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AFRICA.

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BLACKWATER FEVER IN THE TROPICAL  
AFRICAN DEPENDENCIES.

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REPORTS FOR 1913.

(For Reports for 1912 see [Cd. 7211], January, 1914.)

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Presented to both Houses of Parliament by Command of His Majesty.  
February, 1915.

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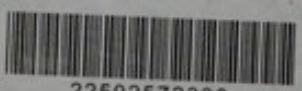
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# AFRICA.

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## AFRICA.

# BLACKWATER FEVER IN THE TROPICAL AFRICAN DEPENDENCIES.

## REPORTS FOR 1913.

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 reports on blackwater fever for the year 1912 were published in the Parliamentary Paper [Cd. 7211]. The report for Nyasaland corresponded with the financial year 1912-13, to the end of March of the latter year.

The present paper contains the reports for 1913. The report for Nyasaland was prepared on the basis of the Calendar year, but the reports on the cases which occurred in the first quarter of the year, and which were included in the report for 1912-13, are not reprinted.

Medical men entitled to speak with authority on the subject of blackwater fever have criticised the form and substance of these annual reports, and it is proposed to introduce considerable changes in both respects. It will necessarily be some time before these changes can take effect.

## GOLD COAST.

THE GOVERNOR TO THE SECRETARY OF STATE.

(Received 23rd March, 1914.)

SIR, Government House, Accra, 3rd March, 1914.  
I HAVE the honour to transmit, herewith, in duplicate, a copy of a letter from the Acting Principal Medical Officer, covering reports on nineteen cases of blackwater fever which occurred in the Gold Coast and its dependencies during the year 1913.

I have, &c.,  
H. BRYAN,  
Deputy Governor.

SIR, Medical Department,  
Victoriaborg, Accra, 26th February, 1914.  
I HAVE the honour to forward, for your information and transmission to the Secretary of State, the Clinical Reports, &c., of nineteen cases of blackwater fever that occurred in this Colony and Ashanti during the year 1913; no case was reported from the Northern Territories.

2. Two fatal cases were reported, but as the patients were not attended by a Medical Officer, I was unable to procure any details of the illness.

3. It is difficult to account for the marked increase in the number of cases which occurred during 1913; although there was an increase in the number of cases, the disease appears to have run a mild course in the majority of cases compared with previous years. The following table shows the number of cases and death-rate since 1910 in blackwater fever cases:—

Year.	Cases.	Deaths.	Death rate per 1,000 cases
1910 .. .. .	20	10	500·00
1911 ... .. .	14	6	428·57
1912 ... .. .	13	6	461·53
1913 ... .. .	21*	7	333·33

\* *Vide* paragraph 2, *supra*.

4. I regret I have been unable to furnish maps and temperature charts in all of the cases.

I have, &c.,  
E. H. TWEEDY,  
Acting Principal Medical Officer.

The Honourable  
the Colonial Secretary,  
Victoriaborg, Accra.



## CASE 1.

## REPORT ON A CASE OF BLACKWATER FEVER AT COOMASSIE.

European (non-official), age 34.

I. *Locality*.—

(a) Residence in centre of business portion of Coomassie. Swamp, partly drained, on two sides of town, nearest less than half-mile off.

Beyond the swamps, forest, partly cleared for some distance.

(b) A case in the same building and same bedroom occurred about eight months previously. Only one other recent case in Coomassie. No native dwellings in vicinity excepting those of servants to Europeans.

(c) House and surroundings carefully searched for insect fauna. Nothing seen; a few *stegomyia* mosquitoes.

II. *Seasonal variation*.—

Hot end of dry season. One or two tornadoes recently. Normal climatic condition for the time of year.

III. *Personal history*.—

(a) Patient has been on the Coast about 13 years, with regular periods of leave. Has had fever fairly often. Generally taken quinine regularly, but has recently been rather irregular.

(b) Patient has been six months in Coomassie this tour, coming direct from England. Has had poor health for about two months. Had some fever and intestinal troubles recently, culminating in a severe malarial attack on the 19th March.

Microscopical examination of blood made on the 24th March.

*Result*.—Large numbers of crescents found. No other forms of parasite.

*Differential leucocyte count*:—

	Per cent.
Large mononuclears...	23
Small „	15
Polymorphonuclears	52
Eosinophiles	5
Transitionals, &c.	5
Many megaloblasts.	

Ova of *Trichocephalus dispar* found in fæces.

*Previous history*.—Has had malaria fairly often, and has been in poor health for two months.

Has not been very regular in taking quinine.

On 14th March had two or three days' severe pain in region of appendix, which disappeared on treatment.

On 18th had a sharp attack of fever; was not seen till morning of 19th, when temperature was 103°, patient vomiting frequently, and feeling very ill.

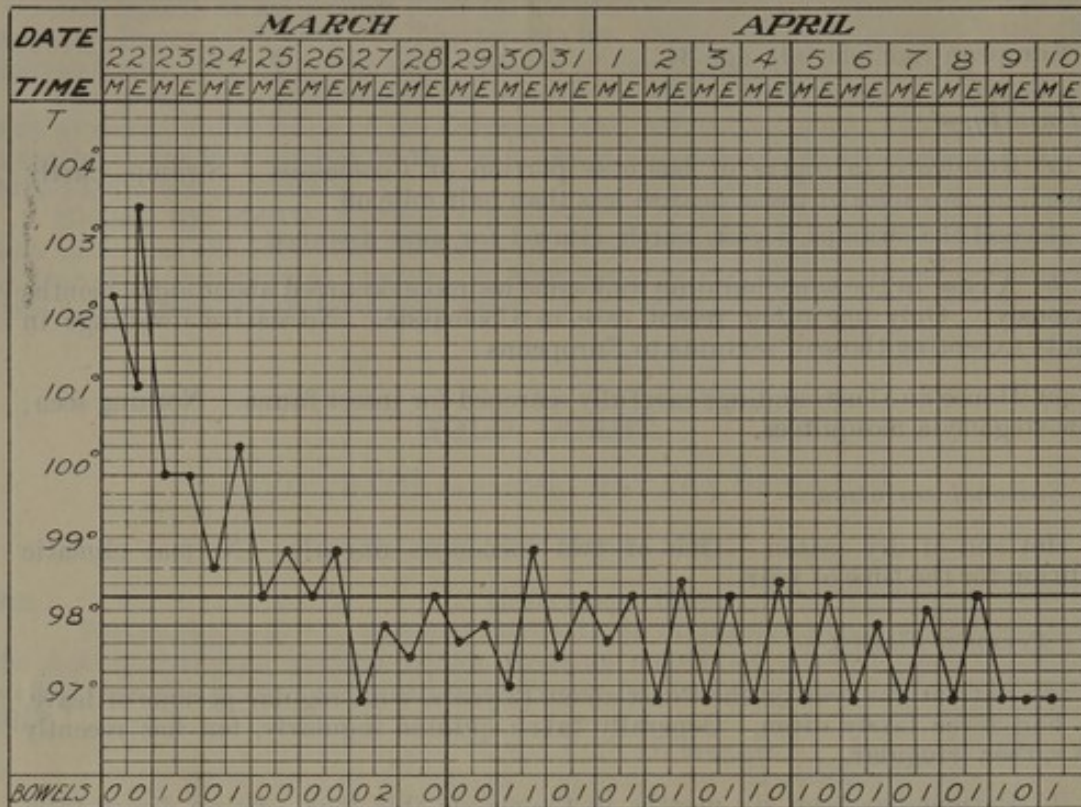
Spleen and liver both tender.

Took 10 grains quinine on 18th, 15 grains on 19th, and 15 on 20th, all in liquid form.

Temperature normal on 20th, and patient got up 21st, feeling much better, looking very pale and a little yellow. 10 grains quinine. On morning of 22nd had



fever again, and sent for Medical Officer; passing very dark urine just before he arrived.



On admission to hospital.—Temperature, 102.4°. Pulse, 90.

Passing very dark urine, almost black in appearance, but translucent against light. Heaviness and slight aching in loins. Vomiting almost everything taken at first, but keeping down "Perrier" water if iced.

Urine passed during day, 60 ozs. Evening temperature, 103.6°.

23rd. Urine a little lighter, about burgundy colour. Pulse rapid.

Yellow colour very marked. Still inclined to vomit.

Urine during day, 55 ozs.—some lost with stool.

24th. Improved. Pulse good. Yellow colour still marked.

Taking large quantities of fluid, only vomited three or four times. Urine passed, 54 ozs., distinctly lighter in colour.

25th. Temperature nearly normal. Pulse good. No vomiting.

Urine very much lighter in colour. Has taken egg-flip, champagne, and Perrier. Yellow colour is still very marked. Urine passed, 32 ozs.

26th. Urine now almost clear. Pulse and temperature normal. Urine, 33 ozs. Hæmoglobin, 50 per cent.

29th. Commenced quinine in iron tonic. Half-grain three times a day. Is now convalescent. Yellow colour rapidly disappearing.

1st April. On full diet. Quinine increased to three-quarter grain three times a day. Hæmoglobin, 55 per cent.

5th April. Continues to gain strength. Quinine increased to one grain three times a day.



10th April. Patient left hospital to proceed to England. Quinine, now one and a half grains three times a day. Yellow colour has disappeared.

J. C. S. McDOUALL,  
Medical Officer.

## CASE 2.

### REPORT ON A CASE OF BLACKWATER FEVER AT ACCRA.

European (non-official).

#### I. *Locality*.—

- (a) A market in the midst of the native town.
- (b) Suspicious native cases reported in neighbourhood.
- (c) Mosquitoes :—
  - Anopheles.
  - Stegomyia.
  - Culex.

#### II. *Seasonal variations*.—

Commencement of rainy season; storage of drinking water in neighbouring houses for days, and consequent increase of mosquito breeding.

#### III. *Personal history*.—

(a) In West Africa nine years. Always enjoyed good health until last return to Colony in November, 1912. Since then subject of frequent attacks of dyspepsia; one attack of dysentery. Lues at age of 21.

(b) and (c) Fever since 1st April; on 2nd and 3rd took 5 grains quinine.

### DETAILED REPORT.

European (non-official), age 33.

Lues at age of 21.

Takes quinine in doses of 3 to 4 grains a day "with fair regularity."

Fever since 1st April; on 2nd and 3rd took 5 grains quinine.

At 9 a.m., 4th April, a rigor, temperature,  $103^{\circ}$ ; pulse, 80; some jaundice, constipation, epigastric pain, but no vomiting. Urine, very dark brown colour, with tinge of bile, hardly any sediment. On boiling, coagulated albumen occupied one quarter of tube.

After 10 a.m. vomited two or three times slightly bile-stained fluid.

6 p.m.—Temperature,  $101^{\circ}$ ; pulse, 74; no injection of eyes or flushing of face. Scleræ distinctly icteric. Tongue rather dry, a dirty brown, but cleaner at tip and edges. Slight tenderness in epigastrium and right hypochondrium.

7 p.m.—Rigor, temperature,  $102.2^{\circ}$ .

#### *Laboratory report*.—

- (1) Urine :—Numerous granular tube casts.  
No cellular elements.  
Much brown granular debris.  
Guaiacum test positive.

- (2) Blood :—

	Per cent.
Polymorphonuclears	82.2
Lymphocytes	11.0
Mononuclears	6.4
Transitionals	0.4



5th.—Temperature and pulse normal. Urine clearing. Albumen after boiling 12½ per cent. of tube. Bowels have acted freely. Quantity of urine, 33 ounces. No albumen at night.

6th.—Temperature and pulse normal. Urine, 53 ounces. No albumen.

7th.—As on 6th. Urine, 84 ounces, faint trace albumen.

*Laboratory report.*—

Blood :—

	Per cent.
Polymorphonuclears	61·2
Lymphocytes	18·4
Mononuclears	16·2
Eosinophiles	2·2
Transitionals	0·6
Mast cells	0·4

8th.—Much better; scleræ clearing; tongue clean. Urine, 61 ounces, no albumen.

9th.—Quite comfortable. No jaundice; urine, no albumen.

10th.—*Laboratory report on blood* :—

	Per cent.
Polymorphonuclears	60·0
Lymphocytes	24·4
Mononuclears	11·0
Eosinophiles	3·2
Transitionals	1·2
Mast cells	0·2

No parasites. No pigment.

11th.—Discharged.

*Treatment.*—Rectal salines first two days, later ordered iron tonic.

*Remarks.*—Diagnosis somewhat uncertain. The firm's premises face the market place, which is situated in the town of Accra, and is surrounded by native dwellings. Of the six other European employes, none suffered from any other similar illness at that time or after.

C. V. LE FANU,  
Medical Officer.

---

## CAPE COAST.

### I. *Locality.*—

Cape Coast is a remarkably well-drained town, and free, to a very great extent, from mosquitoes and sand flies and other biting insects.

### II. *Seasonal variation.*—

This year has been a remarkably wet one, on nearly one-third of the days of the last six months rain has fallen. The previous year had been very dry.

---

## CASE 3.

Child (non-official), age 4.

*Previous illnesses.*—

*Hæmoglobinuria* two years ago; uninterrupted recovery, and no other symptoms.

*Malaria.*—Occasional attacks of fever.

*Previous movements.*—Has stayed all his life in Cape Coast.

*History.*—Passed coffee-coloured urine at early morning. No pain nor tiredness. Feels perfectly fit.

Examination showed enlarged, palpable spleen. No jaundice. Looks perfectly well.



*Urine.*—Hæmoglobin.

Disintegrated red cells.

Albumen plentiful.

Granular debris.

No sugar, bile, &c.

*Blood.*—No parasites.

Leucocytes normal.

*Fæces.*—*Ascaris ova* numerous.

Given *lot. hyd. perch. m X.*, *sod. bicarb.*, *gr. V.*, *t.i.d.*, and told to lie up.

*Progress.*—Ran about the whole time, as he would not stay in bed. Urine cleared by second day, and no symptoms supervened.

#### CASE 4.

##### REPORT ON A CASE OF BLACKWATER FEVER NEAR KIBBI.

European (non-official), age —.

#### I. *Locality.*—

(a) A plantation situated some miles from Kibbi and about 770 feet above the sea-level.

The ground is swampy in parts even in the dry season. The swampy ground is for the most part situated near the banks of a good-sized river which forms the boundary of two sides of the plantation. The rest, and the major part, of the plantation is not swampy. The bungalow where the patient lives, with his wife and another European, is a new wooden building on piles—it is built on the summit of an elevation which rises abruptly to a height of 130 feet above general level of the plantation. The natural drainage is excellent.

The ground around the bungalow is cleared for about 200 yards on all sides of bush, &c. Beyond this clearing on two sides is bush and forest, and on the other sides is the plantation.

(b) No record of any other case of blackwater fever in proximity could be obtained.

(c) *Insect fauna.*—Mosquitoes are very few and far between at the bungalow. I could find none during the two nights I slept at the house. Both anopheles and stegomyia are to be found on the town ground of the plantation.

Sand flies are prevalent during the early morning and before sunset.

Yall flies are very prevalent at certain seasons of the year.

#### II. *Seasonal variation.*—

The present year has been an exceptionally dry one during the early months, the rains not commencing until the middle of May, by which time the patient was convalescent.

The average yearly rainfall, as taken on the plantation, is as follows, viz. :—

1908.—70·80 inches.

1909.—80·19    "

1910.—89·98    "

1911.—61·03    "

1912.—51·06    "

1913.—Very slight up to the middle of May.

#### III. *Personal history.*—

(a) Patient is a planter. He is 35 years old. Thin and dark, with sallow complexion and brown eyes. He has been on the Coast for 5½ years, during the first four of which he went home at yearly intervals for four months at a time.

The length of his last stay at home was about three months, and the length of his present tour to the date of onset of blackwater fever 5 months.

Habits are temperate.

Quinine prophylaxis very irregular.

During his first tour on the Coast patient had one attack of malaria, during his second tour he had fever three or four times, and in his third tour he had some twenty separate attacks of fever, probably malaria.

He has never suffered from blackwater fever previous to present attack, either in Europe or on the Coast.

*Present attack of blackwater* commenced on May 1st, and patient took ten grains of sulphate of quinine when he first felt ill, and about twelve hours before any definite symptom of the disease showed itself.



Jaundice was apparent on the second day of the disease and lasted for about five days after temperature had become normal—thirteen days in all.

*Hæmoglobinuria* lasted five to six days.

*Albuminuria* lasted for twelve days.

*Duration of disease.*—Twelve to thirteen days.

*Result.*—Recovery.

*History of attack.*—On May 1st patient says he felt perfectly well in the morning, doing his work as usual, but on coming home in the middle of the day noticed that he felt no appetite for his food. During the afternoon he suffered from headache and a touch of fever, and before going to bed he took 10 grains of quinine sulphate. Patient passed a very bad night owing to severe headache and feeling of nausea.

*Second day.*—Patient noticed on passing his water that it was "almost black," and in the course of the morning his wife noticed that his eyes were yellow-looking. I saw the patient for first time about 6.30 p.m., when jaundice was very noticeable. The temperature was 103.4° and the pulse 115. There was tenderness on light pressure over the hepatic region, marked pain and tenderness over the epigastrium, and he complained of persistent feeling of nausea, with occasional vomiting of "bile." There was no tenderness, either then or subsequently, over the region of the kidneys. Urine was passed freely throughout the illness and in normal quantities.

*Third day.*—The morning temperature was 102.8°, and evening temperature 103°, with a small pulse of 120. Jaundice very pronounced, and urine typical. The vomiting and epigastric pain was worse, large quantities of a clear bilious-looking fluid being brought up independently of food being taken. Only teaspoonful feeds of champagne, chicken broth, &c., could be retained. Mental condition clear.

*Fourth day.*—The morning temperature was 101° and evening temperature 102°, pulse in each case 115. Skin was moist, and other symptoms remained the same. Patient passed a better night after one-sixth grain of morphia.

*Fifth day.*—Temperature 99.4° and pulse 97. Jaundice clearing up, and urine lighter in colour. Epigastric pain and vomiting also better.

*Sixth day.*—The improvement in all the symptoms continued, and from this time the patient's condition improved rapidly, and he made eventually a complete recovery with no relapse.

*Treatment.*—Consisted of five grains of calomel the second night. Enema was used subsequently. Hot dry applications to the loins, saline injections (rectal). Mustard plasters to epigastrium, &c. No quinine was given.

(b) *Previous movements of patient.*—During the five and a half months of his present tour patient has lived entirely at the plantation with the exception of a short visit to Accra and Mangoase about six weeks before the onset of the disease.

(c) Nil.

T. A. DOWSE,  
Medical Officer.

#### CASE 5. (*Vide also* CASE 18.)

#### REPORT ON A CASE OF BLACKWATER FEVER AT CAPE COAST.

(Non-official), age 33.

##### I. *Previous illness.*

*Lues* three years ago.

*Blackwater* four years ago when travelling home to England after invaliding for remittent malaria.

*Malaria*, constant attacks.

##### II. *Previous movements.*—

Has been in Cape Coast for seven months past. Bungalow away from town, but office is in middle of town, and surrounded by native shops and houses.

*History.*—Patient had taken very little quinine for some months, and that spasmodically, when he felt slight attacks of fever. On Tuesday, 6th instant, he had an attack of fever, with vomiting (six times). No headache. Bowels costive.

On Wednesday he felt better, and vomiting was less.

He went to the office on Thursday, and on Friday afternoon the fever started at midday, with vomiting in evening. This continued till Sunday afternoon, 11th, when he sent for Medical Officer. Headache during this period, and bowels well opened by some purgative pills.



Condition when seen: Temperature,  $101.2^{\circ}$ . Pulse, 108. Head, dull. No pains elsewhere. Liver enlarged. Spleen not palpable. Vomit showed a considerable amount of bile. Urine, high-coloured. Treatment: Quinine, grains X., that evening, and grains V. t.i.d. on Monday, when temperature and pulse were normal, and patient felt quite well, and got up in morning for two hours. Tuesday, grains V. t.i.d., and felt well till evening, when at 5 p.m., he had an attack of fever and temperature went up.

At 2 a.m. in the morning he passed urine black in colour. He vomited three times, bilious green with slight traces of blood; no rigor.

Condition at 11 a.m.: Temperature, 98; pulse, 72, firm and well sustained; felt very weak. Eyes jaundiced, but skin normal. No headache. Tongue moist and clean. Slight tenderness over left kidney.

Urine.—Hæmoglobin.

A few red blood corpuscles.

Slight trace albumen.

S. G. 1012.

Bowels had moved once.

Removed to hospital 3 p.m. and stood the journey well.

Temperature,  $98^{\circ}$ ; pulse, 84; but he looks very ill. Hot sand bags applied to small of back, which produced copious sweating. Urine passed freely, Perrier water being drunk plentifully.

Blood showed no parasites. Leucopenia present.

Progress. May 15th.—Sleep rather disturbed, but feels better. One motion, loosely formed, and smelling rather strongly. Tenderness over kidney absent, and jaundice of eyes less. Has had no vomit nor rigor. Urine passing freely and colour lighter, with less hæmoglobin present. Albumen in slight amount. No casts.

Evening.—Urine plentiful. No vomit nor pain.

May 16th.—Sleep disturbed, urine normal.

May 17th to 24th.—Improvement continuous. Sleep good, and urine normal.

May 25th.—Evening temperature,  $101.4^{\circ}$ ; pulse, 100. Bilious vomit and tenderness over epigastrium.

Blood shows subtertian rings.

Urine high-coloured, but no albumen nor hæmoglobin.

May 26th.—Still febrile, with bilious vomiting.

Quinine, 2 grains morning and evening.

May 27th.—No vomit, but sleep disturbed and fever high in evening. Quinine, 12 c.m. given hypodermically at night.

May 28th.—Much better this morning. No fever to-day. Quinine, grains III. t.i.d.

May 29th to June 2nd.—Improvement continued, and patient discharged with instructions to take grains III. quinine daily.

Treatment during stay consisted in hot sand packs, abundance of Perrier water.

Liq. hydrarg. perch. 5 ss., sod. bicarb. grains X., four-hourly; and bowels kept open.

H. F. HAMILTON,

Medical Officer.

## CASE 6.

### REPORT ON A CASE OF BLACKWATER FEVER AT COOMASSIE.

(Syrian trader), age —, female.

#### I. Locality.—

(a) Residing about quarter mile away from the swamp of Subin. No bush or forest near.

(b) No history of any other case occurring in the house. Patient lives—with many other Syrians—above a native store. Native dwellings all around, and extensive intercourse with natives.

(c) Larvæ of anopheles found in the swamp of Subin.

No fleas seen, but they are probably present.

#### II. Seasonal variation.—

Commencement of rainy season.

Rainfall below average for the time of year.

#### III. Personal history.—

(a) Has had several attacks of malarial fever previously.



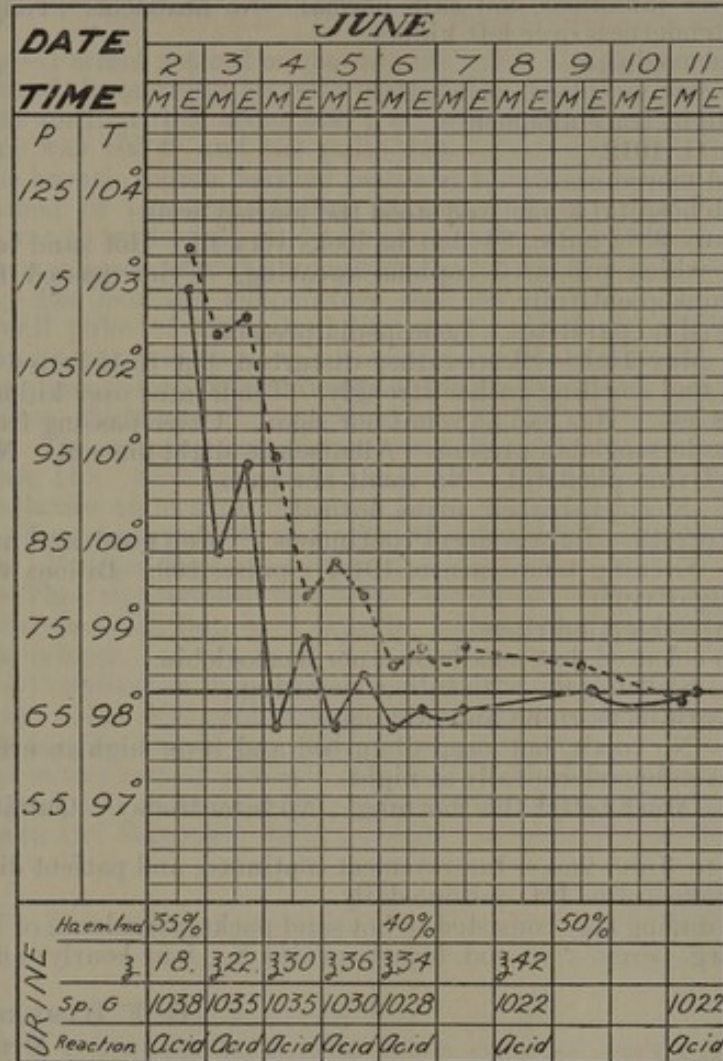
The patient was not in the habit of taking quinine as she is pregnant (five months) and feared abortion.

Frequently had small attacks of fever, but only took quinine when the attack was very severe.

Had never had blackwater fever before.

(b) Patient had been in West Africa for one year only, and only one month in Coomassie. Had previously resided at Abosso.

(c) At no time did a microscopical examination of the blood show any malarial parasites or pigment, but the patient had taken large doses of quinine before I was called in.



I was called to see patient on the evening of the 2nd June, 1913. She had passed water which was the colour of stout, and complained of pain in the lumbar region.

