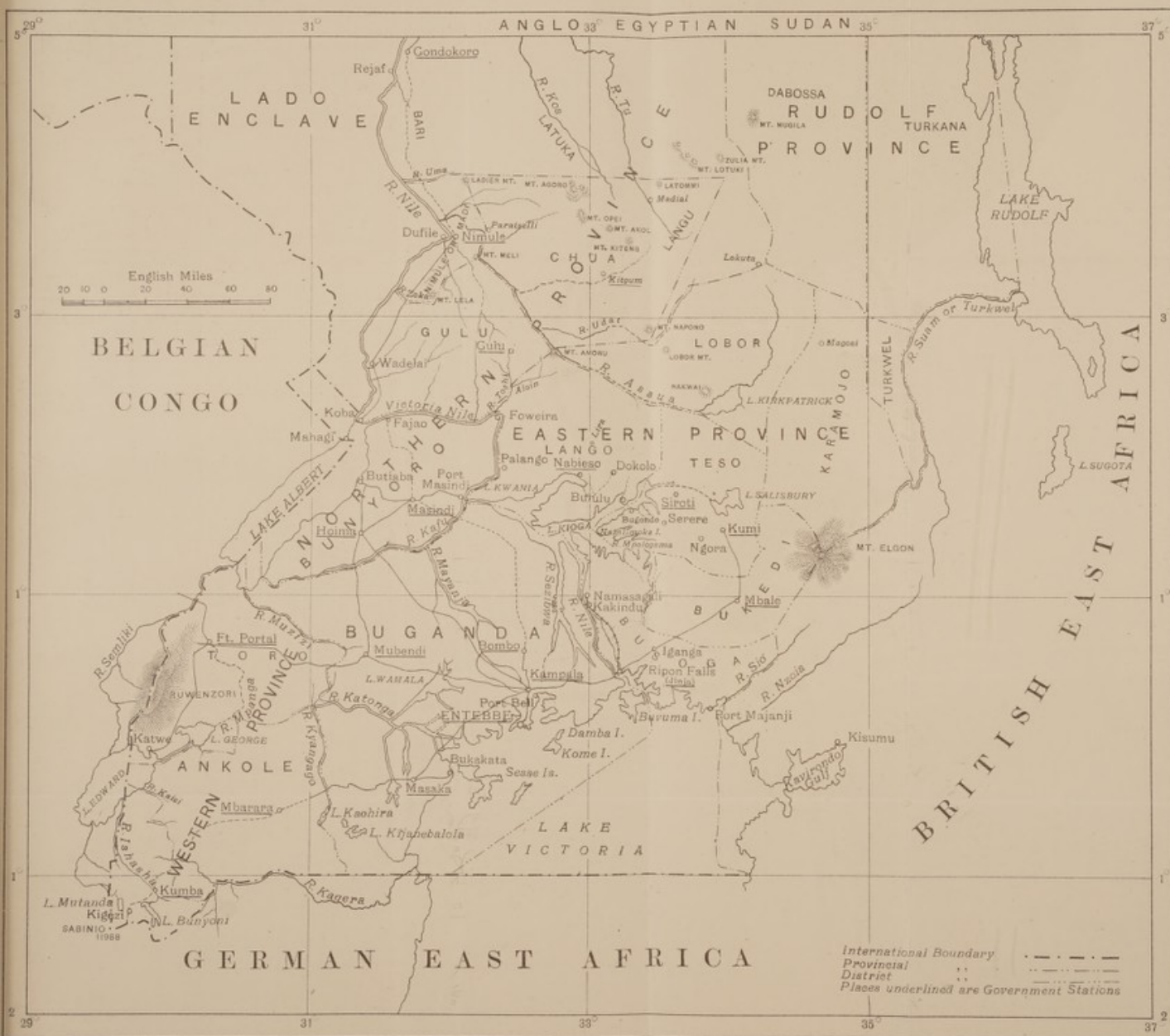
International boundary
Provincial boundary
Sub-provincial boundary
Canton boundary
Railway
Proposed Railway
Approximate heights in feet above mean sea level

Scale 1:100,000 or 1 inch to 25 miles

Printed at the Ordnance Survey, Southampton, 1912



SKETCH MAP OF THE UGANDA PROTECTORATE



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OF AMERICA

To accompany return of cases of Blackwater Fever







SKETCH MAP OF THE GOLD COAST, ASHANTI, AND NORTHERN TERRITORIES



C.O. No. 8

Note:— Towns shown thus Accra denote cases of Blackwater Fever in 1912.

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January, 1914.



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