She was very jaundiced. Had had no vomiting. She declined to come into hospital. Temperature 103° F. Pulse 120 and weak, respirations 30. The patient was five months pregnant. The temperature had fallen to 100° F. on the next morning, but rose to 101° F. that evening, after which it never rose above 99° F. Haemoglobin disappeared from the urine on the sixth day, and albumin on the seventh. The urine remained acid throughout. There was no suppression, the quantity passed during twenty-four hours varied from 18 ozs. on the second day to 42 ozs. on the eighth.

The specific gravity of the urine was 1038 on the second day, and gradually fell to 1022 during convalescence.

The haemoglobin index was at first 35 per cent., and never rose above 50 per cent. On the third day the patient was troubled with vomiting.

The case ended in recovery.

H. W. GUSH,  
Medical Officer.



## CASE 7.

## REPORT ON A CASE OF BLACKWATER FEVER AT COOMASSIE.

European (non-official), age —.

I. *Locality.*—

(a) Living about 300 yards away from the swamp of Subin. Bush within about 50 yards, and forest 200 or 300 yards away.

(b) No other case has occurred in the house, but ten days previously a case had occurred about 100 yards away. Intercourse with natives and native dwellings extensive and continuous.

(c) The larvæ of anopheles are found in the swamp of Subin. No other biting flies, &c., seen.

II. *Seasonal variation.*—

Beginning of rainy season.

Rainfall below the average for the time of year.

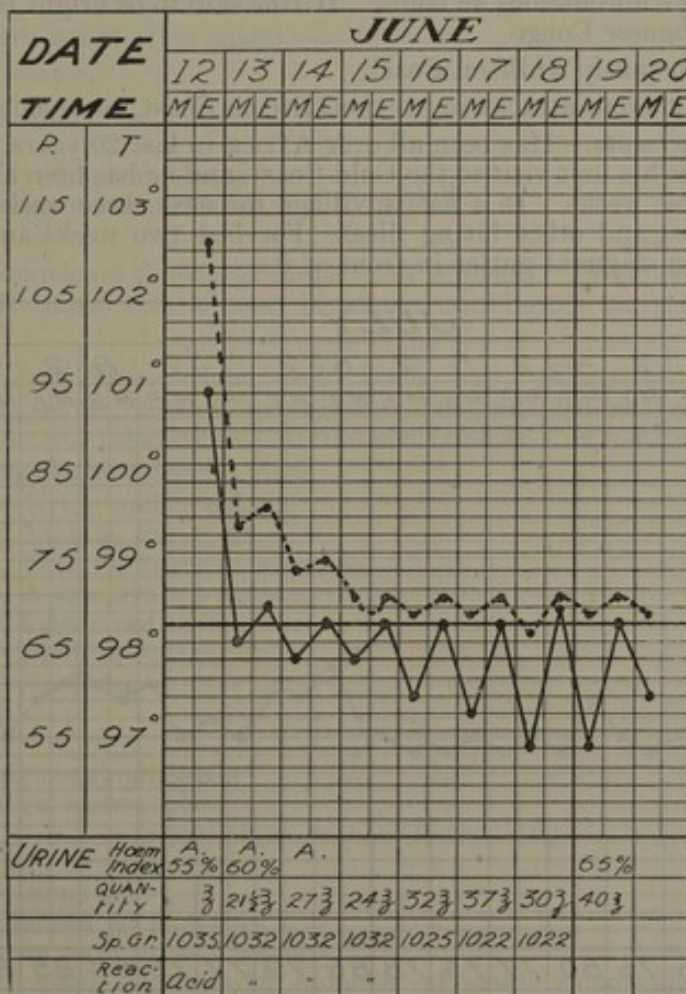
III. *Personal history.*—

This is the patient's second tour. The first tour consisted of five years' residence. He has now completed two years of his second tour. Has frequently had malaria. Has never had blackwater fever before. Never takes quinine regularly.

(b) Has resided in Cape Coast, Secondee, and Coomassie—the latter for the past two years. Has been overworking recently building a church.

(c) Dr. A. J. R. O'Brien examined the blood and at no time found malaria parasites—the patient had previously taken large doses of quinine—but the differential blood count suggests some protozoal infection.

It was as follows:—48 per cent. mononuclears, 5 per cent. transitionals, 1 per cent. eosinophils, and 46 per cent. polymorphonuclears.



I was called to see the patient on the evening of the 12th June, 1913. He had felt feverish and out of sorts for two days. The previous day he had taken 16 grs.



of quinine, and on the morning of the 12th he took 10 grs. At about 5 p.m. he passed a quantity of urine the colour of stout. I saw him shortly afterwards, his temperature was 102° F. Pulse 120, and respirations 30. He complained of tenderness over the hepatic area, and pain in epigastric and lumbar regions. He was moved into hospital. His temperature came down to normal the next morning and did not rise again. He was slightly jaundiced at first; there was no vomiting.

The quantity of urine varied from 21½ ounces during the first twenty-four hours to 40 ounces on the eighth day. Hæmoglobin and albumin had disappeared from the urine on the 5th day. The urine was acid throughout the disease, and the specific gravity fell from 1035 to 1022. The hæmoglobin index was 55 per cent. on the second day, and 65 per cent. when the patient left hospital.

The patient recovered, and left hospital on the ninth day.

H. W. GUSH,  
Medical Officer.

### CASE 8.

#### REPORT ON BLACKWATER FEVER AT CAPE COAST.

(Non-official), age 40.

##### I. Previous illnesses.—

*Lues* five years ago, resulting in hemiplegia. Treated salvarsan with complete recovery. Hg. inunctions still continued for one month in every three. Was using inunction at time of admission to hospital.

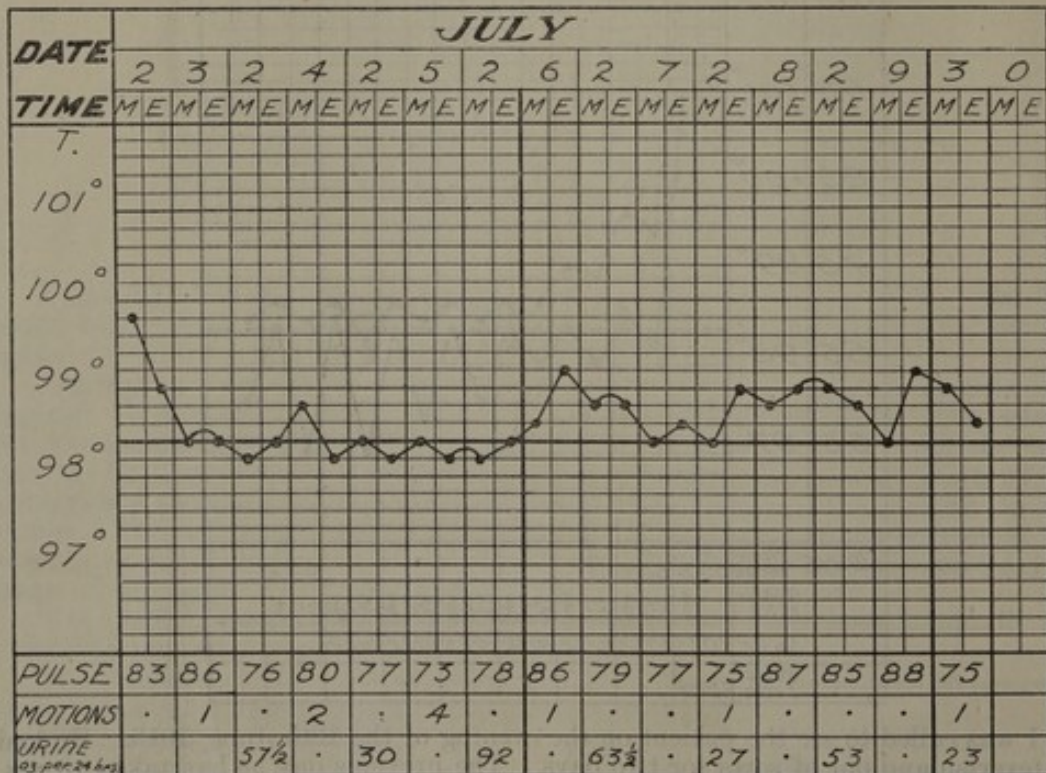
##### II. Blackwater fever.—

Four years ago, unconscious 48 hours. (Urine said to be bright red, then black.) Occurred in Portuguese Congo.

*Dyspepsia* constantly while on Coast.

*Malaria*.—Numerous attacks in previous life on Coast; none this tour.

*Previous movements*.—Has been all over Africa in last 20 years, with intervals in Greece. This is his first visit to the Gold Coast, and he has been out two months. Was in Accra three weeks. In a native village for next three weeks (badly bitten then by mosquitoes and other biting flies). For last two weeks in Sekondi in a house with an open stagnant gutter in front of it.





*History.*—No attacks of fever while in Gold Coast, but much troubled by dyspepsia. Food mainly bread and jam; for past two days has felt unwell and tired. Early this morning (July 23rd) he passed coffee-coloured urine. He walked up to hospital at once (7 a.m.).

*Conditions.*—Complains of tenderness in epigastrium, but none over kidneys. Appearance healthy, weight 15 stone. No jaundice; pustular rash on skin of arms and abdomen from mercury inunction. Gums and under surface of edges of tongue sore and ulcerated (mercurial stomatitis). Quinine taken is usually 3 grs. every two days. Given enema, hot sand packs to small of back, and :—

R Liq. hyd. perch. m 15.  
Sodii bicarb., grs. X.  
Liq. amm. acet. m. XL.  
Aq. ad.  $\bar{s}$  i.  $\bar{s}$  i four-hourly.

Urine (first passed) :—

S. G. 1032, dark-brown coffee coloured.  
Whitish deposit on standing.  
Albumen moderate.  
Trace of blood.  
Bile in small amount.  
No sugar.  
Hæmoglobin dissolved in urine.

*Microscopically.*—Triple phosphates.

Urates.  
Bacterium urinæ.  
Casts. A few granular and fewer hyaline.  
A few amœba-like cells.  
Red blood corpuscles—mostly undergoing degeneration.

*Blood* (twelve hours after onset) :—

No parasites.

Differential count :—

	Per cent.
Polymorphonuclears	75
Large mononuclears...	23
Small „	2

Polymorphonuclears showed granules as of pigment. Large mononuclears badly stained, and with nuclei very loose and irregular and lightly stained (as if in a state of death).

*Progress.* July 24th.—Slept well. Feels well. Stomatitis troublesome; so stopped liq. hyd. perch. in mist.; given pot. chlor. and glyc. ac. boric. mouth wash, and tinct. benzoin. co. inhalations. Urine nearly clear. Is habitually constipated, and requires drugs to keep bowels open.

July 25th.—Urine amber colour.

No bile, sugar, &c.  
Faintest trace of albumen.  
A few hyaline casts.  
Fewer red cells.  
Bladder epithelium.  
Bacteria.

*Blood* :—

	Per cent.
Polymorphonuclears	66
Large mononuclears...	32
(Show signs of new formation.)	
Small mononuclears...	1
Eosinophiles	1

Thick film showed no parasites.

Sleep fair—but pain in mouth severe.

*Blood* (third day).—Increasing numbers of small mononuclears. Pigment granules in one large mononuclear.

July 26th to 29th.—Has felt well all along except for pain of stomatitis, which kept him from drinking as much Perrier water as he has for several days—



accounting for small amount of urine on these days (*vide* chart). It also affected sleep, and required morphia,  $\frac{1}{2}$  gr., and atropine, gr.  $\frac{1}{20}$ , hypodermically on night of 28th.

Light diet started on seventh day, when he was allowed up for the first time. A report since received reports uninterrupted recovery.

H. F. HAMILTON,  
Medical Officer.

### CASE 9.

#### REPORT ON A CASE OF BLACKWATER FEVER AT COOMASSIE.

European (non-official), age 29.

#### I. *Locality.*—

(a) The case occurred in Coomassie, a town situated in a large clearing in dense forest, with some swampy ground in the lower parts. No bush or swamps in the immediate vicinity of the patient's residence.

(b) No series of cases occurred.

(c) No mosquitoes were found in the patient's house, but *Anopheles costalis* and *Stegomyia fasciata* were prevalent in the town.

#### II. *Seasonal variation.*—

The middle of a rainy season presenting no unusual features.

#### III. *Personal history.*—

(a) Patient had done a tour in Northern Nigeria, had blackwater fever, and was invalided home. Had had one or two mild attacks of malaria prior to this, but none since.

Professed to take regular doses of quinine, but admitted that he forgot or neglected it so often that he cannot be said to have taken more than occasional doses. Five-grain doses.

(b) Patient arrived on the Coast from England on the 24th of June, reached Coomassie next day, and was taken ill on the night of the 10th of August.

(c) The blood, at the commencement of the illness, contained numerous subtertian parasites. They disappeared within 36 hours, leaving a very marked anæmia. Few erythrocytes, with increase of the mononuclear and polymorphonuclear corpuscles, especially the former. Later, after apparent recovery and approaching convalescence, subtertian parasites again appeared.

Patient was formerly employed in Nigeria, but was invalided after blackwater fever in his first tour, last year. He landed in Sekondi on the 24th of June and reached Coomassie on the 25th. I first saw him for a moment about a week ago, and made a mental note that he would have to be watched, as he looked weak and anæmic, and it seemed doubtful if he would escape invaliding again. He was then given definite instructions about taking quinine, which, however, he does not appear to have carried out.

On the night of the 10th of August, after he had only been six weeks in the country, he had a rigor, and I found him with a temperature of 103.6°, but beginning to sweat. He said, on being questioned, that he had passed some "rather dark" urine, but it had been thrown away. He had already been given 10 grains of quinine in solution. The next morning his temperature was down to 100.8°, but he complained of severe headache, vomiting, and was passing scanty, practically black, urine. He was immediately removed to hospital.

(It was at this time that his previous history was elicited. He was evidently anxious to return to and remain on the Coast, and was apparently knowingly accepting the risk of doing so.)

Examination of the blood showed numerous parasites (subtertian ring forms) and quinine was administered, with a mixture of iodine, perchloride of mercury, and bicarbonate of soda in frequent small doses to combat vomiting, while he was encouraged to drink large quantities of soda and barley water. Sleeplessness was treated with trional. Although the urine cleared on the third day, it remained very scanty, only a drachm or two being passed at a time, which was so loaded with albumen as to be quite solid after boiling. Hot fomentations were kept constantly applied over the loins and liver, and saline injections given per rectum.



It was only after hypodermic injections of 1/100 grain of digitalin were added to the other means that the quantity of urine began to increase, and they were at one time given every two, but afterwards every four and eight hours.

By the 20th the patient's condition had so far improved that there seemed to be a reasonable prospect of his recovery. The blood was now free from parasites, and the erythrocytes, though greatly reduced in number, were increasing, and deformed and ghost forms absent. The urine was showing a daily increase and the patient was obviously better in himself. He was now taking Fellows's syrup and arsenic.

On admission the patient had been suffering from acne and prickly heat, and for many days the excretory functions had been performed mainly by the skin. Every effort was made to combat the effect of this by dusting powders, antiseptic lotions, &c.: but on the 1st September numerous small boils appeared, not only on the back, buttocks, flanks, &c., but on the forehead, round the mouth, &c., in fact, a more or less general eruption. The gums, too, bled freely, and were swollen and scorbutic looking. The patient was apathetic and could only be induced to take nourishment or do anything at all with the greatest difficulty. Half-grain doses of calcium sulphide were given in pill form, the mouth was treated with tannic acid in glycerine following mild antiseptic washes, and local measures were continued for the skin lesions. These measures proved effective only to a partial extent, and in the course of the following week several large carbuncles formed, and any irritation of the skin appeared to have a tendency to produce this condition.

The patient was twice seen by Doctors Montgomery and O'Brien in consultation with me, who agreed that nothing more could be done. Fresh bone marrow was obtained daily from the market, and every form of concentrated nourishment tried in turn, but after two or three administrations the patient invariably turned against it and something else had to be found.

By the 12th September the carbuncles had greatly improved. Nearly all the sloughs had separated and the residual ulcers were granulating well. The patient, too, seemed a little less apathetic.

Small prophylactic doses of quinine (five grains) had been given on the 8th, 9th, and 10th, but on the 16th the temperature, which had begun to fall after the improvement in the carbuncles, rose again to 99.6°, and examination of the blood showed that malaria parasites were again present. Very great difficulty was experienced in inducing the patient to take quinine, and that given by the mouth was quickly vomited. It was then given in repeated high rectal injections, some of which were retained for an appreciable time.

On the 17th the patient was again seen at my request by Doctors Montgomery and O'Brien and the question of administering intra-muscular injections of quinine was considered. It was decided, however, that in view of the great likelihood—with the tendency to forming carbuncles—that this might result in the formation of another deep seated and large slough, which the patient was not in a condition to withstand, it would be better to watch the effect of the quinine that had been administered per rectum—and which had as yet hardly had time to manifest its action—before resorting to this last measure. On the 18th the temperature was still rising, and although only 99.8°, the patient, in his weak state, was partially delirious, while the parasites were more numerous in the blood. After further consultation, therefore, ten grains of quinine was injected intramuscularly, but the patient never regained consciousness and his temperature continued to rise until it reached 101.8° at 9.15 p.m., when he died.

In this case the actual blackwater fever soon cleared up, but left badly damaged kidneys. The condition then was first an acute, and subsequently a sub-acute, nephritis: the urine always being albuminous to the end. The carbuncles were in part the secondary result of the continued excretion of irritant products of metabolism by the skin, which, in the patient's weak condition, it could not withstand. This further weakened him until a condition of such exhaustion was produced that a very small malarial infection was sufficient to cause death.

W. W. CLARIDGE,  
Medical Officer.



## CASE 10.

## REPORT ON A CASE OF BLACKWATER FEVER AT SEKONDI.

European (official), age —.

I. *Locality*.—

Residence since January, 1913: Various places in the south of Ashanti and the west of the Colony. The accommodation in these places seems to consist of rough rest-houses surrounded by thick bush, numbers of natives being close at hand; flies and other vermin numerous, and the under parts of the houses generally occupied with native produce.

During the last three months there have been heavy rains.

I cannot get reliable details as to mosquitoes, biting fleas, ticks, bugs, lice, and fleas.

II. *Seasonal variation*.—

Heavy rains.

III. *Personal history*.—

(a) Two tours in Northern Nigeria, and two tours on Gold Coast, rough pioneer work.

He admits to very little previous illness.

*Records for this tour*.—At Tarquah, 31st March, 1913, to 6th April, 1913, siriasis.

At Tarquah, 29th April, 1913, to 3rd May, 1913, sciatica and malaria.

Secondee, final illness, admitted 12th August, 1913, and died 19th August, 1913, admitted with quartan malaria, developing on fourth day into hæmoglobinuria.

He professed to be a regular quinine taker.

History of chronic  $C_2H_5(OH)$ .

(b) See Section I.

(c) Blood examined shortly after onset of hæmoglobinuria.

	Per cent.
Polymorphonuclears	83
Lymphocytes	11
Large mononuclears	6
Eosinophiles	0

No pigmented leucocytes.

No nucleated red corpuscles.

No parasites.

## DETAILED REPORT.

The patient came out first to West Africa in 1908 to Northern Nigeria. No fever (?). Second tour was to Gold Coast, again no illness (?). Likewise third tour. The present is the twelfth month of his fourth tour. His sick record is not good, and is as follows:—

Tarquah.—Illness, siriasis, 31st March, 1913, to 6th April, 1913; advised as to clothing and abstinence from alcohol.

Tarquah.—Illness, sciatica and malaria, 29th April, 1913, to 3rd May, 1913; on second day of illness given quinine grains X. per rectum. This set up an unstable condition of rectum and diarrhoea. Advised to take quinine, grains X., and after that grains V. regularly.

Since May he has been crippled with rheumatism and sciatica. This, he says, followed a trolley journey he made from Prestea to Tarquah during a tornado, the result being that he got wet through. (Journey, 19 miles.)

$C_2H_5(OH)$  for some months past.

Previous to this admission to hospital I have been treating him for some weeks for rheumatism. He was an unsatisfactory patient, and appeared to wish to avoid medical attendance. He professed to be a regular quinine taker.

For the present illness he was admitted to hospital on 12th August, 1913, against his inclination. He said he had been ill for about a week previously. I found him in the Railway Institute about 5 p.m. with a temperature of  $103.4^{\circ}$ . His blood was



taken on admission to hospital, and found to have a scanty infection of quartan malaria. On the evening of admission he was given quinine, grains VI., intramuscularly. Next morning his temperature was subnormal. A routine treatment of quinine was continued, and his temperature remained normal or subnormal till the evening of August 15th, nearly three days. He professed to feel better, but had no desire to get up, or to have more food. Liver and spleen were slightly enlarged; about 4 p.m. on 15th August, 1913, he began to feel distressed, disinclined for food; he had frequent shiverings, and inclination to vomit; temperature rose steadily to  $101^{\circ}8'$ , at 10 p.m.,  $103^{\circ}8'$ , and at 10.30,  $104^{\circ}8'$ . I was inclined to think it was fresh crop of malaria parasites. He was given 10 grains aspirin, and I was just preparing to give him a wet pack when at 10.45 he passed an ounce of very black urine. His blood was taken immediately after. No parasites were found. Leucocyte count as follows:—

	Per cent.
Polymorphonuclears	83
Lymphocytes	11
Large mononuclears	6
Eosinophils	0

No pigmented leucocytes nor nucleated red corpuscles.

Treatment adopted was saline injections every three hours. Soda bicarb., grains V., liq. hydrag. perchlor., m XV., aquæ ad 1 oz., every two hours. Ice to suck. Barley water to drink. At his own express desire he was occasionally given a little ginger ale. For the vomiting he was also given an effervescent mixture every three hours; vomiting was troublesome for the first 48 hours. In addition to the effervescent mixture the side of his neck was blistered. Turpentine stupes were placed over his kidneys to accelerate the secretion of urine, with success. On the two occasions 10 c.c. of normal saline were injected into his abdominal wall.

Jaundice and anæmia became very extreme. Urine contained methæmoglobin, but distinctly and steadily improved. The quantity passed was deficient, and the rate of secretion intermitted.

On the evening of 18th August, 1913, he became restless. The temperature had come steadily down and was now subnormal. Pulse had remained about 112.

As he had only passed  $1\frac{3}{4}$  oz. of urine since 2.20 a.m. turpentine stupes were repeated, with beneficent effects as regards urine; 18 ozs. of urine were passed during the night. In the morning there was a change for the worse. He had slept fitfully, and was inclined to be delirious. It is possible he was affected by natives firing off guns practically all night. I had appealed unavailingly to have this stopped. He was given champagne to sip, but was averse to it. About 10.30 a.m. symptoms of syncope threatened. His pulse became weaker and he was clammy cold. He was given hypodermics of brandy, and of strychnine and digitalis, and then a rectal injection of brandy and water. The other usual remedies were tried. The syncopal symptoms started after an attempt at defæcation.

Death occurred at 1.20 p.m.

E. W. GRAHAM,  
Senior Medical Officer.

#### CASE 11.

#### HISTORY OF A BLACKWATER FEVER CASE ADMITTED TO THE COLONIAL HOSPITAL, ACCRA, ON THE 27<sup>TH</sup> AUGUST, 1913. AT 8 A.M.

European (non-official).

##### I. *Locality.*—

(a) Weshiang, Accra Waterworks, river and low-lying ground flooded for the last two months.

Bush sparse.

(b) No other case in the district.



(c) Mosquitoes and other biting insects numerous.

Anopheles.  
Stegomyia.  
Culex.  
Tabanidæ.  
Muscidæ.

II. *Seasonal variations.*—

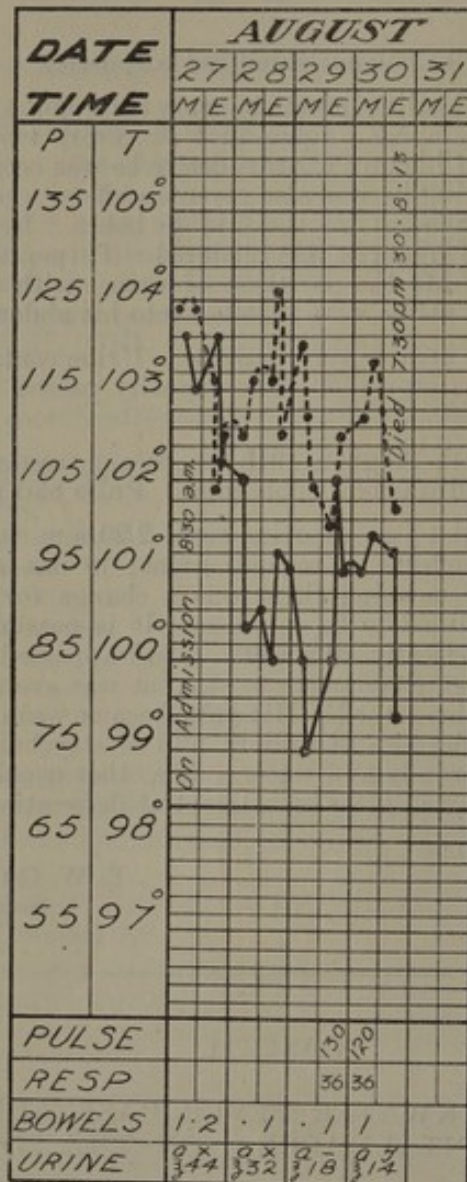
Usual climatic conditions for the time of year—dull, temperature running between 76° to 80°.

Moderate rains, about two inches in August.

III. *Personal history.*—

(a) Little known. Had about a dozen slight attacks of fever during the last few weeks; was in the habit of taking 5 grs. quinine every second or third day.

(b) Had been working at the waterworks for six weeks; previous movements unknown. Sleeping in native huts; food deficient in quantity and quality.



(c) Blood smear negative for malaria parasites; hæmoglobin 12 per cent. for some hours before death, and blood count 800,000. The patient was sent in from Weshiang waterworks; he had been in this country since July last year, but only during the last six weeks resident at the waterworks; he was first seen by Dr. Brabazon late the afternoon the day before (26th) when he found him passing dark-coloured urine; temperature (6 p.m.) 102°, and at 10 p.m. 105°. The man had no previous tropical experience; he had over a dozen attacks of "fever," but no ague;



had been in the habit of taking quinine every second or third day, 5 grains or more, when he felt out of sorts. He felt rather ill on Sunday, 24th instant, and on Monday morning took three tabloids of quinine (presumably 5 grains each), and had rigor and passing of black urine after midday. Condition on admission to hospital—temperature 103·6°, pulse small and weak, 120; whole body very yellow; no pain; shortly after arrival passed 4 ounces of urine about colour of burgundy; albumen in abundance; blood smear negative for malaria.

*Treatment.*—Sternberg's mixture, saline rectal enemas two pints per diem in three doses; 6 p.m., pulse a little better; temperature 103·6°; vomited about five ounces green fluid; bowels have acted several times loosely, and containing much mucus.

28th August, 1913.—A quiet night; passed a fair quantity of urine, but almost as dark as before; vomited three times creamy green fluid; complains of excessive thirst; tongue coated and dry; temperature 100·6°, pulse 108, weak; respirations 22, and inclined to be periodic; hæmoglobin 25 per cent.; icterus very deep.

4 p.m.—Very weak at times; restless; rejects rectal salines; pulse rather weaker and small. Two pints normal saline intramuscularly; 32 ounces of urine passed during the last twenty-four hours, lighter in colour.

29th August, 1913.—Rather restless; low muttering towards 4 a.m.; condition grave, but improved after saline and champagne.

9 a.m.—Very weak; pulse 112, small and soft; temperature 99°; complains of severe pain over the whole abdomen, which pain he has had since Monday; urine quite clear, and containing only a little albumen, but none passed since 5 a.m.

6 p.m.—Still very weak; pulse 125, respirations 36; icterus passing off; urine becoming much clearer, dark sherry colour; retaining all nourishment by mouth, also the rectal saline injections, which he is having every six hours (8 ozs.); rests quietly, and sleeps a good deal; hæmoglobin 12 per cent. 10.30 p.m. Hypodermic injection of strychnine given; 18 ounces of urine passed in the last twenty-four hours.

30th August, 1913.—Rested very well during night, but very weak this morning; pulse 120, respirations 36; nine ounces of urine passed at midnight, and at 6 a.m. bed was found saturated with urine, and fæces also had been passed in bed. Hypodermic of strychnine given at 9 a.m.; urine quite a natural colour, very slight trace of albumen.

7.30 p.m.—Patient became rapidly weaker all day, and died at 7.30 p.m. At 4 p.m. he passed 8 ounces of clear urine, and blood taken at midday showed the count to have fallen to 800,000 c.c. Death was caused by extreme rapid anæmia, the acute blackwater symptoms having been overcome.

C. B. HUNTER,  
Senior Medical Officer.

## CASE 12.

### REPORT ON A CASE OF BLACKWATER FEVER AT SEKONDI.

Native (official), *aet* 40.

#### I. *Locality.*—

(a) *Physical features.*—The patient lived in Accra Town, Sekondi. I have visited the house. There is no swamp, bush, or forest near it.

The area is not congested.

(b) There have been no other cases in the building or in that district.

(c) The insect fauna consist chiefly of a few anopheles and stegomyia mosquitoes. I found no biting flies, ticks, bugs, lice or fleas, &c.

#### II. *Seasonal variation.*—

About the end of the rainy season, which has not been abnormal. The weather recently has not been so hot as usual, and the nights have been cold.



### III. Personal History.—

(a) Has not been known to suffer from any other serious disease, but has frequently had malaria, the last attack being last month, when he was placed on the sick list from August 1st to August 6th, 1913. He only took quinine when he had fever. He always slept under a mosquito net.

(b) A native of Cape Coast, but has been stationed at Sekondi for many years. He went on leave to Cape Coast at the beginning of the year, and returned to duty at Sekondi in March. He lived in a good house in a very clean part of the town. I believe he was temperate in his habits.

(c) Microscopical examination of the blood (by Dr. Hänschell) made on the fourth day of the disease directly after the patient reported sick.

With the exception of occasional attacks of malaria he has not been known suffering from any serious disease previously. He was on the sick list from August 1st to August 6th with benign tertian malaria.

He made a good recovery and returned to duty quite well.

*Present history.*—On the 8th September he felt ill with headache and shivering, and did not go to his office. That evening his urine became black in colour and scanty in amount.

He continued to be ill, and on the 11th September he reported to me in writing that he had fever and was too ill to come to hospital. I sent the hammock for him, and met him on his arrival at hospital at about 11.30 a.m.

His temperature was 99.8° F. Pulse 126 and very weak. Liver and spleen were both greatly enlarged; his conjunctivæ were deeply jaundiced. He passed a little dark-coloured urine after admission and again in the evening. The treatment adopted was a modification of Harsey's.

The patient rapidly became weaker, and died at 10.40 p.m. on the same day.

It was unfortunate that the deceased did not report his illness until the fourth day of his disease.

A post-mortem examination was made on the morning of the 12th September. I attach the post-mortem report.

I am indebted to Dr. Hänschell for the following report upon the patient's blood and urine.

#### *Blood.*—

*Differential count (300 counted) :—*

	Per cent.
Polymorphonuclears	77
Lymphocytes	10
Mononuclears	13
Eosinophiles	Nil.

Very scanty subtertian rings were found.

Total red blood corpuscles, 600,000.

Total white blood corpuscles, 22,500.

No pigmented leucocytes were seen, but six nucleated red corpuscles

A thick blood film showed *Filaria bancrofti*.

*Urine.*—Specific gravity, 1.017.

Albumen present.

Slight trace of bile.

Alkaline methæmoglobin (revealed by spectroscopic examination).

Hæmoglobin index, 25 per cent.

The small number of red blood corpuscles made life practically impossible.

### POST-MORTEM REMARKS UPON CASE 12.

*Thorax.*—The heart was normal in size and revealed no traces of organic disease except a little commencing atheroma of the first part of the thoracic aorta. There was very little fluid in the pericardium, a little blood in the left side of the heart, and practically none in the right side. The blood present was extremely thin and watery in all the vessels. Both lungs showed old pleuritic adhesions; this was more marked on the right side than the left.



*Abdomen.*—The liver was very much enlarged, and was very adherent to the diaphragm, ribs, and spleen; there was commencing cirrhosis on the anterior surface of the left lobe.

Some small fibroid new growths were seen distributed throughout the liver, some appeared on the surface, but caused no puckering or umbilication of the surrounding hepatic tissue. In colour they were whitish-yellow. The gall bladder was normal. The spleen was enlarged and adherent to the liver; it was of a pale plum colour. The kidneys were normal, and the capsules stripped easily. The bladder contained a little urine. The stomach and intestines displayed no abnormalities. Everywhere the anæmia and small amount of fluid were markedly pronounced. The parent forms of the *Filaria bancrofti* were searched for, but not found.

H. W. GUSH,  
Medical Officer.

### CASE 13.

#### REPORT ON A CASE OF BLACKWATER FEVER AT COOMASSIE.

European (official), age 32.

##### I. *Locality.*—

(a) *Physical features.*—Coomassie is about 800 feet above sea-level. Built in a series of small huts, divided from each other by swamps. The swamps surrounding the locality occupied by the non-commissioned officers of the Gold Coast Regiment, and most of the civil population, have been well drained. Bush has been cleared for 600 yards in the vicinity of the patient's residence outside this area in dense forest. Climate at this time of the year is very damp, as much rain has been falling for the last two months, *i.e.*, August and September.

(b) *Case series.*—I can find no record of a series of cases in any one building except in the Bank of British West Africa. This is a comparatively new building, well built as lately as 1907. There was a case here in June, 1912, and another in April, 1913. This building is nearer the native town than that of the patient's.

A non-commissioned officer of the Gold Coast Regiment died in the same room as the patient was living in, in 1904, but the cause of death was not blackwater fever.

(c) *Intercourse with natives.*—As regards intercourse with natives, the patient had, I should think, only the same amount of intercourse with natives that other Europeans have. He was brought into contact with them during his work.

(d) *Insect fauna.*—The patient's quarters have been carefully searched by the Medical Officer of Health (Dr. O'Brien) and myself, and no insect fauna which could possibly communicate blackwater fever were found. There were no mosquitoes or biting flies or bugs, &c., to be found.

The Medical Officer of Health informs me that *Anopheles costalis* is the most common mosquito here.

*Previous and personal history.*—Previous illness: nothing worthy of mention.

Patient is aged 32, unmarried. Has been 14 years in the Army. Has not been in India or Egypt.

He was in South Africa one year in 1902, in East Africa, 1907-1909, and, although he admits having had a little fever there, has never been on the sick list. It is noteworthy, perhaps, that he was only 2½ months in England before coming here. He has almost completed his third period of twelve months in West Africa; he has been in Kintampo for (two) periods of five months each, and in Zouaragu for nine months of this his third tour.

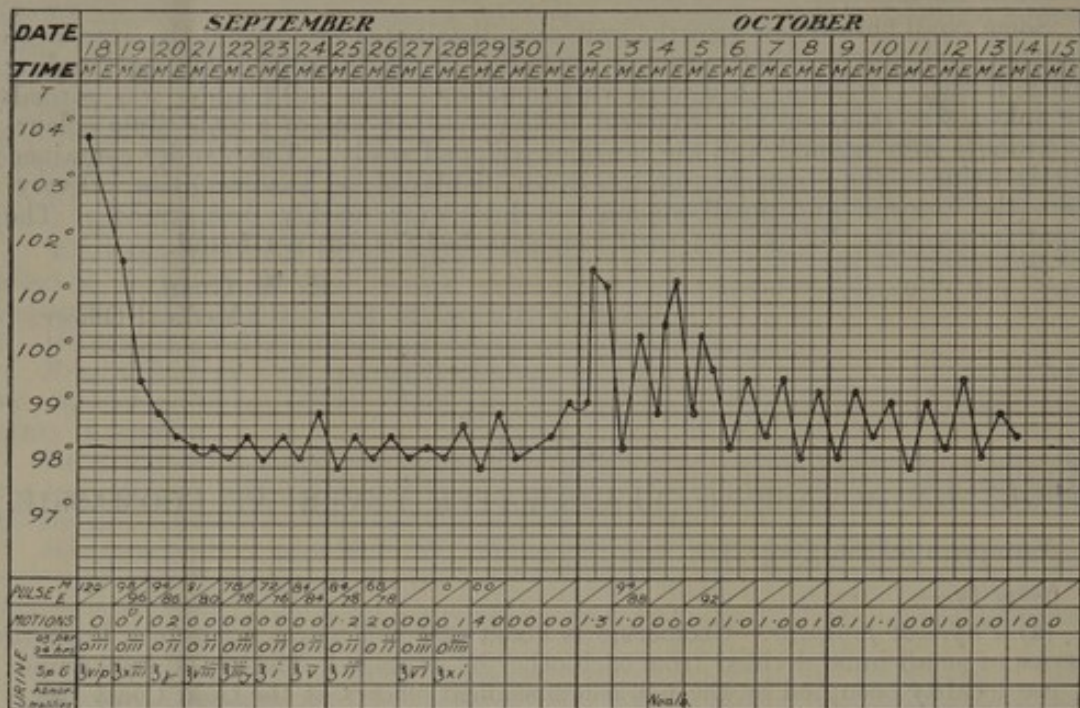
*Attacks of malaria.*—None till his second tour, when he states that he had an attack of fever which has lasted a month, and necessitated his transfer to Coomassie. He was quite well during this tour till his return from Zouaragu, in the Northern Territories, in the August of this year (1913), and was seized with his attack of blackwater fever on the 18th September, 1913, about one month after his arrival.

*Quinine taking.*—He says that he has taken 10 grains euquinine almost regularly twice a week since he has been in West Africa.

*Personal history.*—Temperate and sober. As a rule in bed early every night.



Has been out in the sun a good deal. Has always been careful as regards his mosquito net, but says that he can remember getting mosquitoes in his net on occasions before this illness. Takes his meals regularly.



*History of illness.*—Dr. Montgomery, Provincial Medical Officer, reports as follows:—

At 6 p.m. on the 10th September I was called to see patient as he was not feeling well. When I saw him he had passed about two pints of porter-coloured urine. His temperature was 104°, and he was admitted into hospital at 8 a.m. For about ten days before he went sick he was feeling unwell, and had no appetite. On the 18th after lunch he lay down, and at 3 p.m. he had a rigor, and after an hour he passed black water. He had taken 10 grains euquinine that morning before breakfast. He had not taken any euquinine, with the exception of the above-mentioned dose, for the ten days before his illness.

*Blood count:—*

	Per cent.
Polymorphonuclears	50·9
Mononuclears	44·15
Transitionals	2·88
Eosinophils	1·19

19th September.—Patient had a restless night, he passed over a pint of porter-coloured urine during the night. Temperature coming down, and there was only a slight inclination to vomit.

21st.—Urine nearly clear-coloured, but albumen still present. Was put on Easton's syrup twice daily, and the modified Sternberg treatment stopped. His rectal injections of normal saline, each containing a pint, of which he was getting three a day, were discontinued.

23rd.—Albumen disappeared from urine.

24th.—Observed a slight rise of temperature at night, and he was given three grains quinine in solution, and an enema and purgative next morning.

25th.—His jaundice, which was only slight and apparent since 20th, has passed away. No parasites were found in his blood.

26th.—Patient going on well, and put on increased diet.

29th.—Patient still weak and bloodless, and has not got out of bed yet.

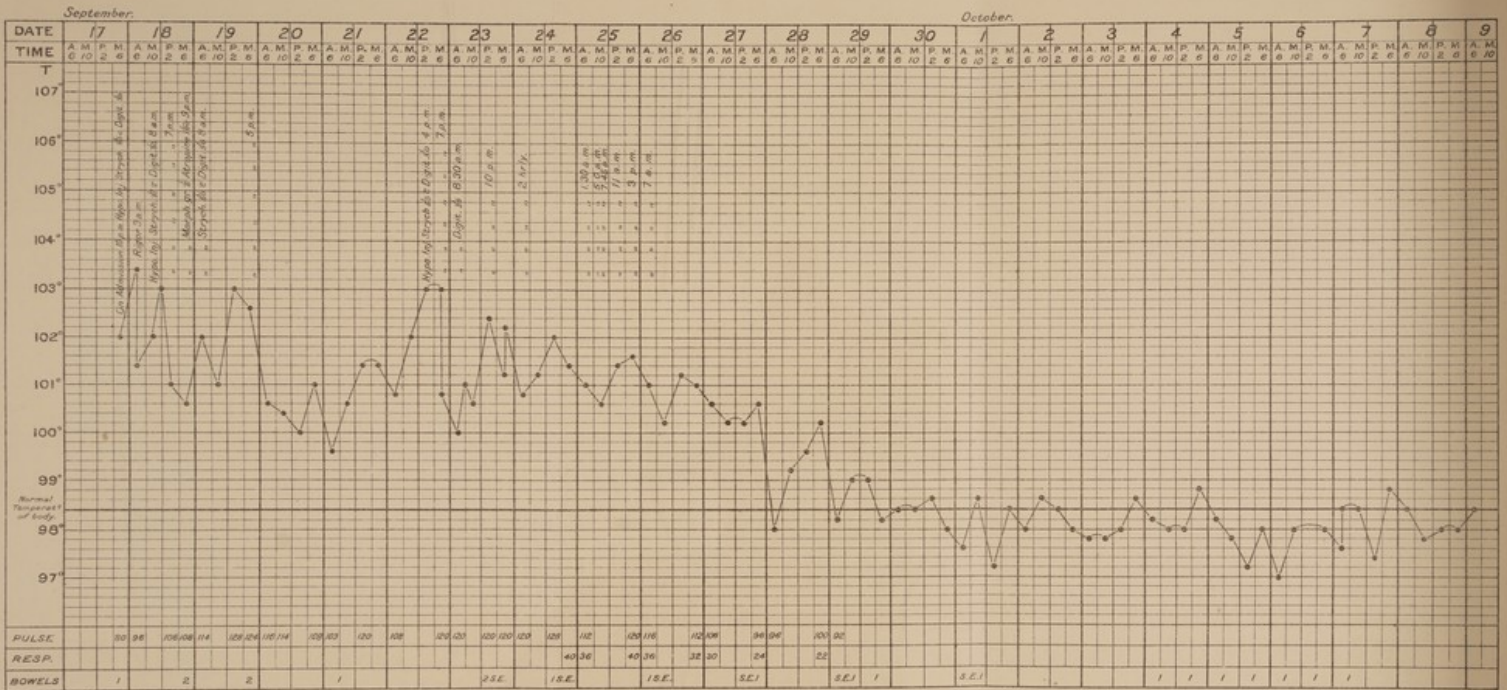
October 1st.—Case taken over by me, and a note made that patient was going on well.

2nd.—Slight rise of temperature at night, and on 3rd temperature at night rose to 101·6° after slight rigor. Pulse 88-94. Tongue clean, felt no discomfort. Urine continued free from albumen, and it was acid in reaction.



10220

CASE 14.





4th.—Morning temperature 98·6. Blood: no parasites. Spleen much enlarged, and liver slightly so. Bowels very constipated. Easton's syrup stopped, and 20 grains quinine ordered in divided doses, with zi. mag. sulph., and 10 grains salol. pil: hydrarg: grains V, at night. Diet reduced.

5th.—For temperature see chart. Still obstinate constipation. Urine: no albumin. Blood: no parasites.

6th.—Temperature still elevated at night. Several very foul stools after morning enema.

9th.—Still an evening rise of temperature, which continued till 14th. Patient otherwise comfortable.

14th.—Invaliding Board held.

17th.—Proceeded Sekondi. Invalided to England.

F. S. HARPER,

Acting Provincial Medical Officer.

#### CASE 14.

##### REPORT ON A CASE OF BLACKWATER FEVER AT SEKONDI.

European (non-official), age 27.

#### I. *Locality*.—Sekondi.

(a) *Physical features*.—Fairly up-to-date drainage and sanitation. No bush and no swamp in the neighbourhood.

(b) No cases on record.

(c) Mosquitoes not numerous; anopheles, culices, stegomyiæ, glossinæ, rare; ticks, bugs, lice, fleas, &c., absent; residence formerly at an hotel. Cases of malaria are frequent.

#### II. *Seasonal variation*.—

End of rainy season. Not much rain, but ground has lately been rather saturated.

#### III. *Personal History*.—

(a) Patient came to the Gold Coast five years ago. This is the sixth month of his fourth trip.

He states he has had no malaria since 1910, and that he has been in the habit of taking 20 to 25 grains of quinine weekly.

(b) Has been in Sekondi all this tour with exception of ten days' visit to Cape Coast Castle six weeks ago.

(c) Blood examination within few hours of onset of hæmoglobinuria.

	Per cent.
Polymorphonuclears	69
Lymphocytes	11
Large mononuclears	20

Quartan and tertian parasites. Subtertian scanty. One pigmented leucocyte. Total, 4,000,000.

Leucocytes, 16,500.

Hæmoglobin index, 80 per cent.

*Present illness*.—He was admitted at 10 p.m. on 17th September, 1913. Slightly jaundiced and temperature 102°. Spleen and liver not enlarged. He had a rigor during his first night. He was treated with saline injections, liquid by the mouth, hypodermics of digitalin and strychnine. Bowels were emptied as required by enema.

Progress was at first satisfactory. Urine cleared on fourth day.

On 23rd September, 1913, he was still extremely anæmic.

Hæmoglobin index only 10 per cent.

Condition on 24th September, 1913, was very alarming. Respirations rose to 48 per minute, pulse 120 and thready, and he was delirious.

Nutrient enemata were given, brandy by the mouth, in addition to saline injections, hypodermics of digitalis were given three hourly. His condition slowly improved, but remained very serious for two days more. He was discharged from hospital on 9th October, 1913, still very anæmic. He left for home a few days later.

E. W. GRAHAM,

Senior Medical Officer.



## CASE 15.

## REPORT ON A CASE OF BLACKWATER FEVER AT CAPE COAST.

Syrian (trader), age 30. Female.

I. *Locality.*—

(a) One of the best positions in the mercantile part of the town. Cement drains round the house; no bush near. Roomy house, situated at a corner.

(b) No other cases have occurred in or near the present one. Native dwellings near at hand, and constant intercourse with natives owing to business relations. Lives with her husband and two small children. The latter have frequent attacks of fever.

(c) Personal habits of this family very clean—no lice, &c., observed. Mosquitoes rarely in evidence.

II. *Seasonal variation.*—

Close of an exceptionally wet season. Not heavy rains, but light showers of almost daily occurrence. Unusually cool.

III. *Personal history.*—

(a) Resident on the Gold Coast for the past five years. Small attacks of fever about every four months, for which she took liquid quinine obtained from a native qualified practitioner (dosage unknown). No history of any specific disease or previous kidney trouble. Total abstainer. Apart from the recurring attacks of fever above mentioned, she felt quite well until the evening of the 28th September, when she suddenly had a rigor, followed by strong fever. Took some liquid quinine (dose unknown) and sweated profusely. Urine said to be as usual—ordinary colour.

DAY OF MONTH	OCT.			
	30	1	2	3
DAY OF DISEASE	3	4	5	6
TIME	M	E	M	E
T.				
101°				
100°				
99°				
98°				
97°				
PULSE M	96	80	72	70
E	92	87	70	22
MOTIONS	0	1	1	1
os. per 24 hrs	30	40	51	54
Sp. G.	1026	1018	1020	1050
Reaction	AC	AC	AC	AC
Abnor. Hglobin malities	Trace			
U. Albumen				
Hyaline Casts				



Fever continued throughout the 29th, and it was not until the morning of the 30th that she noticed her urine was bright red, and sent for medical aid. Bowels had been regular, and the motions normal in appearance.

She said she had vomited twice some thin, yellowish fluid.

(b) Has not been out of Cape Coast for the past five years. Subject to hard conditions, as she has entire charge of her two children, in addition to long hours working in her husband's store.

(c) Blood examinations: No parasites found. Polymorphonuclears, 20 per cent. This was the condition on the third day of the disease, and remained so during the following three days.

#### IV. *Clinical history.*

First attack of blackwater fever.

1st day.—Skin moist, no jaundice. Tongue moderately furred all over. Nausea, but no vomiting. Pain in loins and back. Spleen considerably enlarged, reaching two inches below the costal margin. Liver, normal. General condition highly neurotic.

Urine: Claret-coloured. S. G. 1026. Trace of albumen. No blood corpuscles, but hyaline casts present. Hæmoglobin present. In twenty-four hours, 30 ounces.

2nd day.—Slight jaundice and anæmia. No pain in loins or back. Headache. No vomiting; motions normal. Urine clear, but bile tinged. No albumen or hæmoglobin. In twenty-four hours, 40 ounces. General condition much improved.

3rd day.—Everything normal. Feels well, but weak.

4th day.—Improvement maintained. Iron and strychnine tonic, to be followed by regular doses of quinine later. No further visits paid.

*Remarks.* A slight attack, lasting altogether, as regards the hæmoglobinuria, only two days. I enquired on the 13th October, and heard that she continued quite well, no relapse having occurred.

T. H. DUGON,  
Medical Officer.

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### CASE 16.

#### REPORT ON A CASE OF BLACKWATER FEVER AT ACCRA.

European (official), age 34.

#### I. *Locality.*

(a) Flat grassy land—no bush. No native dwellings near.

(b) No other case in the district.

(c) Mosquitoes, few.

Anopheles.

Culex.

#### II. *Seasonal variations.*—

Usual climatic conditions for the time of the year, occasional shower. No rain in the month of September. Temperature running between 79° and 84°.

#### III. *Personal history.*—

(a) Was in the habit of taking 5 grains of quinine daily, and wearing mosquito boots in the evenings.

Had frequent attacks of fever during the last three or four months for a day or two at a time, but continuing at his work.

(b) His work obliged him to be making short trips to the bush behind Accra during the last few months for a few days at a time.

(c) Blood smears on admission to hospital showed subtertian malaria parasites in large quantity. Hæmoglobin for some hours before death was down to 10 per cent.

The patient was first seen at the consulting room of the hospital on the morning of the 8th of October, 1913, complaining of having had fever all night and aching all over. On taking his temperature it was found to be  $103.4^{\circ}$ , and he was admitted to hospital at once.

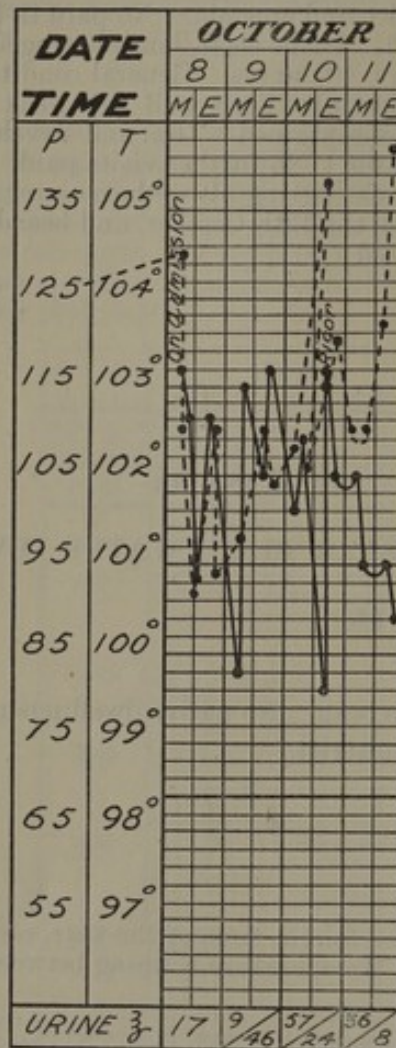
Blood examination showed numerous subtertian parasites. Spleen slightly enlarged.

He was given diaphoretics and quinine, and his temperature came down to  $100.8^{\circ}$  during the day.

At 6.30 p.m. he had a slight rigor, and at 10.30 p.m. the urine he passed was noticed to be very black. He rested fairly well all night, and passed 8 ounces of black urine again at 6.30 in the morning, and at 8 o'clock there was a little vomiting of clear fluid.

During the ensuing twenty-four hours he passed sixty-five ounces of very black urine.

Treatment consisted of being kept at perfect rest, barley water, Brand's and Valentine's juices, fresh chicken soup, Perrier water, and saline injections every four hours, and fomentations to loins, and elevation of lower end of bed, and occasional hypodermic injections of morphia ( $\frac{1}{4}$  grain).



*Previous history.*—This is the patient's ninth month of his second tour on the Coast. From the records it is seen that he had been on the sick list on two occasions, during his first tour suffering from malarial fever.

He began the present tour in the Gambia Colony, and spent two months there, where he had ptomaine poisoning.

He then came to Cape Coast, where he was ill for nearly a month with sciatica. In June last he was working on the side of the Volta, where he says he got badly bitten by mosquitoes.



For the last three months his headquarters have been in Accra, but during that time he has been going up country, two days' march off, to different places and stopping away for two or three days at a time.

For the last two months he had been having attacks of fever for a day or two at a time about every two weeks, but never going on the sick list, and keeping at his work.

The present attack began really on the evening of the 4th instant, when he had a shivering fit followed by fever, and he thinks the fever has been constant since, although he kept going about at his work.

He says he has been a regular taker of quinine, 5 grains daily, and wore mosquito boots in the evenings.

3. During the 10th instant large quantities of black urine continued to be passed, over 80 ounces in the twenty-four hours, and at 12.30 p.m. that day he had a rigor lasting half an hour, and later on some vomiting of clear fluid, but on the whole he retained his nourishment very well, also the saline injections. On the 11th conditions remained much the same, the urine was lighter in colour, but still black, but there was more vomiting of yellow and green coloured matter. He became very blanched in appearance, and for a few hours before death was almost unconscious.

During the day the blood smear showed only about 10 per cent. of hæmoglobin, and he died at 9.30 in the evening, death being due to hæmorrhage.

C. B. HUNTER, Senior Medical Officer,  
Colonial Hospital, Accra.

#### CASE 17.

#### REPORT ON A CASE OF BLACKWATER FEVER AT ACCRA.

European (non-official), age 36.

##### I. *Locality.*—

(a) Weshiang; waterworks; river and low-lying ground; flooded for the last three months; bush sparse.

(b) Last case in the same locality occurred six weeks before this one.

(c) Mosquitoes and other biting insects numerous—

Anopheles.  
Stegomyia.  
Culex.  
Tabanidæ.  
Muscidæ.

##### II. *Seasonal variations.*—

Usual climatic conditions for the time of the year, dull with frequent showers. Temperature running between 75° and 80°.

##### III *Personal history.*—

(a) Been on the West Coast since January last; during last four months had fever about every three weeks for two or three days at a time. Was in the habit of taking 5 grs. quinine daily. Sleeping in native-built huts under mosquito net.

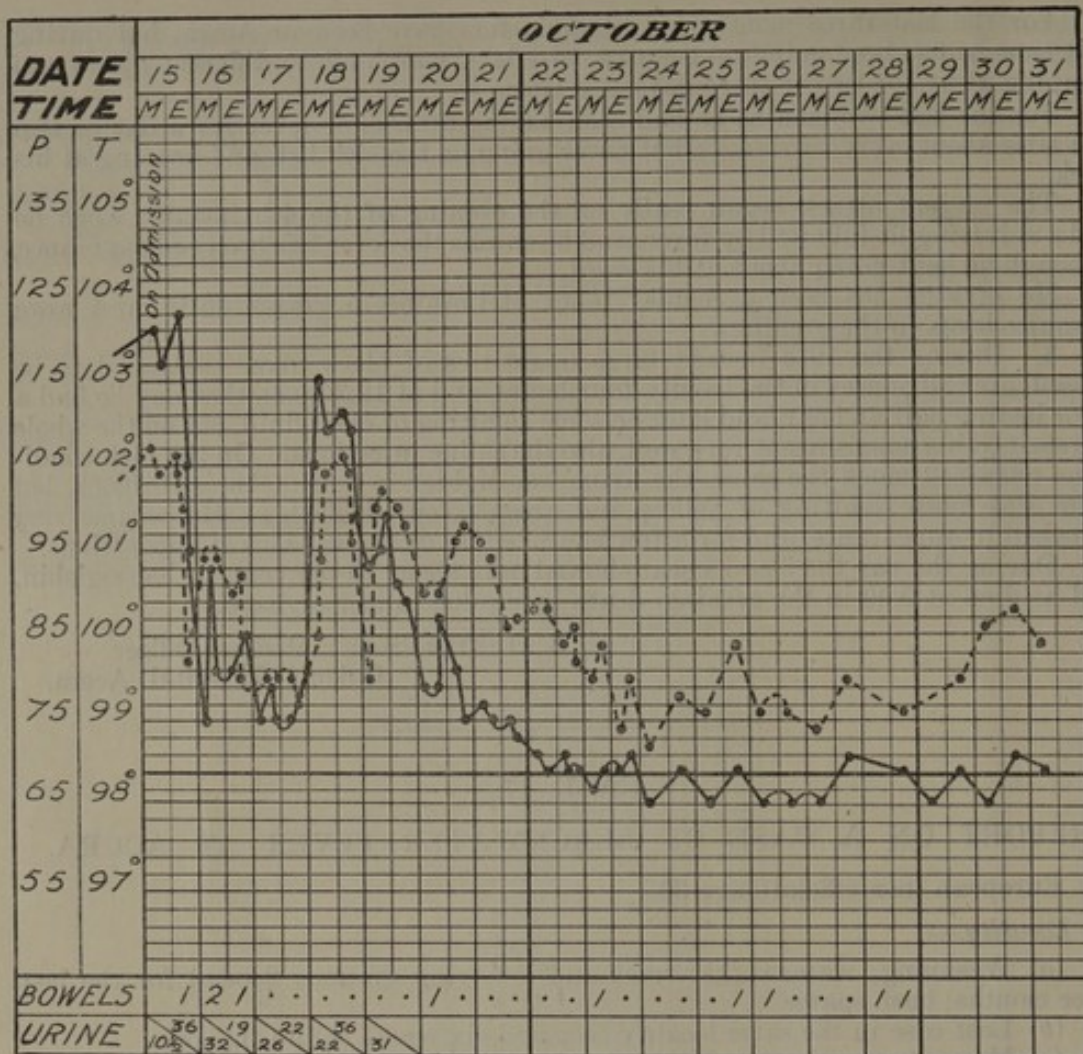
(b) Blood smears negative for malaria parasites.

The previous two years he had spent in Egypt, when he had good health; since coming to the Coast he has been working at the waterworks, Weshiang, all the time. During the last four months he has been having attacks of fever about every three weeks for two or three days at a time; says he has been taking 5 grs. of quinine daily since coming to the Coast; sleeping under mosquito net, wearing mosquito boots in the evenings.

This attack of illness began on the morning of the 14th instant, the day before admission to hospital, where he had a severe headache with a temperature of 99°; by 5 p.m. the temperature was 102°, and he passed dark-coloured urine accompanied by a little vomiting. Had a very restless night, passing a good quantity of urine, containing a large amount of hæmoglobin; when brought into hospital there was a jaundiced appearance all over the body; temperature 103·6°, pulse 105. He passed 8 ozs. of urine soon after coming in; it was not the intense black colour often seen.

Blood examination did not show any malaria parasites.





*Treatment.*—Saline rectal injections 8 ozs. every four hours; a mixture of potas. acet. milk, barley water, Perrier water, and perfect rest.

About 10 p.m. the same day the urine began to get a lighter colour, also that passed at midnight.

16th.—At 2 p.m. he had a rigor, and the next urine passed was darker coloured again, which continued much the same until the evening, when it showed signs of clearing. He had been taking his nourishment well and retaining the saline injections; had only been sick once, vomiting a little yellow-coloured fluid, about 6 ozs. In the first twenty-four hours of being in hospital he passed 64 ounces of urine.

17th.—Had a good night, getting a fair amount of sleep. This morning, urine cleared up, a dark sherry colour. Temperature 99.4°, pulse 74.

18th.—About midnight the urine again became dark coloured, and the temperature went up to 103°, and he vomited 8 ozs. of green-coloured fluid; there had been no rigor.

18th.—During the afternoon the urine began to clear up again, and by the following morning (19th) it was light sherry coloured.

Taking his nourishment of milk, barley water, and Benger's food well, and getting a fair amount of sleep.

20th.—Jaundice passing off, had a good night, and feeling much better, but he is anæmic; hæmoglobin 40 per cent.

22nd.—Patient going on satisfactorily, urine normal, sleeping well, begins to take a little solid food.

31st.—Patient made good progress, walking about for the last five days, and left for Europe.

C. B. HUNTER,  
Senior Medical Officer.



## CASE 18.

## REPORT ON A CASE OF BLACKWATER FEVER AT CAPE COAST.

European, age 33 years.

I. *Locality.*—

(a) The bungalow is situated on a hill outside the town. The surroundings of the house are kept free from bush, and the drainage is excellent.

The office is situated in the midst of the native community, but the patient invariably left it by 5 p.m.

(b) This is the second attack of hæmoglobinuria that the patient has had in the same house within the last five months. (*Vide Case 5, ante.*)

(c) Personal habits very clean, but seldom, if ever, took quinine between his different attacks of fever. He often had small attacks of fever without calling for medical advice.

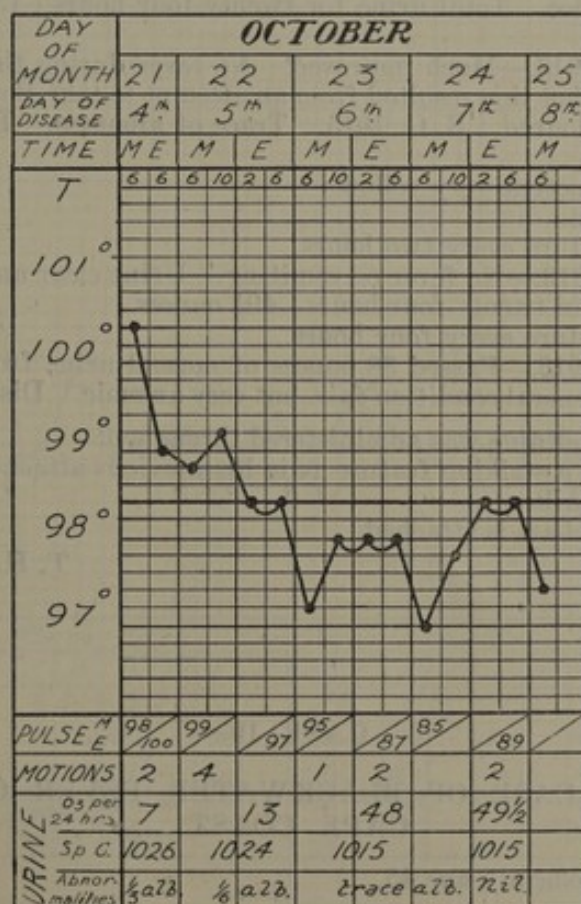
Owing to the good position of his house it is practically free from mosquitoes. I was unable to find any biting flies in the vicinity.

II. *Seasonal variation.*—

Close of an exceptionally wet season. Moderately hot.

III. *Personal history.*—

(a) Resident on the West Coast for the past twelve years. In 1909 he was invalided to England with remittent malaria, and during the voyage home had blackwater fever for the first time. In 1911 he was invalided home with anæmia, the result of malaria and hepatitis, having contracted lues in 1910. In May of the present year he had his second attack of blackwater fever, and at the beginning of this month (October) a sharp attack of hepatitis, with mild malaria, from which he had completely recovered by the 17th October.



On the morning of the 21st October he sent for me because he had passed some "blackwater." I saw him at 6 a.m. His temperature was then 100.4°, skin moist,



tongue furred, and brown all over except at the tip, scleræ and skin jaundiced, had vomited about six times during the night, and the bowels had acted three or four times. Both vomit and motions were full of bile—no blood. The liver could be felt three inches below the costal margin; the spleen was not enlarged.

No tenderness over the abdomen, no pain.

Headache slight, pulse full rate, 98.

*Urine.*—Quite black (like stout), and very thick, faintly acid. S. G. 1026, albumen, one-third. Hæmoglobin, hyaline and tubular casts, and a few red corpuscles were present.

*Blood.*—No parasites. Marked leucopenia. He stated that he had felt "seedy" a day or two previous, but had had no rigor.

(b) *Previous movements.*—Was always stationed in Cape Coast, from which he occasionally paid visits to other small towns within a short distance of Cape Coast. He never had occasion to spend the night away from the station. Not subjected to hard conditions.

(c) *Blood examination.*—As stated above on the first day, and no change of importance occurred during the subsequent days of his illness.

*Clinical history.* 21st October, 1913.—At noon on the first day of his illness the temperature fell to 98·2°. Pulse 80.

Vomiting occurred three times between 6 a.m. and noon, and the bowels acted twice; large quantities of bile were evacuated on each occasion. No further urine had been passed in spite of the consumption of six large bottles of Perrier water. At 5 p.m. he was brought into hospital, and passed three ounces of black urine soon after, this making a total of seven ounces during the previous twenty-four hours.

During the same night (21st) bilious vomiting occurred three times, and the bowels acted four times.

He slept fairly well.

The *treatment* consisted of Sternberg's mixture every hour, hot sand bags to the back and loins, and Perrier water *ad lib.*

22nd October, 1913.—General condition better, but urine still black.

Vomited bile once. Total urine for twenty-four hours—13 ounces, containing one-sixth albumen.

23rd October, 1913.—Much improved. No fever during the day.

Vomited twice, but this resulted from an attempt to take Bovril.

Urine claret-coloured. S. G. 1015. Trace of albumen. Total in twenty-four hours—48 ounces.

Skin and conjunctivæ very yellow.

Marked anæmia.

Sternberg's mixture every two hours.

24th October, 1913.—No fever or vomiting. Urine clear and of normal colour; no albumen. Total in twenty-four hours—49½ ounces.

Sternberg's mixture every four hours.

25th October, 1913.—Passed 38 ounces of normal urine from 6 p.m. yesterday to 6 a.m. to-day. General condition fair, but very anæmic. Discharged to-day.

*Remarks.*—No quinine was administered throughout.

Leucopenia was a striking feature as in his previous attack of hæmoglobinuria, recorded by Dr. Hamilton.

A temperature chart is attached.

T. H. DUGON,  
Medical Officer.

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#### CASE 19.

### REPORT ON A CASE OF BLACKWATER FEVER OCCURRING AT CAPE COAST.

European (non-official), age 45.

#### I. *Locality.*—

(a) House situated on sea-front, freely exposed to the prevailing breeze. No swamp or bush in the vicinity. Surroundings well drained.



(b) No history of other cases in this house or near at hand. Numerous native dwellings are situated at the back and west sides of the house, but there is a large open space on the east side. Intercourse with natives is frequent owing to trade relations.

(c) Biting flies, ticks, &c., are entirely absent. Mosquitoes only seen occasionally.

II. Seasonal variation.—

(a) Marked dryness—no measurable quantity of rain having fallen for the past seven weeks. Strong harmattan has prevailed most of this time.

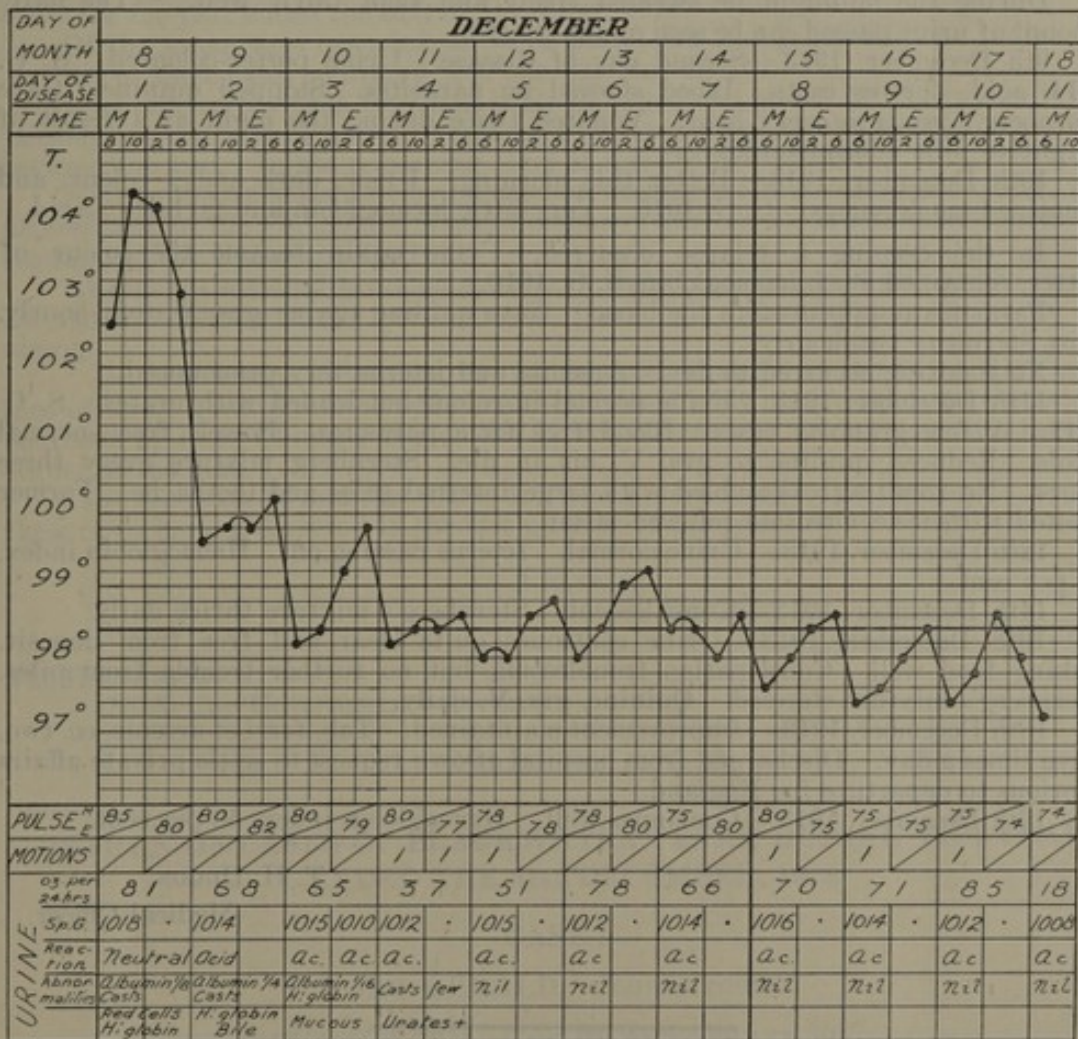
III. Personal history.—

(a) A man of exceptionally strong physique. He states that he has had no attacks of fever previously, or any other illness since childhood.

Quinine he took but rarely. States he took 5 grains on the 7th instant.

(b) First experience of the tropics; lived in London for the past 25 years. Has just completed twelve months on the Coast, eight of which have been spent in Cape Coast, and four at Dunkwa (20 miles up the Prahsu road). He has been living in Cape Coast for the past six months. His habits are strictly temperate, but he has greatly overworked himself, and confessed to recent family worries. He has stinted himself of good and general domestic comforts, although living with his two European assistants.

(c) Microscopic examination of the blood. See clinical report below.



IV. Clinical history.—

Felt quite well on the night of the 7th December. On the morning of the 8th he took "salts," which acted at 7 a.m. Then noticed that his urine was black. The stools were free, but he did not observe their colour. His assistants remarked at



once his yellowness, and sent him up to the hospital, where he arrived at 8 a.m. collapsed, shivering, and with a temperature of 102.6°. He immediately vomited a few ounces of light yellow fluid, probably the result of the salts he had taken.

He was given an ounce of brandy, put to bed between blankets, and forthwith began to sweat profusely.

He stated that he had felt "shivery" ever since rising that morning.

The skin was bright yellow, but the scleræ less so. He was drowsy, had slight frontal headache, but no pain.

The tongue was covered with grey fur, except at the lateral edges.

Slight tenderness over the liver, but no enlargement. The spleen could be felt extending two inches below the costal margin, but there was no tenderness.

A hæmic bruit was audible over the pulmonary area of the heart. The pulse full but soft.

*Urine.*—Stout-colour. S. G., 1018. Albumen, one-eighth. Large quantity of granular and hyaline casts. Many red corpuscles. Only a trace of bile, but much hæmoglobin.

*Blood.*—Subtertian ring parasites. Great increase in number of large mononuclears. Red corpuscles pale.

*Treatment.*—Liquid quinine, grs. V., four-hourly, until four doses had been taken—20 grs. per diem. He retained this well if given well diluted. In the ordinary strength of 5 grs. to the ounce he vomited it at once.

Milk diet, Perrier water *ad lib.*

During the midnight he sweated freely and slept fairly well. (The daily amount of urine passed can be seen on the chart.)

9th December, 1913.—Second day of disease. Urine porter-coloured. S. G. 1014, acid. Fewer casts. Blood showed no parasites. Stopped quinine. Gave Sternberg's mixture every hour. Vomited twice during the night as a result of purgative pills administered.

10th December, 1913.—Better this morning. Urine, dark amber colour, and contained much mucus. S. G. 1015. Very little hæmoglobin and no bile. Acid.

In the evening a relapse occurred. Urine again became the colour of porter, contained much hæmoglobin, S. G. 1010.

Parasites re-appeared in the blood. Gave quinine again—grs. V. four-hourly. Mist Sternberg two-hourly.

No vomiting occurred to-day. Anæmia and icterus very pronounced.

11th December, 1913. Urine normal in colour but loaded with urates. S. G. 1012. A few granular casts. Blood free from parasites. Bowels free—normal stools. Reduced quinine to grs. V. bis in die. Sternberg mixture every three hours. No vomiting. Troubled with large internal piles and toothache. Former treated with ice. Creosote relieved latter.

12th December, 1913.—Urine normal. Icterus passing off. Hæmoglobin index, 30 per cent.

14th December, 1913.—Convalescent. Sternberg's mixture thrice daily.

16th December, 1913.—Urine continues quite clear and free from deposit. Taking food well. Constipation troublesome, but no further trouble from piles. Sternberg's mixture stopped. Quinine, grs. V. daily.

18th December, 1913.—Improvement maintained. Tab. ferri et arsenic. co. two, three times a day. Discharged from hospital at own request to settle private affairs previous to departure for England.

19th December, 1913.—Continues well. Hæmoglobin index, 50 per cent.

T. H. DUGON,  
Medical Officer.



## NYASALAND.

THE GOVERNOR to THE SECRETARY OF STATE.

(Received 10th March, 1914.)

Government House, Zomba, Nyasaland Protectorate,

SIR,

31st January, 1914.

I HAVE the honour to transmit the annual report on cases of blackwater fever in the Nyasaland Protectorate during the year ended the 31st of December, 1913, together with a map\* showing the localities in which the cases occurred.

2. Since the present report is rendered in respect of the calendar year, instead of the financial year as heretofore, it includes three cases (Nos. 1, 3 and 4) which occurred during the last quarter of the financial year 1912-13, and were reported on in the return for that year.

I have, &c.,

G. SMITH,

Governor.

Office of the Principal Medical Officer, Zomba,

SIR,

Nyasaland Protectorate, 21st January, 1914.

I HAVE the honour to submit, in triplicate, a return of cases of blackwater fever for the year ended the 31st of December, 1913.

Of the seven cases recorded, all were males; six Europeans and one Indian.

Six of these cases recovered, and one (Indian) died.

It is noteworthy that four had previously had one attack of blackwater fever, periods of 14 months, 7 years, 7 years, and 10 years, respectively, having intervened between the two. In the remaining three it was the first attack.

Four of the patients were by occupation planters; one a Portuguese officer; one an employee of the Portuguese Nyasa Company; and one an assistant stationmaster (Indian) of the Nyasaland Railway.

As regards seasonal prevalence, three of these cases occurred during the rains; one shortly after the rains; two during the fairly cool, and one during the warm, dry season.

With reference to locality, five of the cases occurred in the Shiré Highlands (one of these, however, developed his attack immediately on arrival from the neighbourhood of Lake Chiuta); one on the Lower River; and one at the south-eastern border of the lake.

It is necessary to add that Cases 1, 3 and 4 were included in last year's return, these cases having occurred in the last quarter of the past financial year.

I have, &c.,

H. HEARSEY,

Principal Medical Officer.

The Honourable

the Acting Government Secretary.

### RETURN OF CASES OF BLACKWATER FEVER DURING THE YEAR ENDED THE 31ST DECEMBER, 1913.

#### CASE 1.

PORT HERALD. (LOWER SHIRÉ.)

(Vide [Cd. 7211], CASE 24, PAGES 29 AND 30.)

\* Not reproduced.



## CASE 2.

## BLANTYRE (SHIRÉ HIGHLANDS).

Male, aged 33; admitted 26th April, 1913.

I. *History*.—The patient has been 12 years in tropical Africa, and has resided nowhere else in the tropics. Of these 12 years eleven were spent on the Lower river, running a stern-wheeler, and one in the hills. During his first two years he had three severe attacks of malaria (bilious remittent). In 1906 he had blackwater fever. Since then, though he has frequently had slight fever, and felt seedy, he has never been actually laid up.

II. *Insects*.—Has been badly bitten by mosquitoes, but has no recollection of being bitten by other flies. Has been bitten by bugs in his present residence, but had not been bitten by them before his 1906 attack of blackwater.

III. He lives about 20 miles out of Blantyre. His house presents a remarkable health record, as follows:—

- (1) The original occupant died on the way home. He is said to have died of malaria.
- (2) The second occupant, an Italian, was found dead in bed by myself in 1906, having died about two hours before I reached him; his temperature when I saw him was 104°, and there was no doubt he died of severe malaria.
- (3) The third occupant suffered various severe attacks of malaria, and eventually died in Zomba Hospital from an attack of blackwater.
- (4) The present patient went to live there on the 20th August, 1912, and developed blackwater on the 26th April, 1913. At present the house is unoccupied.

IV. *History of present illness*.—Patient has taken quinine irregularly, when he "felt seedy." Before the present attack he took grs. X for three consecutive days. It is frequently the case that persons coming to the uplands from the lower levels regard them as quite healthy, and neglect quinine and other prophylactic measures.

Patient was admitted on the 26th April, 1913. Temperature 100°, pulse 72, much jaundiced. In six hours passed 30 ounces urine, very dark, port-wine colour. Blood examined, no parasites found. Liver and spleen both enlarged. Was ordered normal saline injections per rectum, three hourly, if awake.

27th.—Injections fairly well retained, but patient vomited twice and had a rigor; during the day his urine became clearer coloured and was copious, but patient was extremely restless. Was given milk and soda and plain soda only. Injections continued. At 6.45 p.m. I gave him morphia sulphate,  $\frac{1}{4}$  gr., hypodermically; after this he slept till 9.30, and after that dozed all night. Vomiting ceased.

28th.—He now retained fluid nourishment well and passed copious light-coloured urine. Four capsules oleum ricini given. This followed later on by an enema, which acted well. Again this night he had a hypodermic injection of gr.  $\frac{1}{4}$  morphia and slept well.

29th.—Saline injections were continued, chicken tea, Brand's essence, &c., given by mouth, all retained. Urine copious and light coloured, with a trace of albumen and hæmoglobin.

30th.—Slept well and asked for food. From now on the case steadily improved, and was discharged on May 14th. On the 5th May I again searched carefully for parasites, but failed to find any. Severe anæmia was present, and the patient was put on dialysed iron, from which he derived marked benefit. I regard this case as severe tropical blackwater with no complications.

A. H. BARCLAY, Medical Officer,  
Blantyre.

## CASE 3.

(*Vide* [Cd. 7211], Case 29, pages 33 and 34.)



## CASE 4.

(Vide [Cd. 7211], Case 30, page 34.)

## CASE 5.

MLANJE. (SHIRÉ HIGHLANDS.)

A planter, aged 35, 11th August, 1913.

I. *Locality*.—Ruo river is half a mile distant. Clearances of bush extend for a quarter of a mile on all sides of the house. A swamp is situated at 200 yards distance, and numerous larvæ—anophelinæ and culicinæ—were easily found. Elevation under 2,000 feet.

(b) Exactly two years previously the resident in a house 150 yards distant had an attack of blackwater. No native dwellings are within quarter of a mile. As an estate manager the patient is constantly coming into contact with natives.

(c) *A. costalis* and *stegomyia* were found in the house. *G. brevipalpis* has been reported within two miles. Stomoxys were numerous about a quarter of a mile distant.

II.—The time of onset was the cold season, maximum temperature about 70° F., minimum, 48°-50° F.

III.—(a) Previous attack of blackwater ten years before. This was followed by eight years of good health. Residence in tropics (North-Eastern Rhodesia and Nyasaland) of 13 years; first attack of blackwater occurred in the Red Sea on way to England. His occupation had always been indoors until this year.

(b) About 15 months ago, for two weeks, the patient suffered from malaria in Blantyre, and for the last three months, before the blackwater attack, he had not been fit. Otherwise he has enjoyed excellent health.

*Quinine*.—Five grains daily. Had not been taken with much regularity. His home conditions are of the best.

(c) *Blood*.—No examination was made while the blackwater continued, but on the fourth day the examination for malarial parasites was negative. On the twelfth day the examination was again negative.

*Treatment*.—Rectal salines four-hourly; sod. bicarb. and hydrarg. perchlor. (Hearsey's formula); fluid diet; alcohol was given on the fourth day in the form of champagne; quinine was begun on the twelfth day, and is being continued regularly.

ROBERT DRUMMOND,  
Medical Officer,  
Mlanje.

## CASE 6.

ZOMBA. (NEIGHBOURHOOD OF LAKES CHIUTA AND AMARAMBA.)

European (non-official), aged 40.

I.—(a) Patient has been employed for a number of months past surveying the Anglo-Portuguese boundary in the neighbourhood of the marshy lakes Chiuta and Amaramba. He states that he has not suffered from malaria during that time, and has taken no quinine.

(b) Other cases of blackwater fever have come during past years from this district, but I have no data about them.

(c) Mosquitoes and biting flies are very numerous in this district, including *Anopheles costalis*, *A. funestus*, *A. mauritanus*, *A. squamosus*, *A. maculipennis*, *A. transvaalensis*, *Stegomyia simpsoni*, *Mansonioides uniformis*, *Culex pipiens*, *C. quasigelidus*, *C. univittatus*, *Tabanus africanus*, *T. par*, *T. uniteniatus*, *T. tæniola*, *Hæmatopota pertinens*, *H. rubens*, *Glossina morsitans*, *Stomoxys calcitrans*.

II.—The case has occurred at the beginning of the rainy season when other cases are commonly seen.

III.—(a) Patient has spent many years in various parts of Africa, and has had several attacks of malaria at various times in the past, but not blackwater fever. He is an irregular quinine taker.



(b) Patient has been subjected to the vicissitudes of camp life for several months.

(c) The interesting feature in the case is the co-existence of a fairly heavy benign tertian malarial infection.

*History of case.*—Having completed his field work the patient came to Zomba to complete his work some ten days before being taken ill.

On evening of 29th November, 1913, he felt feverish, but thought nothing of it, but the following morning at 6 a.m. he took 10 grains of quinine in tabloid form—a little later he rose from his bed, had a shivering attack, and shortly afterwards, about 7 a.m., he passed "blackwater."

The bowels were open at 8 a.m., but there was no vomiting, and patient did not feel very ill.

He was seen by me at 10.30 and admitted to hospital at noon.

On admission: A well-nourished man with above history, but no symptoms. Temperature, 102.4° F.; pulse 120. Very slight icteric tint to conjunctivæ.

On examination: Physical signs over chest and abdomen normal, with the exception of enlargement of the spleen, which reached three inches below the costal margin. Heart sounds rather soft and of tic-tac rhythm.

Urine of a bright cherry colour; sp. gr. 1020; acid; no deposit; a small amount of albumen present; no sugar.

Microscopically: No red cells present; spectroscopic examination revealed the typical spectrum of oxy-hæmoglobin; guaiacum test for blood very slight.

Examination of the blood revealed a fairly heavy infection, with benign tertian malaria parasites. No leucocytosis. In the evening a rigor occurred lasting half an hour, during which the patient vomited four times; he perspired freely throughout, and the temperature fell from 100° to 99°.

The further history of the case is uneventful; the temperature never rose above 99° after the first two days, and was normal from the sixth to the eleventh days. The pulse gradually slowed down from 120 to 80 per minute, and improved in tension.

The spleen gradually receded under the costal margin, but was still just palpable when he left hospital.

The jaundice which, while most evident on the third day, was never more than slightly marked, disappeared by the sixth day.

The urine measurement remained good throughout under treatment at about 60-70 ounces. It commenced to clear on the fourth day, and remained clear after the fifth day. Frequency of micturition was rather troublesome at first, but cleared up later.

On the tenth day patient's demands to be discharged from hospital were acceded to under protest, from which date he was lost sight of.

He was advised to commence taking quinine in a week's time, beginning with one grain a day, working up to 15 grains a day.

The changes in the blood picture were those of progressive anæmia, the number of red cells rapidly being diminished, with the occurrence of shadow forms, polychromatophilia, poikilocytosis, and nucleated cells, with an increase of the epithelioid type of mononuclear white cells. Malaria parasites became increasingly difficult to find after the third day. Only one cell was noticed containing what might have been a cell inclusion. No other malaria or other parasites were noted.

The treatment consisted of rest in bed with use of bed pan; the administration of calomel at the commencement; milk and chicken broth diet, plus three pints of water per diem containing two drams of sodium bicarbonate to the pint.

H. S. STANNUS, Medical Officer,  
Zomba.

## CASE 7.

### FORT JOHNSTON.

A trader, age 32.

Admitted to Fort Johnston Hospital at 4 p.m., May 13th, 1913.

He came into hospital after a journey of nine hours by machila.

He said his illness commenced on Saturday, May 10th, on which day he had a.



severe rigor, and afterwards got very hot; on passing water he noticed his urine was dark.

The following day, May 11th, he had another severe rigor. On May 12th (the day before admission) he took a dose of Epsom salts, which, he says, worked his bowels very well.

About six days before the beginning of the present attack he felt out of sorts and took a tabloid of quinine (?5 grains).

After this he took no drugs of any sort until he took the Epsom salts on the 12th.

*Past history:—*

Patient has been fourteen months in Africa—this being his first tour of African service.

Since coming to Africa he has had frequent attacks of fever; he reckons he has had an attack about every three months.

He had dysentery about a year ago.

He had lues some years ago.

He uses a mosquito net.

He does not take quinine as a prophylactic measure, but takes it when he feels the fever abating after an attack.

*Present illness:—*

On admission his pulse was 66 and his temperature 100·8° F.; jaundice was very marked; there was no apparent enlargement of liver or spleen.

Just after admission he passed three and a half ounces of very dark red urine.

He complained of epigastric, hypogastric, and lumbar pains. Epigastric tenderness was noticeable.

Headache was also present.

*Continuation and course of the illness:—*

*Urine.*—The first specimen of urine passed was very dark red in colour—much deeper than port wine—and on standing separated into the usual greyish and red layers.

The sediment of the greyish layer contained much epithelium, also hæmoglobin granular casts, and hyaline casts. The colour gradually cleared in succeeding specimens until on the morning of the 15th it was quite free from hæmoglobin.

The hæmoglobin re-appeared, however, in a specimen passed at 11 a.m., and then disappeared until the 23rd, the fourteenth day of the disease, when there was another paroxysm.

Albumen was present in the urine until May the 30th, when it finally disappeared. It was never present in any great quantity, and could not be measured by the albuminometer.

The quantity of urine passed was always abundant.

*Blood examination.*—Slides were made (both fresh and stained) on May the 14th and again on May 17th.

No malaria parasites were found.

*Jaundice.*—The icterus reached its maximum intensity on May 14th, and gradually faded, finally disappearing about May 30th.

There was, however, a marked increase in intensity after the hæmoglobinuric relapse of May 23rd.

*Vomiting.*—This was never a very severe symptom in this case.

*Treatment.*—The patient all along took liquids—water and milk—well, and passed copious quantities of urine, so that treatment by rectal salines was deemed unnecessary.

Sodium bicarbonate in ten grain doses was given on May the 14th, 15th, and 16th, with a view to correct any tendency to vomit or retch, and was then discontinued.

For the lumbar and abdominal pains hot water bottles and mustard leaves were used. Quinine, magnesium sulphate, and morphia were administered.

*Locality.*—The disease was contracted in Portuguese territory.

R. BURY, Medical Officer,  
Fort Johnston.



## GAMBIA.

THE GOVERNOR to THE SECRETARY OF STATE.

(Received 30th January, 1914.)

SIR, Government House, Bathurst, Gambia, 10th January, 1914.  
I HAVE the honour to inform you that no cases of blackwater fever occurred in the Gambia during the year 1913—*vide* Dr. Mayer's report, enclosed herewith.

I have, &c.,  
H. L. GALWAY,  
Governor and Commander-in-Chief.

### ANNUAL REPORT ON BLACKWATER FEVER, GAMBIA, 1913.

THE HONOURABLE THE COLONIAL SECRETARY, Bathurst, R.G.  
No case of blackwater fever occurred in this Colony or Protectorate in 1913.  
T. F. G. MAYER,  
Acting Senior Medical Officer.

Medical Office,  
Bathurst, R.G.,  
10th January, 1914.

## UGANDA PROTECTORATE.

### REPORT ON CASES OF BLACKWATER FEVER DURING THE YEAR 1913.

Blackwater fever shows an increased incidence during the year in proportion to the increase in susceptible population,\* but the mortality is rather below the average for the four preceding years.

There were 58 cases reported during the year, of which 12 were fatal, giving a death-rate of 20 per cent. Of these 35 were returned by Government Hospitals and 23 (excluding five also returned by Government Hospitals) by the Church Missionary Society's Hospital at Kampala.

The figures for previous years have been as follows :—

1909	...	...	21 cases with 6 deaths, mortality 28·5 per cent.
1910	...	...	26 " " 6 " " 23·0 "
1911	...	...	18 " " 3 " " 16·6 "
1912	...	...	45 " " 9 " " 20·0 "

*Sex.*—Of the total cases two were females and 56 males.

*Age.*—There were three children, aged 4, 7, and 13, respectively, and the remaining cases varied in age from 19 to 60, but were chiefly young adults.

*Nationality.*—There were 19 Europeans and 39 Asiatics.

*Deaths.*—There were two deaths among Europeans and 10 among Asiatics. Of the European cases four were in Government employ, of which none were fatal, and of the Asiatic cases 12 were in Government employ and two were fatal.

\* In 1913 the European and Asiatic populations were 823 and 3,110 respectively. In 1912 they were 640 and 2,216 respectively.



*Locality.*—Some relation of attacks to surroundings appears to be shown in Kampala Township. In the Indian Bazaar at Kampala 11 cases occurred, and in the Asiatic Clerks' quarters five cases. The general conditions in the Indian Bazaar at Kampala were insanitary, and included constant exposure to malarial infection and overcrowding. Pools of stagnant water, which have since been filled up, existed during the year near the Asiatic Clerks' quarters, and in addition most of the clerks have friends in the bazaar, and visit it after sundown. Malaria was very frequent during the year, both in the bazaar and in the clerks' quarters. In the vicinity of Kakindu, on the Nile, which is known to be a very malarious district, five cases originated. The other cases were scattered, and beyond what has been stated above no definite relation of an attack to any particular class of surroundings was shown. In 42 cases the disease appears to have been contracted in a town or station, and in 16 in outlying districts, or while travelling.

Two cases occurred in the same house at Jinja in August and October, respectively.

All the patients had been exposed to the bites of mosquitoes, including anopheles, and some had also been exposed to the bites of simuliidæ, stomoxys, *Ornithodoros moubata*, and other insects. In one case it was suspected that tick fever was concurrent with the attack of blackwater fever. (See Appendix No. 1.)

The following chart shows the stations from which cases of blackwater fever were returned, and the months in which they occurred:—

*Blackwater Fever Chart, 1913.*

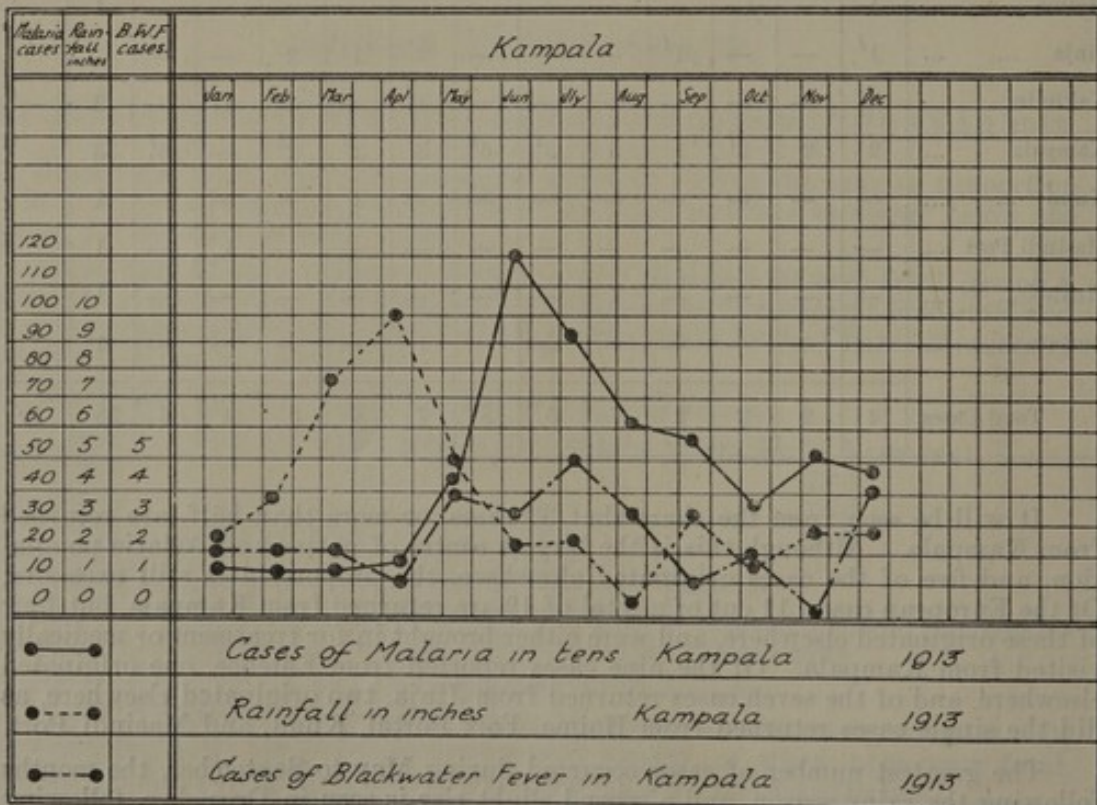
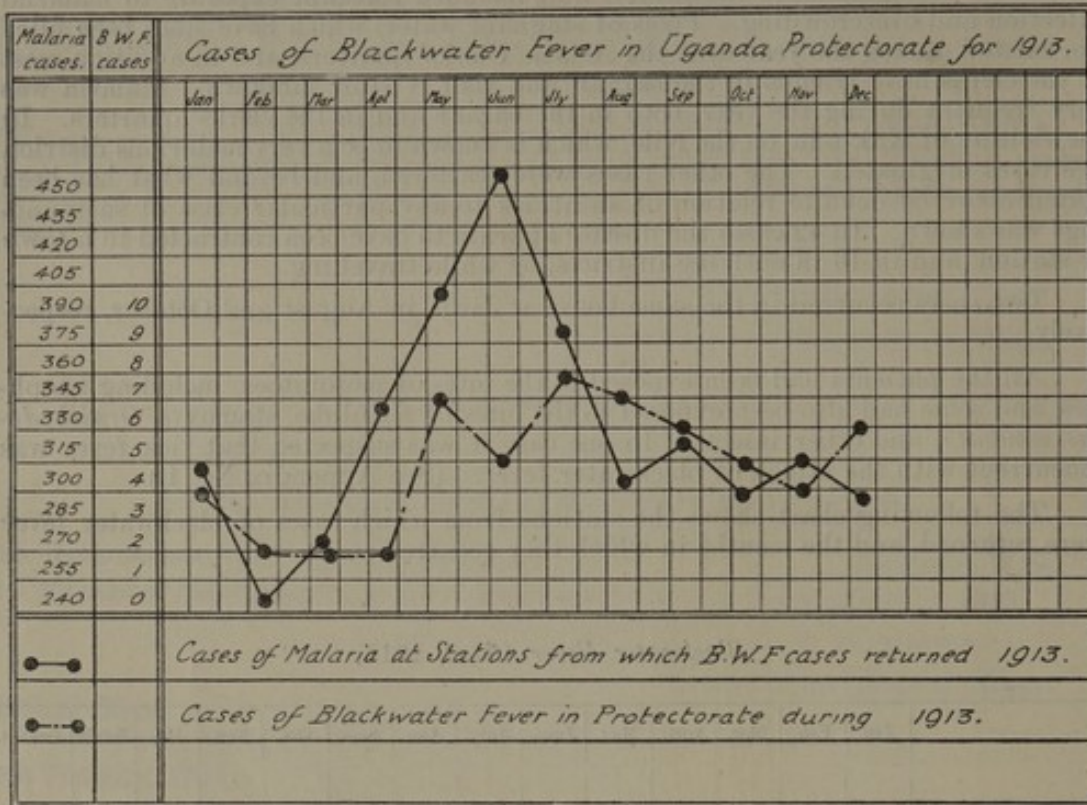
—	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	Deaths.
Entebbe ...	—	—	—	—	—	1	2 <sup>1</sup>	—	2	1	2 <sup>1</sup>	1	9	2
Fort Portal ...	—	—	—	—	—	1	—	—	—	—	—	—	1	—
Hoima ...	1	—	—	—	—	—	—	—	—	—	—	—	1	—
Jinja ...	1 <sup>1</sup>	—	—	1 <sup>1</sup>	—	—	—	2	1	2	—	—	7	2
Kakindu ...	—	—	—	—	1	—	—	1 <sup>1</sup>	—	—	1 <sup>1</sup>	—	3	2
Kampala ...	2	2	2 <sup>1</sup>	1	5	3 <sup>1</sup>	6 <sup>1</sup>	3	2 <sup>1</sup>	2 <sup>1</sup>	—	5 <sup>1</sup>	33	6
Kumi ...	—	—	—	—	—	—	—	—	1	—	—	—	1	—
Masindi Port ...	—	—	—	—	—	—	—	—	—	—	1	—	1	—
Mbale ...	—	—	—	—	1	—	—	—	—	—	—	—	1	—
Butiaba ...	—	—	—	—	—	—	—	1	—	—	—	—	1	—
Total Cases	4	2	2	2	7	5	8	7	6	5	4	6	58	12

It will be seen from the chart that 33 cases, or more than half, are returned from Kampala. Although this is the largest centre of native and Asiatic population, and five of the cases originated elsewhere, the proportion is still excessive. Of the European cases, 11 out of a total of 19 are returned from Kampala, but four of these originated elsewhere, and were either brought in for treatment or medically visited from Kampala. Of the nine cases reported from Entebbe, one originated elsewhere, and of the seven cases returned from Jinja, two originated elsewhere, as did the single cases returned from Hoima, Fort Portal, Kumi, and Masindi Port.

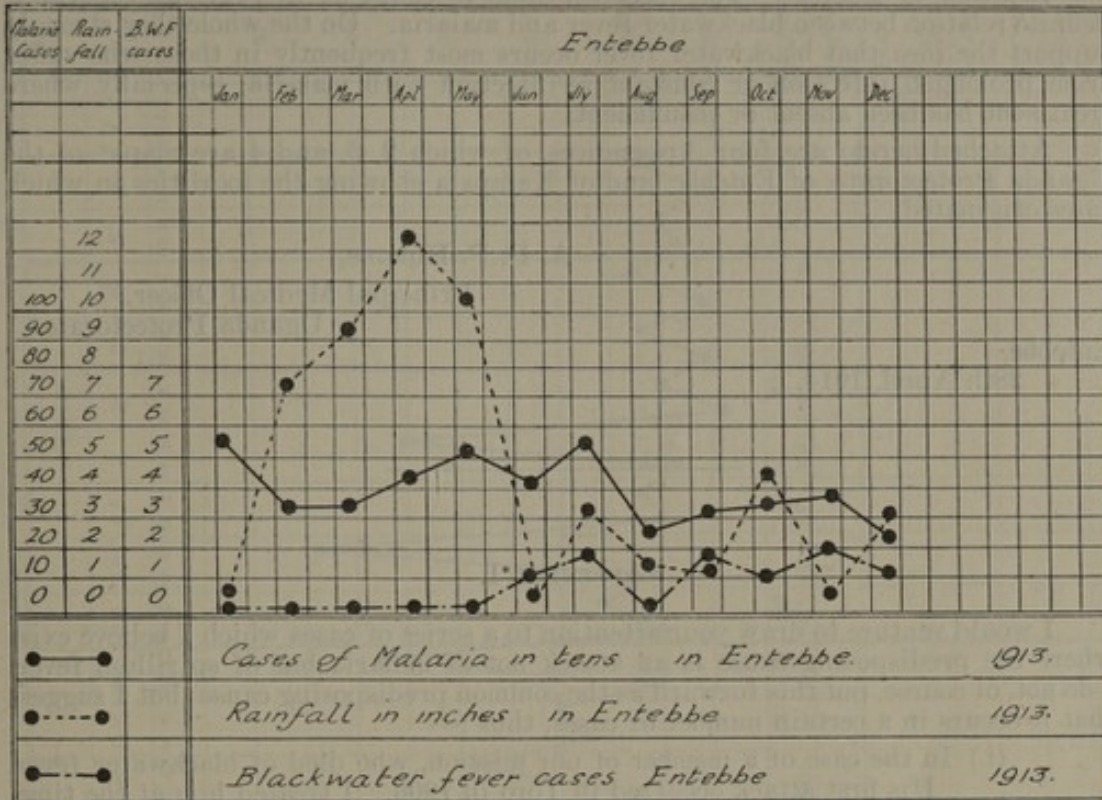
The greatest number of cases occurred during May to September, the months following the rainy season, and a second slight rise is seen in December, following the lesser rains in September, October, and November. In the following charts for



the Protectorate and Kampala and Entebbe stations a similar relationship is also shown, and the seasonal incidence of malaria is given for comparison.







*Personal history:—*

(a) Previous blackwater fever.—Of the 58 cases, 20 had had previous attacks, and of these two had had five, one four, three three and two attacks. Previous attacks had occurred in four of the 12 fatal cases.

(b) Previous malaria.—In 57 cases there was either a history of malaria or spleen enlargement. In most cases the attacks had been frequent.

(c) Quinine habits.—In ten cases quinine was stated to have been taken regularly, and in 29 cases irregularly. In 13 cases no quinine was taken, and in six cases there is no record. Among the 12 fatal cases none had taken quinine regularly, seven had taken it irregularly, three had taken none, and of two there is no record.

(d) Quinine is cited as an additional exciting cause of the attack in five cases, and in one case, in which 30 grains of quinine were taken on two consecutive days preceding the attack, as the sole exciting cause. None of these attacks was fatal, and all occurred during malaria.

(e) Other exciting causes.—Chill during fever is given in 20 cases, exposure or over-exertion, or both, in eight cases, and reckless disregard of health in three cases.

(f) Length of residence in Africa varied from six weeks to twenty-two years. In four cases it was over ten years, and in four cases under one year. Of the latter one case had been resident only six weeks, but had been seven years in Siam, two had been in Uganda six months, but these were both Asiatics, and had been exposed to malarial infection previously. One was a European who had been in Africa ten months. He stated that he had taken, as a rule, five grains of quinine daily; he was acting as engineer on a Lake Albert and Nile steamer, and was much exposed to malarial infection. He had had several attacks of malaria previously.

*Presence of parasites.*—In four cases malaria parasites were found before the hæmaturia commenced; in one of these they were also found afterwards during the illness. In one other case parasites were found after the attack commenced. In two cases the presence of parasites is recorded, in one 17 days, and in one a month after the attack, but examination at the time had given negative results. In 17 cases the result of examination was negative, and in 36 there is no record.

*The duration of hæmoglobinuria* in the cases in which this detail is recorded was from one to four days. The average was rather less than three days.



*Relation to malaria.*—The cases continue to show, as in previous reports, a definite relation between blackwater fever and malaria. On the whole they strongly support the idea that blackwater fever occurs most frequently in those who suffer from prolonged infection or constant re-infection with malaria, especially where treatment has been absent or insufficient.

Attached hereto are four Appendices, of which 2, 3, and 4 are maps\* of the Uganda Protectorate, of Entebbe, and of Kampala showing the localities in which cases originated.

A. D. P. HODGES,

Principal Medical Officer.

Uganda Protectorate.

Entebbe,

28th April, 1914.

#### APPENDIX I.

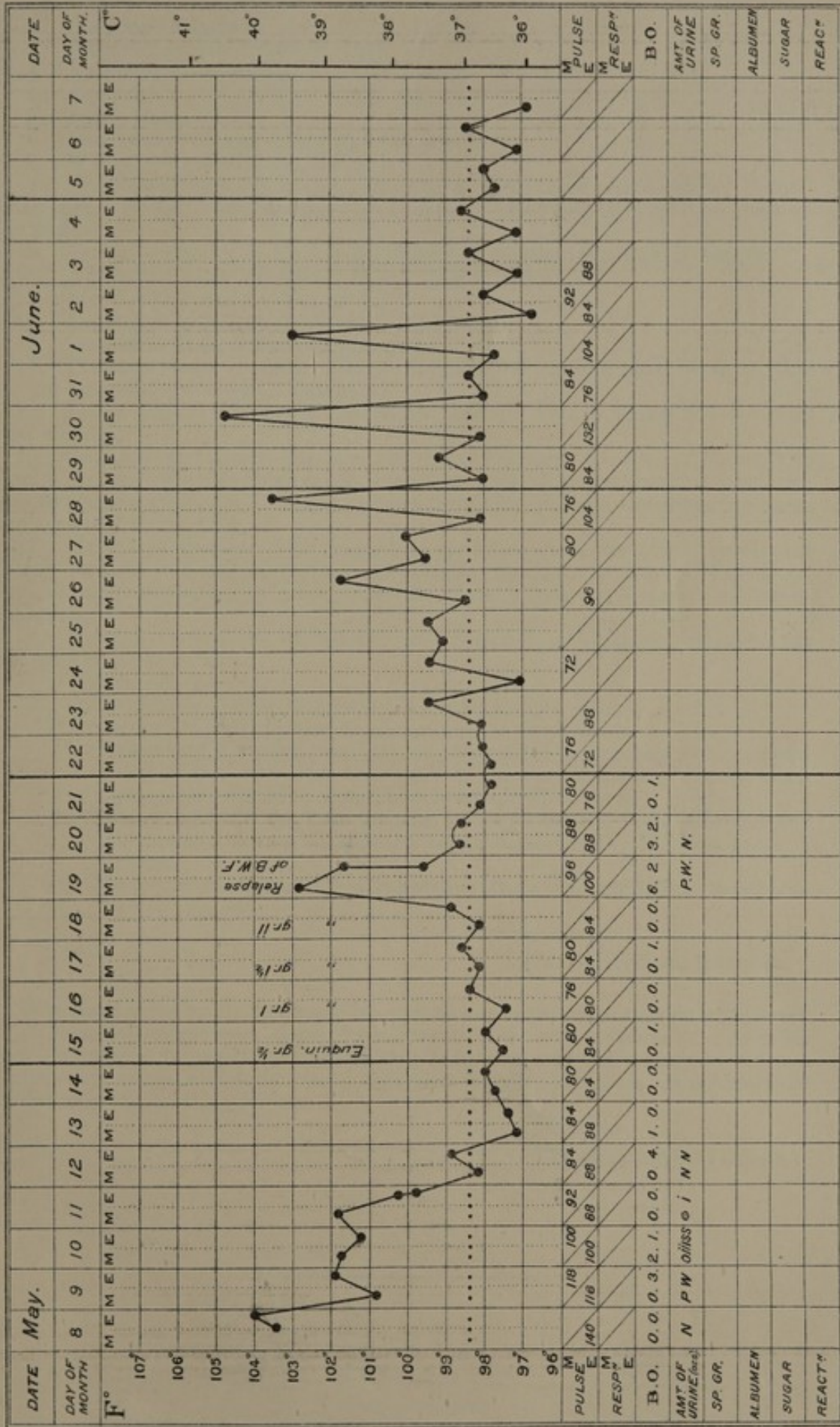
I would venture to draw your attention to a series of cases which I believe exist where the predisposing cause is an attack not of malaria but of spirillum fever. I do not, of course, put this forward as the common predisposing cause; but I suggest that it occurs in a certain number of cases, thus:—

- (i.) In the case of a member of our mission, who died of blackwater fever. His first attack occurred in Toro in 1906. I treated him at the time, and found *no malaria* in his blood, but spirilla in abundance. The blackwater fever cleared up (*i.e.*, the hæmaturia did) in two days. The first relapse of the spirillum fever occurred eight days later, and with it a relapse of the hæmaturia. Subsequently, a few years later, he again contracted spirillum fever, with typical relapses of temperature, and died of blackwater fever in a relapse of the spirillum fever.
- (ii.) One patient in 1907 had a typical attack of spirillum fever, with three fortnightly relapses. In the third relapse he took a cold bath, and immediately severe blackwater fever occurred. I examined his blood and found *no malaria*, though it is also true I found no spirilla either, but they are often difficult to find, *i.e.*, harder than malaria.
- (iii.) I enclose a chart of one of our blackwater fever cases. I would suggest that this chart is strongly suggestive of spirillum fever, and that that suggestion is further borne out by the presence of *Irido cyclitis* with *Keratitis punctata* as a complication in his case.  
I venture to think that if search were made through the charts of blackwater fever cases in Uganda a certain number would be of this type, which we might call a "spirillar type of blackwater fever" as distinguished from the commoner "malarial type of blackwater fever."
- (iv.) Redwater fever of cattle has, I believe, been proved due to the bite of a tick. It would be interesting if human hæmoglobinuric fever were also sometimes due to the bite of an infective tick (the *Ornithodoros moubata*) which is known to produce the spirillum fever.
- (v.) If this be so, and the point could surely be proved by a more systematic examination of blood in blackwater fever cases, or even by a search of past records, then it would be a tempting hypothesis to assume that the long sought cause of blackwater fever may be some active agent (? germ *sui generis*, ultra microscopic, or otherwise) acting upon blood corpuscles already impoverished by the toxins of malarial germs (generally) or spirillum (sometimes). Or, again, if Moffat's theory be correct, then that a chill may cause abortion of malaria containing red corpuscles, or disintegration of corpuscles whose nutrition has been undermined by spirilla.

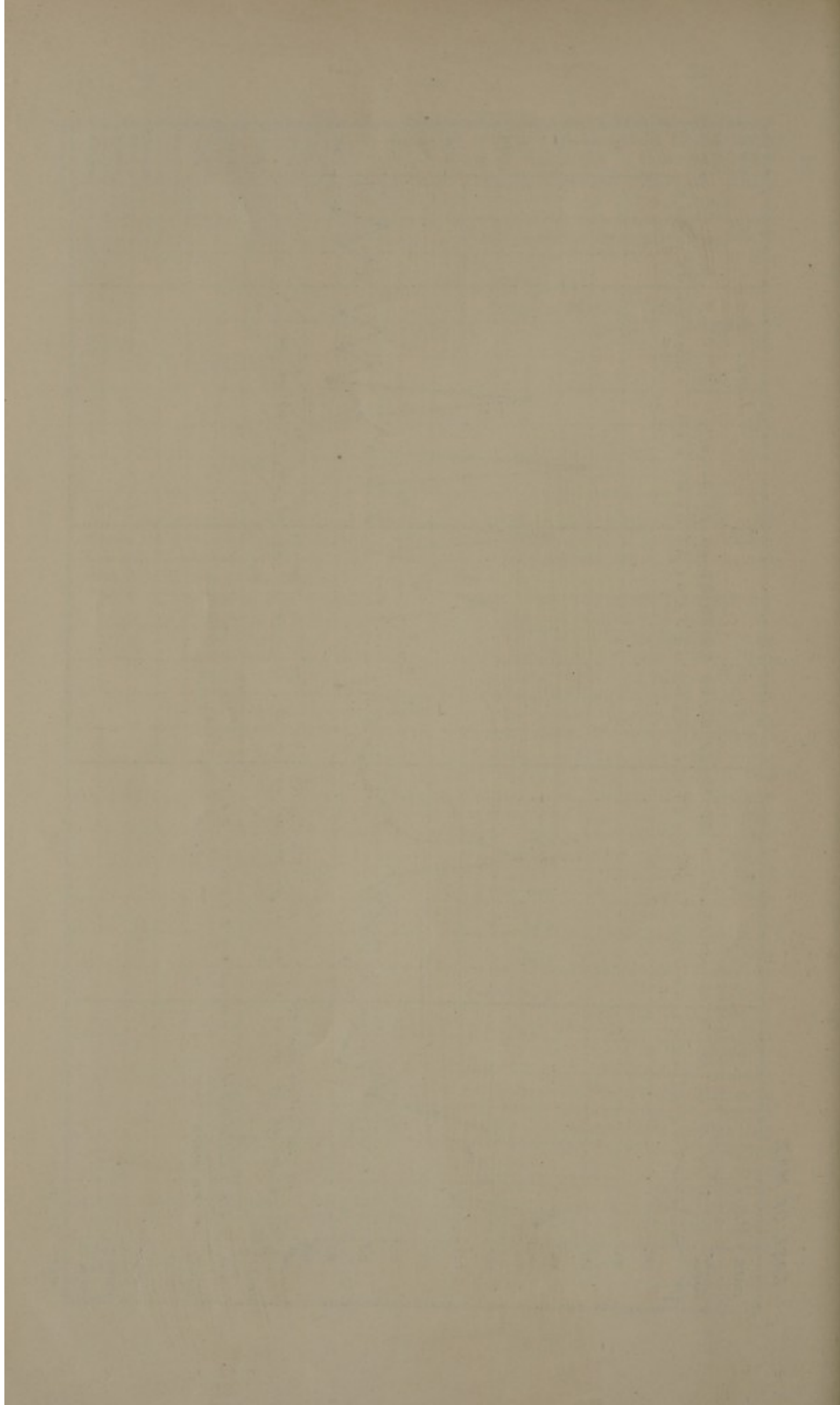
\* Not reproduced.



# CASE OF M. R. Z.









Case alluded to in (iii.) above:—

1. Station.—Kampala.
2. Date.—May 8th-June 7th, 1913.
3. Nationality.—German.
4. Age.—35.
5. Sex.—Male.
6. Date placed on sick-list.—May 8th, 1913.
7. Where contracted.—On safari.
8. Previous attacks of malaria.—Had been ill for three months with "Fever" at Mwanza. Spleen "very enlarged and tender." Reached level of iliac crest on May 29th.
9. Previous attacks of blackwater fever.—Never had blackwater before
10. Attributed cause of attack.—Chill during fever.
11. Blood examination.—Not made.
12. Length of residence in Africa.—Not stated.
13. Locality.—Had arrived at Kampala.
14. Previous cases in same place.—About 20-30 cases a year come to this hospital from the township of Kampala.
15. Insect fauna.—Anopheles prevalent, also in certain houses the *Ornithodoros moubata*.
16. Seasonal variation.—January one case, February two cases, March two cases, April one case, May five cases, June two cases, July five cases, August two cases, September two cases, October two cases, November nil, and December five cases, were admitted to hospital.
17. Habits of patient with regard to quinine.—Said he could never take quinine, and did not, therefore, take it. During residence in hospital even 2 gr. of euquinine (after rising by a daily increase of gr.  $\frac{1}{2}$  from gr.  $\frac{1}{4}$ ) gave a relapse of hæmaturia.
18. Previous movements of patient, and personal condition to which he has been subject.—Safari life.
19. Result.—Recovered.
20. Other details.—Four interesting features in this case:—
  - (1) Susceptibility to quinine and euquinine in small doses.
  - (2) Patient had *Keratitis punctata*, and two small hæmorrhages on temporal side of disc very near the centre of the macula lutea. The *Keratitis punctata* pointed to a past history of spirillum fever.
  - (3) Though he could not take quinine or euquinine the fever subsided and symptoms cleared directly he began taking methylene blue in gr. 2 doses.
  - (4) The temperature chart\* was suggestive strongly of a spirillum fever with three relapses.

J. HOWARD COOK,

C. M. S. Hospital, Kampala.

The cases given by Dr. Cook and his remarks on them are of particular interest.

I have not myself seen cases of blackwater fever with pyrexia of a spirillar type, but there is no reason to suppose that tick fever may not sometimes act as a predisposing cause, and it is known that tick fever and malaria sometimes exist concurrently in the same patient.

A. D. P. HODGES,

Principal Medical Officer.

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\* See opposite page.



## NORTHERN NIGERIA.

The Principal Medical Officer, in forwarding the report on "Blackwater fever in Northern Nigeria for the year 1913," states:—

Seventeen cases of the disease, as against fourteen in 1912, were reported, of which number I am able to record full particulars in fifteen instances. Owing to the impossibility of obtaining the necessary information from the Medical Practitioner in attendance, one case has been necessarily omitted from the tabulated return, whilst the non-inclusion of a second case is accounted for by the fact that the patient was not professionally attended. Both the two latter cases, which terminated fatally, have, however, been embodied in the statistical charts which accompany this report.

Sixteen Europeans and one Syrian were attacked; the results in six instances proved fatal, giving a mortality percentage of 35.29 as compared with 24.7, the average for the past sixteen years.

As regards the geographical distribution of the cases, as in previous years it cannot, in my opinion, be concluded that any one district or province of the Protectorate is more affected than is another.

The cases are naturally more in number where the European population is highest, hence the marked recent increase in the number of cases occurring in the mining areas, mainly situated in the Central Province. Reference to the tabulated return will show that 11 cases occurred in places where previous attacks are on record in the immediate vicinity; whilst cases numbered 1, 4, 6, 7 and 11 occurred in the larger and older established stations, viz., Zungeru, Lokoja, Zaria and Naraguta.

The natural surroundings of the places of incidence are, however, widely diverse, ranging from the banks of rivers and streams in low-lying districts, to the plateau of the high altitude. In nine of the tabulated instances the surroundings appear to be free from dense bush and swamp, and in the majority of cases the stations and camps are reported as being well cleared.

The prevalence of mosquitoes was reported as being general, anopheles, stegomyia and culex being found in large numbers in nearly every affected locality; bugs, biting flies, and ticks were, however, in many cases conspicuously absent.

The seasonal variation points to the fact that eight of the patients were attacked during the rainy season, three in the harmattan season, and four during the hot weather. It is perhaps worthy of comment that these figures are relatively correspondent to the records for previously recorded years.

The remaining information is detailed on the tabulated return under the prescribed headings, and I can only reiterate the opinions expressed in the two previous reports.

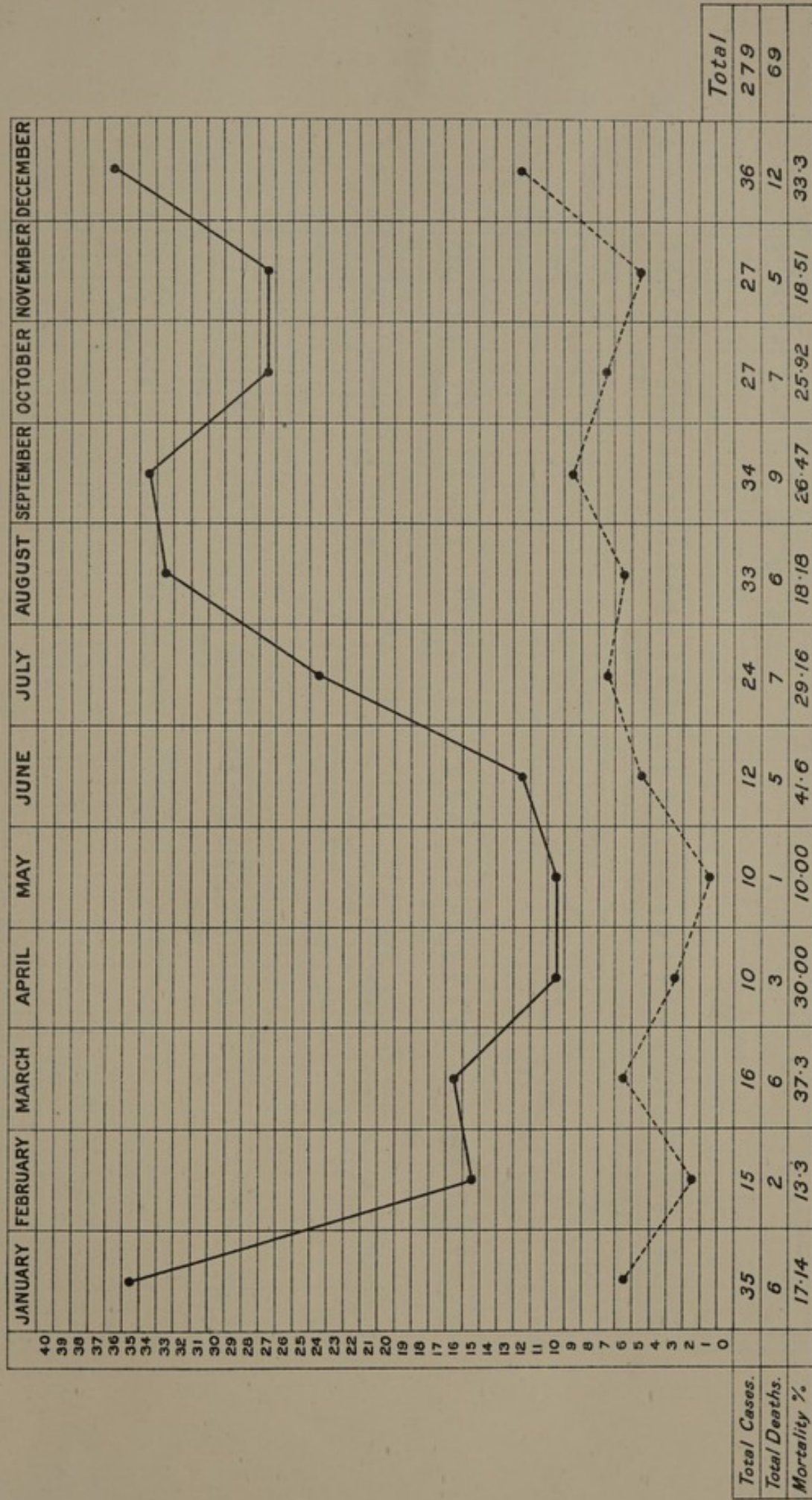
The case given by Dr. Cook and his remarks on the nature of the disease. I have not myself seen cases of blackwater fever with the typical type, but there is no reason to suppose that tick fever may not be a parasitic cause, and it is known that tick fever and malaria sometimes occur concurrently in the same patient.

A. D. B. Hinde,  
Principal Medical Officer.



# BLACKWATER FEVER.

## MONTHLY INCIDENCE OF CASES AND DEATHS, 1898 - 1913 INCLUSIVE.



Horizontal lines represent Number of Cases.  
Vertical lines represent Months.

Continuous line represents Total Cases.  
Dotted line represents Fatal Cases.



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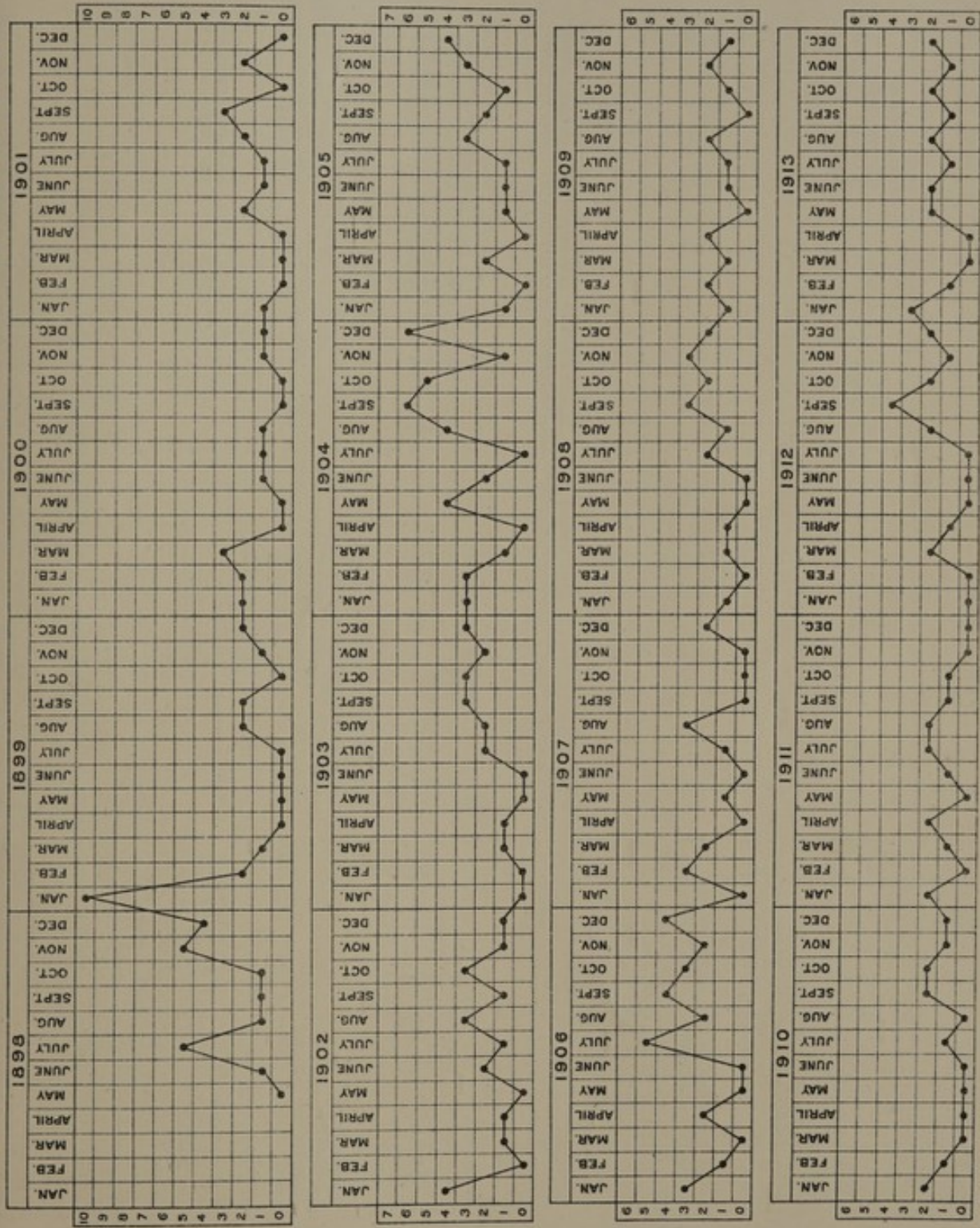
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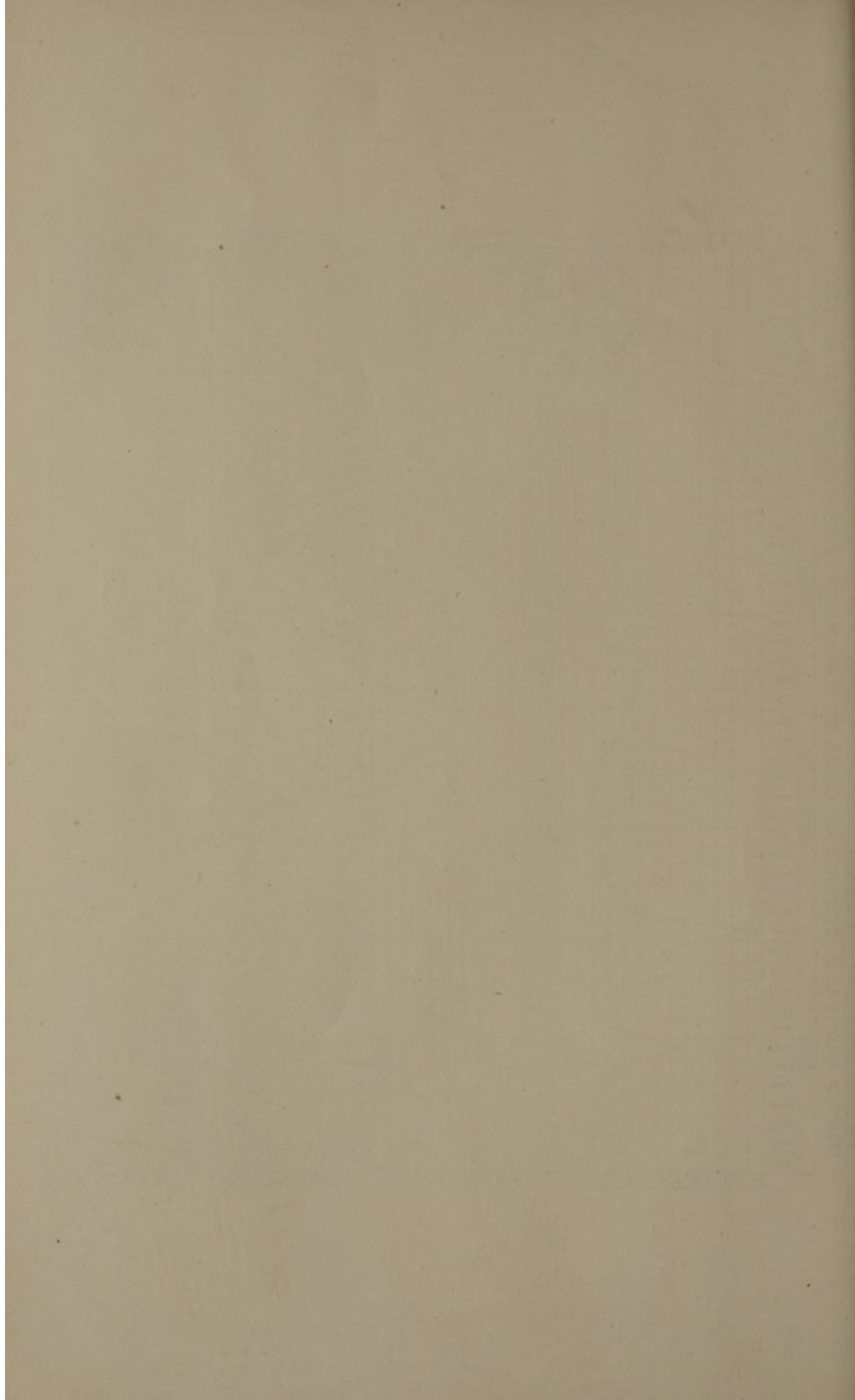
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MONTHLY AND YEARLY INCIDENCE OF CASES OF BLACKWATER FEVER FOR THE PAST 16 YEARS.







REPORT ON CASES OF BLACKWATER FEVER IN NORTHERN NIGERIA, 1913.

Number of case and result.	Locality.		Seasonal Variation.	(A.) Medical History.	Personal History.	
	(A.) Physical Features.	(B.) Occurrence of a Series of Cases.			(C.) Insect Fauna.	(B.) Previous Movements and Personal Conditions.
1. Recovery	Open undulating country. No bush or swamps in vicinity of bungalow.	8 cases 1906; 3 cases 1908; 2 cases 1910.	Middle of dry season. Slight harmattan.	No previous illness here. Took quinine daily.	Only two months in West Africa. Previously served in India. European built house.	Examination revealed a few small ring forms of malarial parasites.
2. Recovery	Open country with very little bush. Sandy soil.	1 fatal case, 1912	Harmattan season. Very cold nights.	No previous illness. Took quinine daily.	Resident in W.A. four years. Is a native of Syria, lived in a partially completed mud house.	No parasites found.
3. Death ...	Bare rocky surroundings. Stream round two sides of camp.	1 case in 1912 ...	Harmattan season. Cold nights.	Had "fever" often. Took quinine irregularly.	Had been 1 year in Canada and previously served on the Coast as a miner. Lived in a good mud house.	No examination possible.
4. Recovery	Bank of River Niger. Swamps. Station well cleared of bush.	3 cases in 1912, 2 of which in same quarter.	Exceptionally hot season. Mean shade temperature previous month 100° F.	Had five attacks of malaria. Took quinine regularly.	18½ months in W.A. Served in Lagos, Warri and Zungeru during tour. European built house. No previous tropical experience.	No parasites found.
5. Recovery	Plateau surrounded by ridge of hills. No forest, but plenty of scrub.	Nil	Tornado season ...	Frequently suffered from "fever." Had not taken quinine for months.	Eighth month of fourth tour of service. No previous tropical experience. Was much exposed to sun. Housing not good.	No parasites found.

6. Death ...	Bank of River Niger. This patient practically lived on the Niger for two months in a hulk.	3 in 1912; 1 in 1913.	Anopheles, Culex, Stegomyia, Glosinae, Tabanus.	Rainy season ...	Was under treatment for debility in 1911. A regular quinine taker.	Fourth month of second tour. Previously served in India. Had moved about on the Niger a good deal.	No parasites found.
7. Death ...	Plateau. Camp situated 150 yards from river; surrounding bush of thin variety.	1 case in 1911; 1 case in 1912. Both in this neighbourhood.	Anopheles, Culex, Stegomyia. No evidence of other biting flies, ticks, bugs, &c.	Rainy season ...	Suffered from gastric trouble for two months previous to the blackwater fever. A regular quinine taker.	Fourth month of second tour. Had spent most of his life gold-mining in Australia. Was accommodated in a good mud house.	No parasites found.
8. Recovery	A high plateau (3,200 feet) surrounded by hills. Small swampy areas in wet season.	One case a few miles off, in 1913. (See 5.)	Anopheles, Culex, Muscidae. No bugs or ticks.	Rainy season ...	Had several attacks of malaria recently. Does not take prophylactic dose of quinine.	Ninth month of second tour. Has worked for three years in South America and also in India. Lived in good mud house.	No examination possible.
9. Recovery	Cultivated land; well wooded. No swamps.	One case 18 miles off, in 1912.	Anopheles, Culex, Stegomyia. Sandflies very numerous. Ticks on animals in the district.	Rainy season ...	Had three previous attacks of blackwater fever in 1905, 1906 and 1906. Prior to those attacks he suffered repeatedly from malaria. Had no malaria since 1907. A regular quinine taker.	South Africa 1899-1903; Northern Nigeria 1904-1907; Portuguese Guinea 1909-1910; Northern Nigeria 1911-1913. Left Florin three days prior to this attack. Was constantly on the march. Housing during trek was bad.	No examination possible.
10. Recovery	Well-cleared station; only opened seven months. Altitude 3,000 feet. No swamps.	Nil	Culex and Anopheles. Very few Sandflies.	Rainy season ...	Had five or six attacks of malaria lately. Spleen much enlarged for some years. A regular quinine taker.	12 years in West Africa, 2 years at St. Paul, 4 years Sierra Leone, 4 years Southern Nigeria, and the last two years in Northern Nigeria.	No parasites found.

REPORT ON THE PROGRESS OF MALARIA IN NORTHERN NIGERIA, 1913



11. Recovery	Park-like country. Cultivated land. Large grazing district.	4 cases since 1912	Anopheles, Culex, Stegomyia, Haematopota, Psychodidae.	End of rainy season.	Had malaria two months previous to this attack. Did not use a mosquito-net. A regular quinine taker.	Had completed nine months of third tour in Northern Nigeria. No previous tropical experience. Housing unsuitable to local conditions.	Small ring forms of malaria parasites found.
12. Recovery	Open veldt-like country. Swampy in places during rains.	1 case in 1913. (See 8.)	Mosquitoes and sandflies said to be numerous. Patient stated that he found ticks on his body every day as a result of walking through grass.	Damp mist prevalent in the district, which is also occasionally visited by severe blizzards. The nights are cold.	Patient states had mild attacks of fever twice a month, while for a month previous to his attack of blackwater he had malaria in a mild form nearly all the time.	Attack occurred in tenth month of first tour. No previous tropical experience. Was always on the move. Lived in a tent all the time.	No parasites found.
13. Recovery	Hilly country. No swamps. Very little bush.	Nil	Culex, Anopheles, Stegomyia, sandflies and Glossinae.	Rainy season	No previous illness. Was irregular with quinine until two months before this attack of blackwater.	Three years tour in Northern Nigeria. Served previously in Rhodesia and East Africa. Housing said to be of good native-built class.	No parasites found.
14. Recovery	Open bush country with scattered farms.	Nil	No information	Beginning of dry season. Rains had been unusually scanty this year.	Severe attack of blackwater in December, 1912, at Lokoja. Since then had been remarkably well. Took quinine daily.	Has been in Nigeria a good many years. Housing not suitable to local conditions.	No examination possible.
15. Death ...	Park-like undulating country. Well-wooded. Bush only partially cleared.	1 fatal case in 1910	<i>Stegomyia suguens</i> , <i>Nyssorhynchus pretoviensis</i> , <i>Stomoxys nigra</i> , <i>omega</i> and <i>calchirans</i> , Tabanus, Haematopota. Ticks numerous.	Harmattan season. Very cold nights.	Had many slight attacks of malaria recently. Took quinine daily.	Had been in Northern Nigeria two years and four months. No previous tropical experience. Housing unsuitable to local conditions.	No parasites found.



## SOUTHERN NIGERIA.

## BLACKWATER FEVER REPORT FOR 1913.

Twenty-one cases of blackwater fever were notified in 1913. This number is a little smaller than that for the last year. Twenty-three cases were reported in 1912, and the average for the previous five years was thirty-five. This reduction, which is most marked for the larger towns, may be ascribed to the activities of the Sanitary Department both as regards their actual improvements and their influence on the individual. The total for 1913 is a small number to deal with statistically, and the following analysis is given for what it is worth. Nineteen cases occurred amongst Europeans, one in a West Indian negro, and one in a West African native.

One of the cases amongst Europeans (No. 16) is doubtful, for the illness closely resembled yellow fever.

Including this case, the disease ended fatally in five.

*Sex.*—Male Europeans far outnumber females in Southern Nigeria. Only one of the nineteen was a female.

*Occupation.*—Eleven of the patients were Government officials, five were merchants, two were missionaries, one was a mining engineer, one was captain of a merchant steamer, and the last was a native school-boy.

Four of the officials were in the Southern Nigeria Regiment, three lieutenants and a colour-sergeant.

Two were Medical Officers, two were District Commissioners, one was an engineer in the Public Works Department, one was a boiler-maker, and the tenth, the West Indian, was in the Agricultural Department.

The conditions are reversed from those of last year. The disease incidence then was highest in the mercantile community, now it is greatest amongst the officials. (Table I.)

As regards occupation, it will be observed that all the patients were required to travel through their districts, and to live for varying periods in a bush-hut, tent, or rest-house (cases 4, 15 and 20 are excepted). Put in another way, the patients had spent much of their time in places where the Sanitary Department have not yet been able to extend their energies in the way of clearing, drainage and town-planning.

*Locality.*—Eight cases occurred in the Eastern Province, eight in the Western, and five in the Central Province. Generally speaking, the physical features are the same for all three—mangrove swamp along the seaboard, dense forest in the central area, and grass land with large tracts of low bush in the north. The Central and Eastern Provinces have larger areas of low-lying swamp land and dense forest than the Western, and the Eastern Province possesses more dense humid forest than the Central.

*Season.*—The driest months are from October to March. Twelve cases occurred in this period. Four of these cases were in October and in the early part of November, just at the close of the rains.

The wet season extends from April to September. Nine cases took place during this period, four of them occurring in April, at the very beginning of the tornado season.

Mosquitoes and other biting flies may be said to be most numerous from May until September, and only four cases were recorded during this time.

The rainfall during 1913 was below the average. This happened too in 1912, so that the reduction in the number of cases in 1912 and 1913 may be attributable to the lessened rainfall.

*Blackwater fever localities.*—Blackwater fever, according to the records, appears to have occurred most frequently in Lagos, Warri, Sapele, Calabar, Ibadan, and Oshogbo. It must be remembered that these, with the exception of Oshogbo, are the largest towns in Southern Nigeria as regards both European and native population. They have all, in addition, a well-equipped hospital, and one or more Medical Officers are always in the station. Cases are brought into these places from the surrounding districts. Further, it is only natural that a "prospective" patient feeling "seedy" whilst travelling hastens in to the town, where he can receive prompt attention when necessary. Three cases, one a doubtful one, and another from a ship, occurred in Lagos or Ebute Metta during 1913. There were five cases in 1912, and an average of six to eleven each year since 1905.



One case was recorded from Sapele. Three occurred there in 1912, four in 1911, and one in 1910.

Two cases were notified from Warri. There were four in 1912, none in 1911, and one in 1910.

The West African negro lived in Ibadan, where there have been one or two cases in Europeans each year since 1907.

There has been one case in Oshogbo each year since 1909 (two in 1911).

With regard to the three Calabar cases, one had been resident also in Lagos, another was stationed at Uwet, and the third had been living in Forcados, Benin City, Warri, and Onitsha previously.

The patient from Oshogbo had also been resident in Itu and Ikom. The two Warri cases had been living one in Koko and the other in Sapele.

The Sapele case had also been in Warri.

The European patient from Ibadan had been trekking round the district.

It would appear, therefore, that there are no definite grounds for believing that blackwater fever clings to any one particular locality.

*Age.*—Most of the patients (nine) were between thirty and forty years, eight were in the third decade, three were over forty, and one was aged twelve years.

The age period thirty to forty years includes a larger number of Europeans, in Southern Nigeria, than any other, although the age period twenty to thirty years runs it closely. (Table II.)

*Complexion.*—Excluding the two negro patients, fifteen were described as "fair," three as "medium," and one "dark." The four deaths amongst Europeans included three of a fair complexion and one medium.

*Antecedent malaria.*—Only two patients stated that they had never suffered from malarial fever.

*Previous attacks of blackwater fever.*—Case 8 had suffered from one attack previously, and Case 12, the West Indian, had had two previous attacks. There was in Case 13 a history of eight or nine previous attacks of hæmoglobinuria, which all occurred in England. No further particulars are available for this case.

*West African service.*—Excluding the native boy and the case from the ship, one had served only nine months, one had served twelve months, four between one and a half and two years, one two and a half years, three had served three years, two four years, one five years, one six years, one seven years, two eight years, one eleven years, and one seventeen years. Thirteen of the cases occurred in those who had served five years or less. This is considerably more than half the total. Nine cases occurred in those who had served three years or less, which is more than one-third of the total cases.

*Service in other tropical countries.*—Three patients had served in India, one had been resident in South America, and one in South Africa.

*Length of tour in which illness occurred.*—One patient was attacked twelve days after his arrival. He was acutely ill and died in four days. Another case occurred after three months, three after six months, three after seven months, two after eight months, two after nine, one after ten, two after eleven, two after twelve, one after twenty-one months, and the last, the West Indian, after four years' continuous residence. Thus seventeen took place after six months' stay. (Table III.)

*Habits as regards quinine prophylaxis.*—Eight patients stated that they took five grains of quinine regularly. One of these took euquinine, and the others either the sulphate or the hydrochloride. Ten others admitted some irregularity, and two of these are interesting inasmuch as they are both Medical Officers. They had been extremely regular with the prophylactic, but owing to pressure of work in travelling round their districts they had omitted the drug for some three weeks before the blackwater fever attack.

One patient, the female, took only two grains per day, and this was measured roughly on the point of a penknife. Another patient took five grains regularly on alternate days, and the last, the West African, never took quinine at all.

The statement by the eight patients as to their taking five grains of quinine regularly has to be accepted in the broadest of spirits, but even so, the larger proportion of the cases were inefficiently protected from malaria by quinine.

*Dosage of quinine immediately preceding the attack.*—The dose was ten grains in eleven of the cases. It was the usual five-grain dose in other five. The dosage was large (about twenty-five grains) in two cases, and only two and a half grains in the case of the native boy and in Case 13, but in these two the drug had been



regularly administered in these doses for a day or two previously. It is definitely stated in one case (No. 3) that no quinine was taken before the attack.

*Particular salt of quinine used.*—This is stated in only three cases. The hydrochloride was used in two, and euquinine in one (a fatal case).

*The deaths.*—Curiously enough, four out of the five deaths occurred in those cases where five grains of quinine had been taken daily with regularity. All five had had frequent attacks of malarial fever. Only one patient had admitted irregularity with quinine taking.

One out of the two cases in which hæmoglobinuria had previously occurred died. It was the third attack in this case.

It has to be noted that three of the deaths took place in those of fair complexion, one in a patient of medium complexion, and the fifth in a negro.

As regards the length of service, two had six years' total residence, one had five years', one four years', one three, and one had one and half years' residence.

One patient contracted his fatal illness after twelve days of his tour, one after three months, one after six months, one after eleven months, and the last after four years' continuous residence in West Africa.

Three of the patients were aged 32 years, one 31, and one 37 years.

*General signs and symptoms of the attack.*—The premonitory symptoms, entirely absent in three cases, varied in intensity from merely a feeling of being "out of sorts" to violent general pains, headache, &c. Rigors are noted in fourteen cases. There was usually more than one rigor, and the usual duration was about thirty minutes. One patient complained only of "burning heat." Pains in the body, limbs, loins, stomach, &c., were observed in seven cases and were noted as severe in three.

In one case there was a sensation of tightness round the waist, which is possibly similar to the feeling expressed by another of the patients as a pressing desire to pass urine.

Vomiting occurred in fifteen cases, and was noted as troublesome, violent, or distressing in nine. It was bilious in four cases and "coffee-grounds" in one.

Three patients suffered from diarrhoea.

Restlessness, hiccup, persistent vomiting, delirium, "air-hunger," suppression of urine, great exhaustion and high fever characterised the severe and fatal cases.

Enlargement of the spleen was detected in five of the cases. Some degree of fever was observed in all the cases. Temperature charts are appended except for Case (No. 6) where no Medical Officer was in attendance and no records were made, No. 20 and No. 21.

Except in Case 9, where the temperature was never above 99.8° F., there was a considerable degree of pyrexia. All the charts show a well-marked remission, which amounts to a definite intermission in some, during the first few days. The tracings show a considerable range of variation, quick falls and rapid rises being prominent. The high fever as a rule terminates abruptly, but a low fever continues for several days thereafter in most of the cases. This later fever may be due to malaria (Case No. 2) or to absorption of toxins resulting from the hæmolysis. As regards the actual illness, the cases appear to fall naturally into groups.

The first group includes the mild cases where hæmoglobinuria and a rise of temperature are the only obvious features. In the second group there is more general disturbance, with rigors and vomiting, but the attack follows a mild course. The third group includes cases where there is severe systemic disturbance, violent pains, distressing vomiting, anxiety and restlessness, &c.

Cases 7, 8, 9, 14, 17 and 20 fall into Group I., Cases 4, 5, 10, 11, 13, 15 and 18 into Group II., and Cases 1, 2, 3, 6, 12, 16, 19 and 21 fall into Group III.

*Average duration of hæmoglobinuria.*—This in round figures was just under 48 hours. The shortest period was three hours and the longest eleven days (in the last, Case 15, however, there was hæmaturia).

One illness of eleven days duration, two of nine days, two of seven and one of six days bring up the average, whilst the duration in the remaining twelve cases was five days and under. The fatal cases showed hæmoglobinuria lasting 11 days, seven days, four days, four days, and two days.

*Hour of onset.*—The hour is stated in nineteen cases. It was between 6 a.m. and 6 p.m. in fourteen. Eight occurred in the afternoon between 1.30 p.m. and 6 p.m.



1877

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ANTHROPOLOGY

SKETCH MAP OF



1877

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CENTRAL CAUCASUS

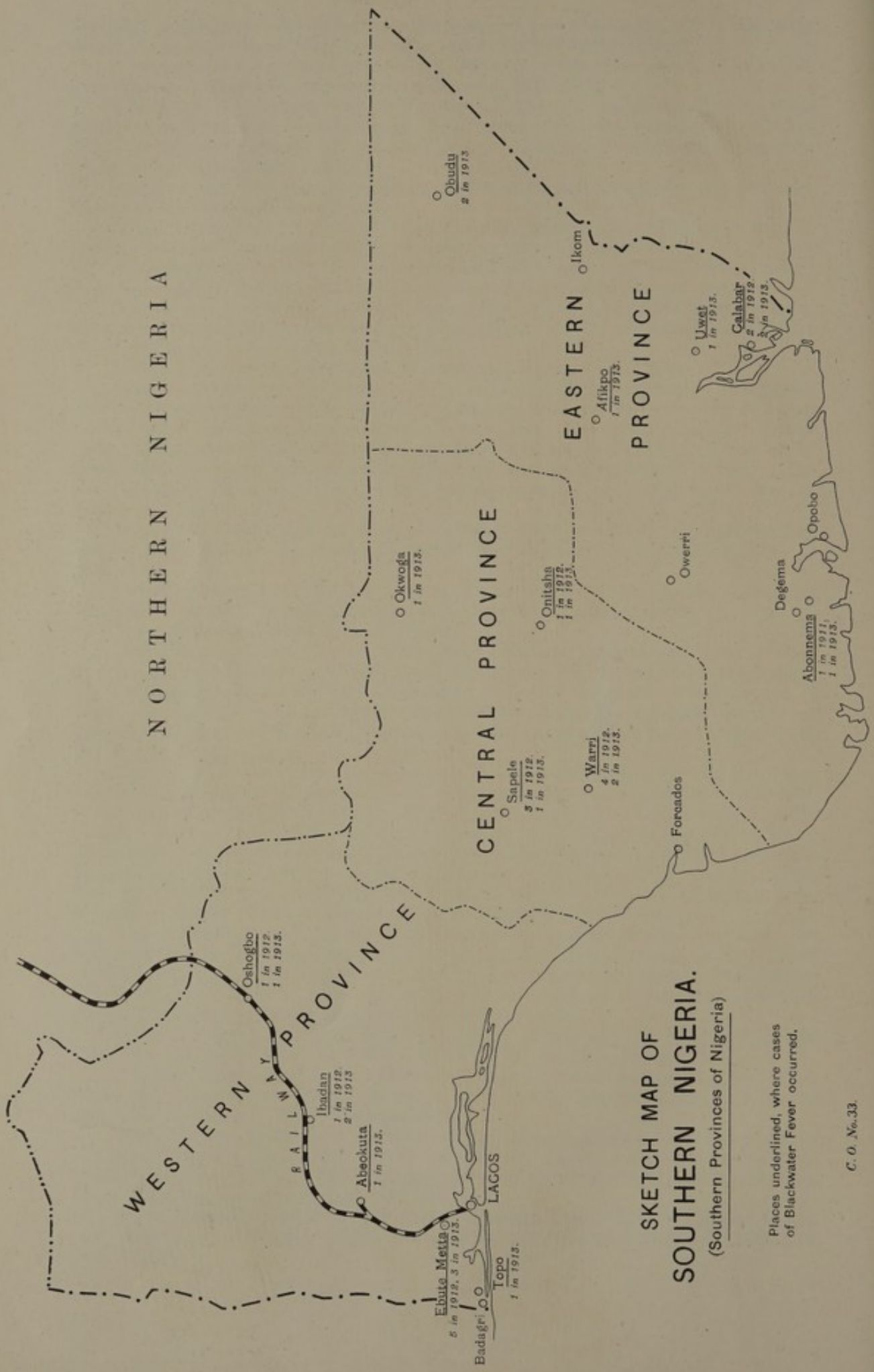
VALLEY

RIVER

MOUNTAINS

PLAINS

NORTHERN NIGERIA



SKETCH MAP OF  
SOUTHERN NIGERIA.  
(Southern Provinces of Nigeria)

Places underlined, where cases of Blackwater Fever occurred.



*Remissions and relapses.*—Only three cases showed relapses. These occurred in one on the sixth day, in another on the second and again on the sixth day, in the third on the tenth day. This last case also showed a remission on the fifth day, whilst a fourth case showed remissions on the second and again on the third day.

*Onset of jaundice.*—Jaundice appeared on the first day of the hæmoglobinuria in ten cases, on the second day in five, on the third day in two, on the fourth day in one (the West African native), and on the sixth day in Case 16 (already commented on). Jaundice was not observed in one case.

The tint as a rule was lemon-yellow, and in one case was described as deep saffron. As a rule the colouration affected the entire body surface, but in a few cases it was only observed in the conjunctivæ.

*Parasites found at blood examination.*—Subtertian malaria rings were found in five cases. They were detected at the time of onset of the hæmoglobinuria in one case, two days before the attack in two cases, on the day before the attack in one case, and on the sixth day of illness in the fifth.

No blood examination was made in one case (No. 6), no record is made in another, and the findings were negative in the remaining fourteen.

No attempt has been made to collect statistics regarding the incidence of malarial fever for comparison with the number of cases of hæmoglobinuria. There are several reasons why such figures would be entirely valueless. Not every European reports his illnesses officially, and not every native seeks medical treatment when he has fever. Further, many cases are reported as "Fever," "Continued Fever," "Malarial Fever," in which no blood examination has been made, on account of the lack of the necessary appliances.

Major Beverley, Intelligence Officer, has supplied the figures for the population. The map was also prepared by him and has been copied and filled in by Sergeant Phipps, R.A.M.C. Mr. A. Cleminson, Deputy Director of Surveys, supplied the rainfall statistics for the year.

A. CONNAL,  
Director,  
Medical Research Institute.

Yaba,  
30th May, 1914.

SYNOPSIS OF CASES OF BLACKWATER FEVER, SOUTHERN NIGERIA, 1913.

Western Province :—

Abeokuta	...	...	...	...	...	1
Badagry (Topo)	...	...	...	...	...	1
Ibadan	...	...	...	...	...	2
Lagos (and Ebute Metta)	...	...	...	...	...	3
Oshogbo	...	...	...	...	...	1
						— 8

Central Province :—

Okwoga	...	...	...	...	...	1
Onitsha	...	...	...	...	...	1
Sapele	...	...	...	...	...	1
Warri	...	...	...	...	...	2
						— 5

Eastern Province :—

Abonnema	...	...	...	...	...	1
Afikpo	...	...	...	...	...	1
Calabar	...	...	...	...	...	3
Eket (Qua Ibo district)	...	...	...	...	...	1
Obudu	...	...	...	...	...	2
						— 8

Total	...	...	...	...	...	21
						—

## CHART

Showing monthly rainfall and cases of Blackwater Fever.

The rainfall figures are the combined totals from all the Stations in which cases of Blackwater Fever occurred.

Continuous line — rainfall in inches.

Dotted line ..... number of cases of Blackwater Fever.

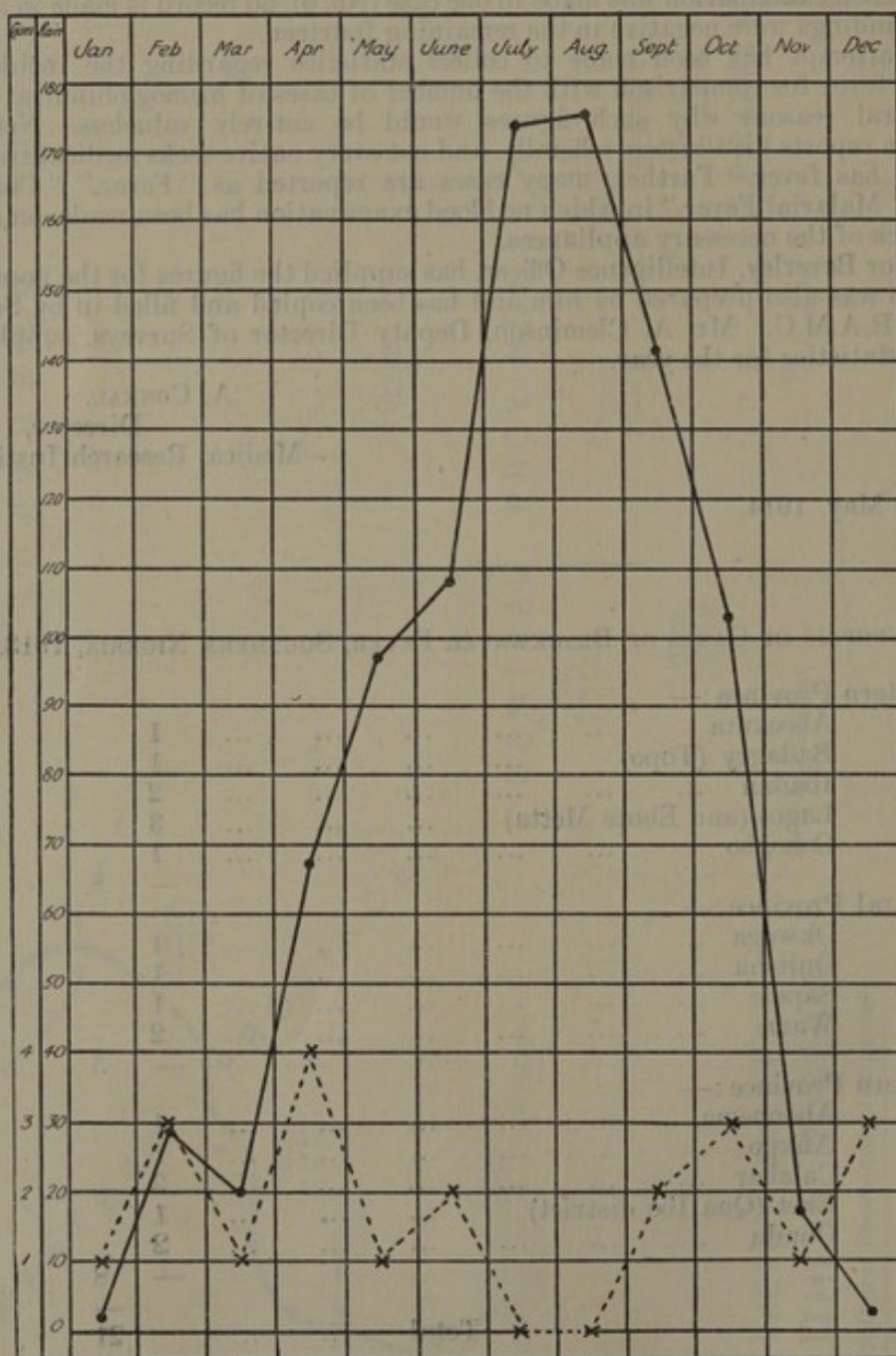




TABLE I.

Occupation.	Cases.	Census 1911.	Per cent.
Government Officials ... ..	11	630	1.74
Merchants, &c. ... ..	7	798	0.87
Missionaries ... ..	2	191	1.04
Native ... ..	1	—	—

TABLE II.

Age.	Cases.	Deaths.
Under 30 years ... ..	9	0
30-40 years ... ..	9	5
Over 40 years ... ..	3	0
	21	5

TABLE III.

Length of Tour.	Cases.	Deaths.
Under 6 months ... ..	2	2
6-12 months ... ..	13	2
Over 12 months ... ..	5, one native	1
	20	5
Omitting the case from the ship		

## APPROXIMATE POPULATION.

Place.	European.*	Native †	West Indian.
Abeokuta ... ..	60	51,000	
Afikpo ... ..	10	15,500	
Badagri ... ..	20	7,000	
Calabar ... ..	150	14,000	
Degema and Abonema**	25	4,000	
Ibadan ... ..	80	175,000	
Lagos†* ... ..	550	72,500	
Obudu ... ..	5	2,000	
Okwoga ... ..	5	4,000	
Onitsha ... ..	60	12,000	
Oshogbo ... ..	10	60,000	
Sapele ... ..	30	2,000	
Warri ... ..	60	2,500	

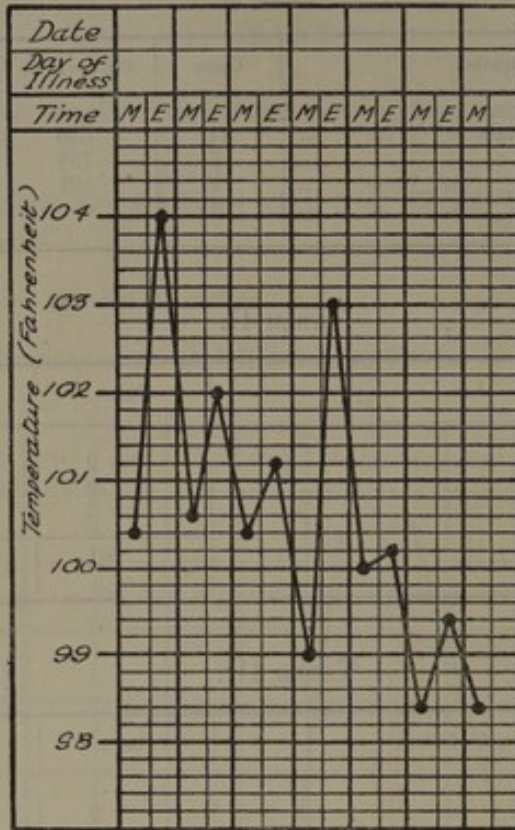
Brazilians and West Indians in the S. Provinces—400; the latter equal about 17 of the former. There are about 10 West Indians in Abeokuta.

\* Average number.  
†\* Municipal area.

† Natives of West Africa.

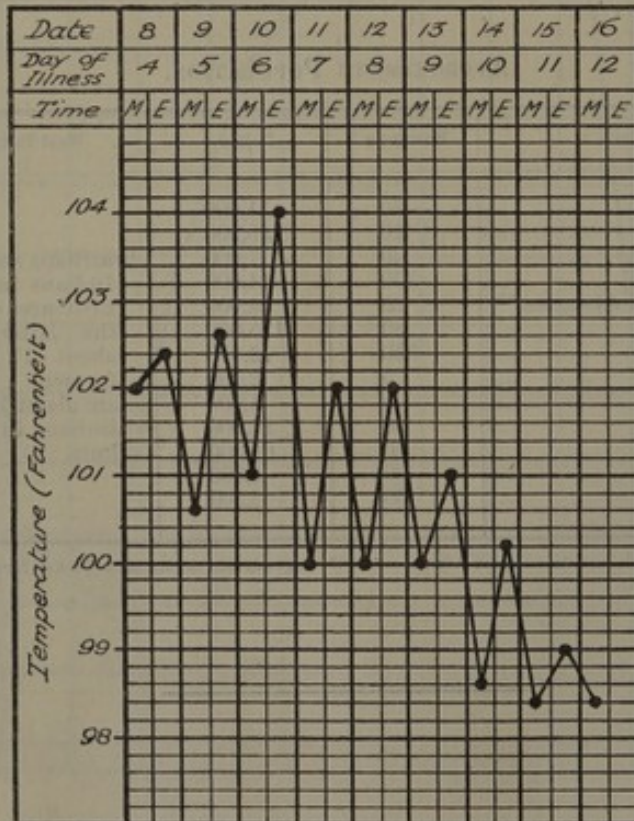
\*\* Degema and Abonema together form practically one place.

Case 1.



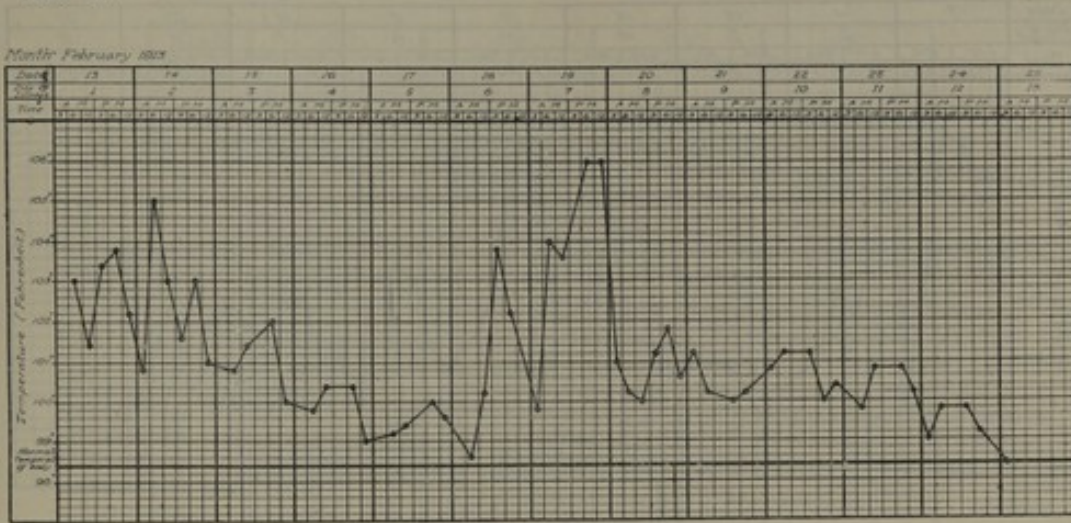
Case 2.

Feb. 1915.



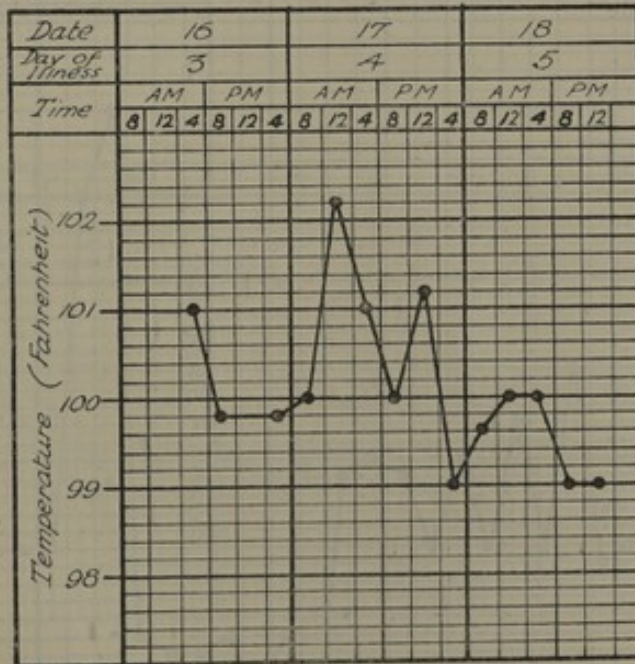


Case 3.



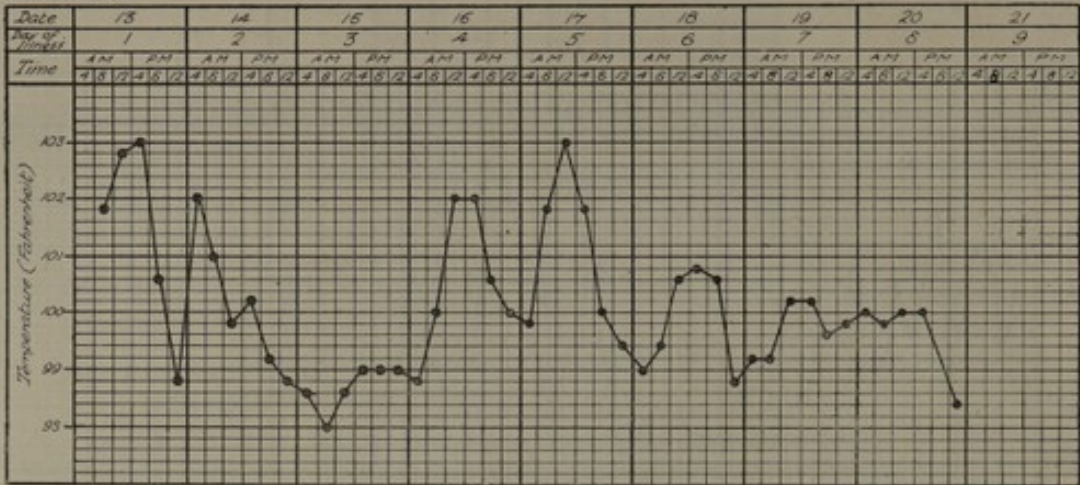
Case 4.

Feb. 1913



Case 5.

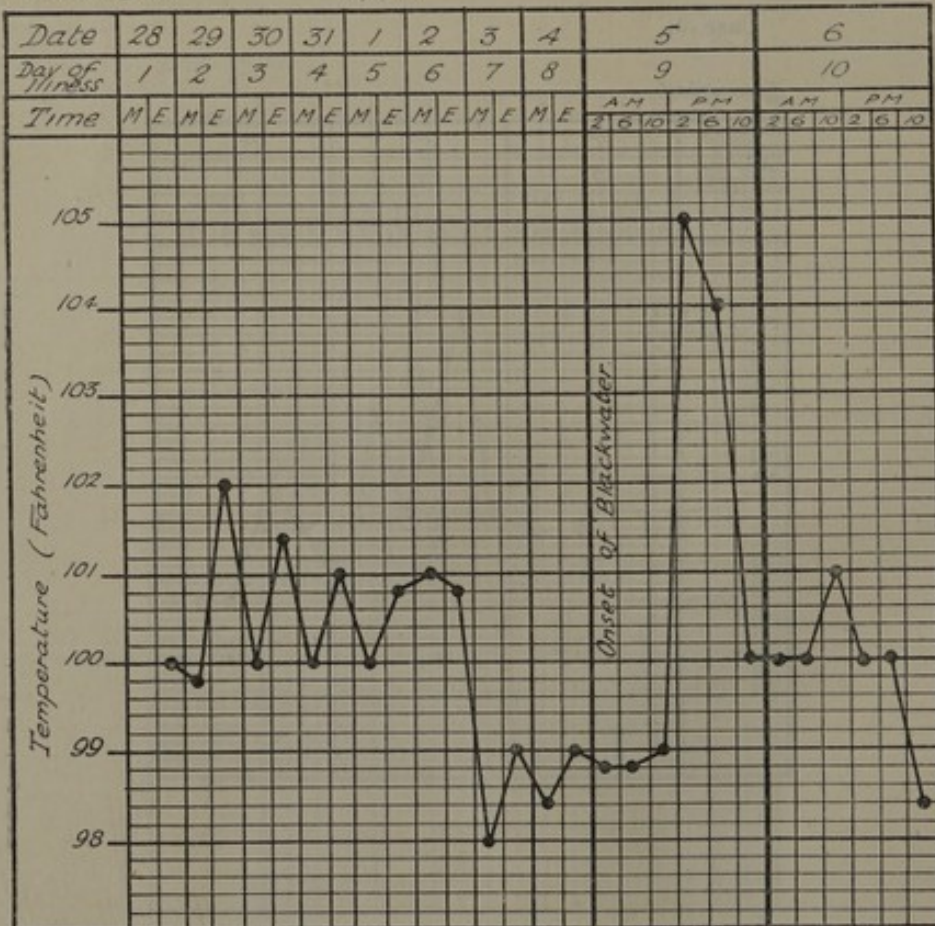
March 1913.



Case 7.

March 1913.

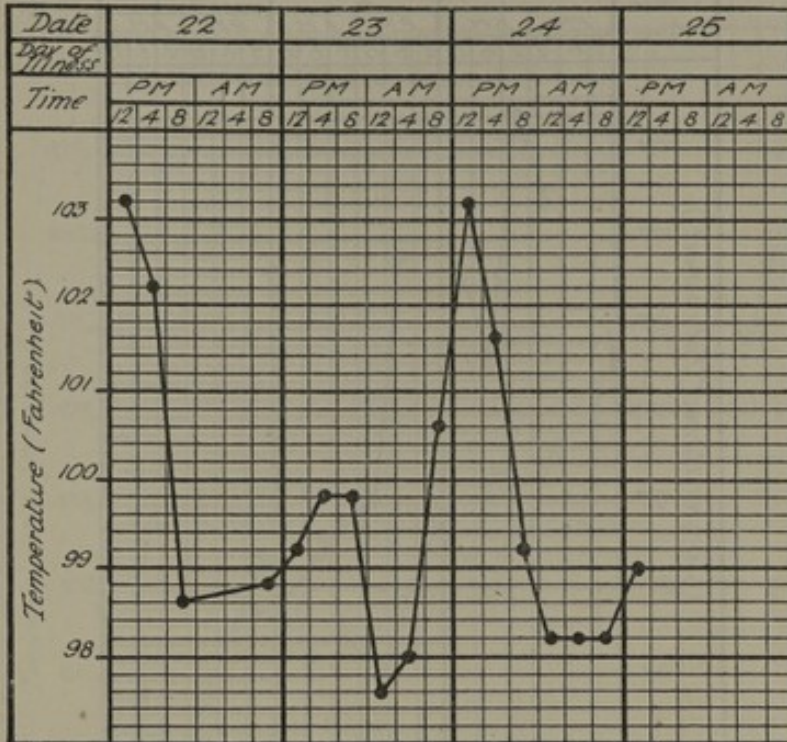
April





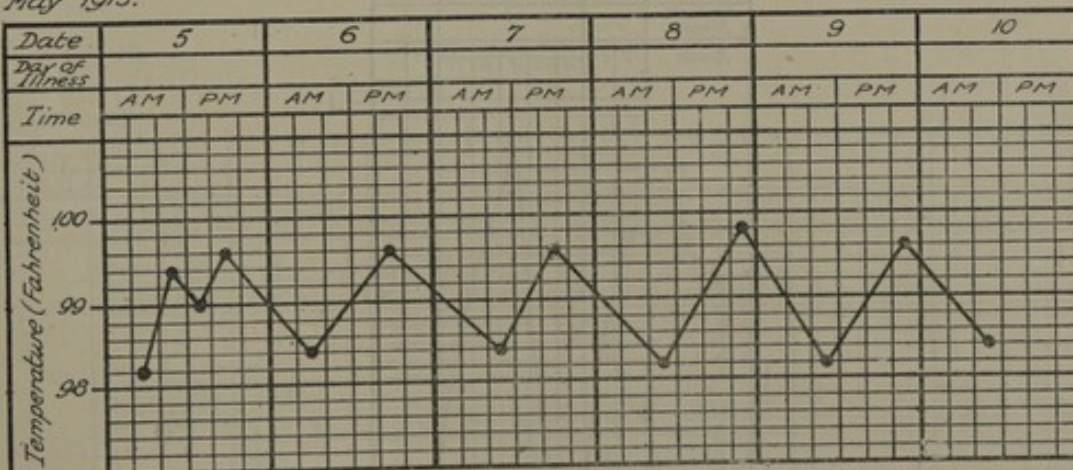
Case 8.

April 1913



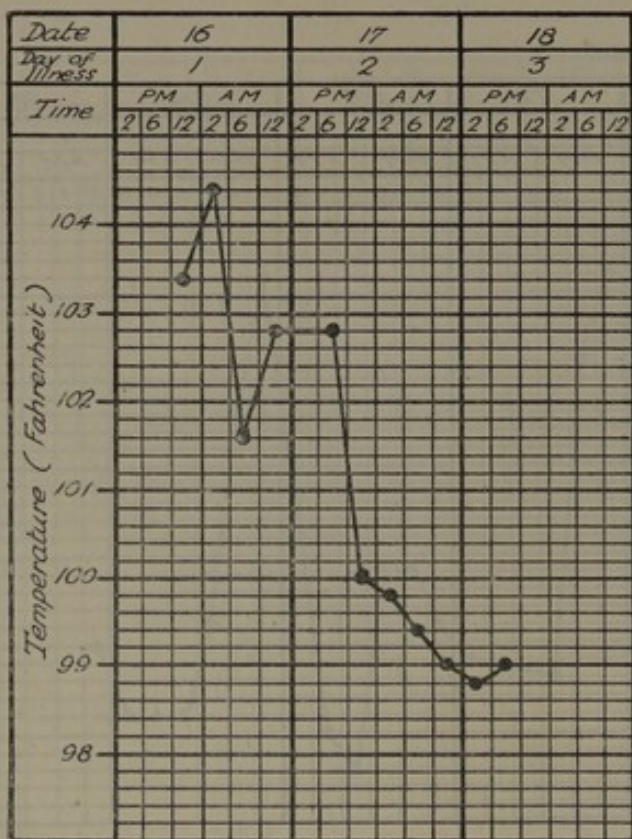
Case 9.

May 1913.



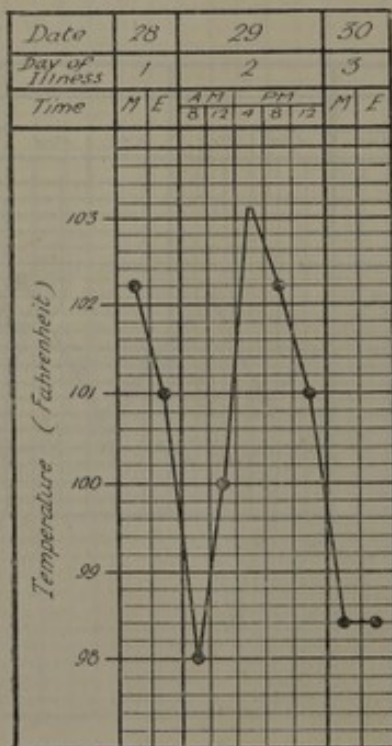
Case 10.

May, 1913.



Case 11.

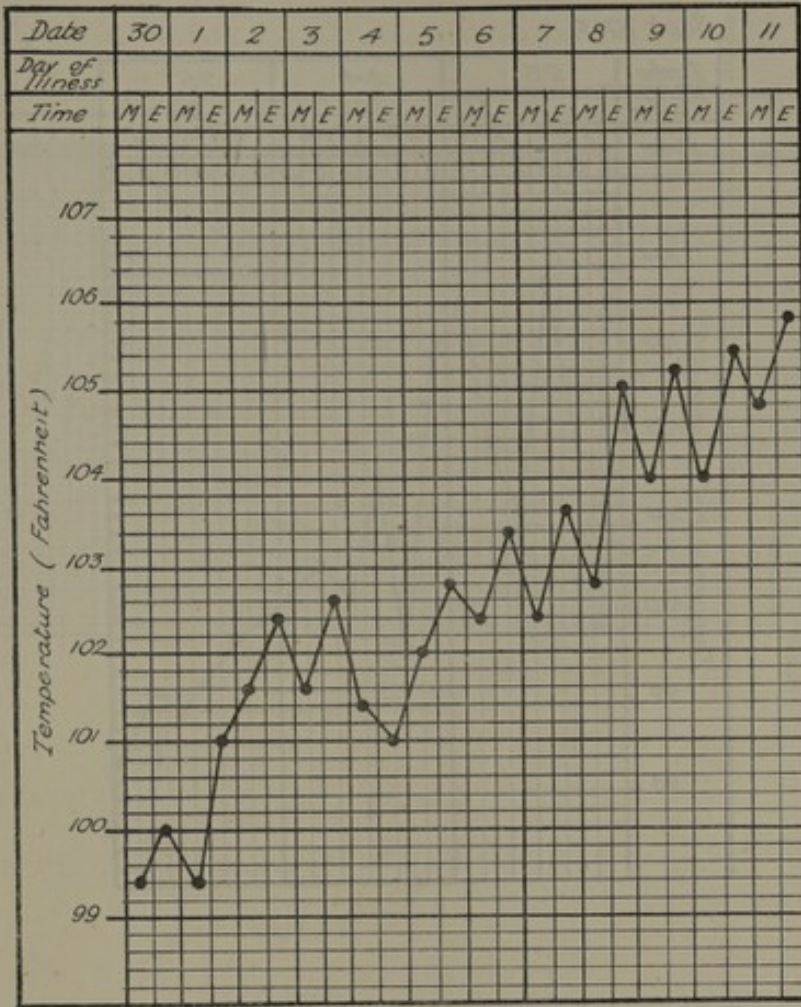
June 1913.





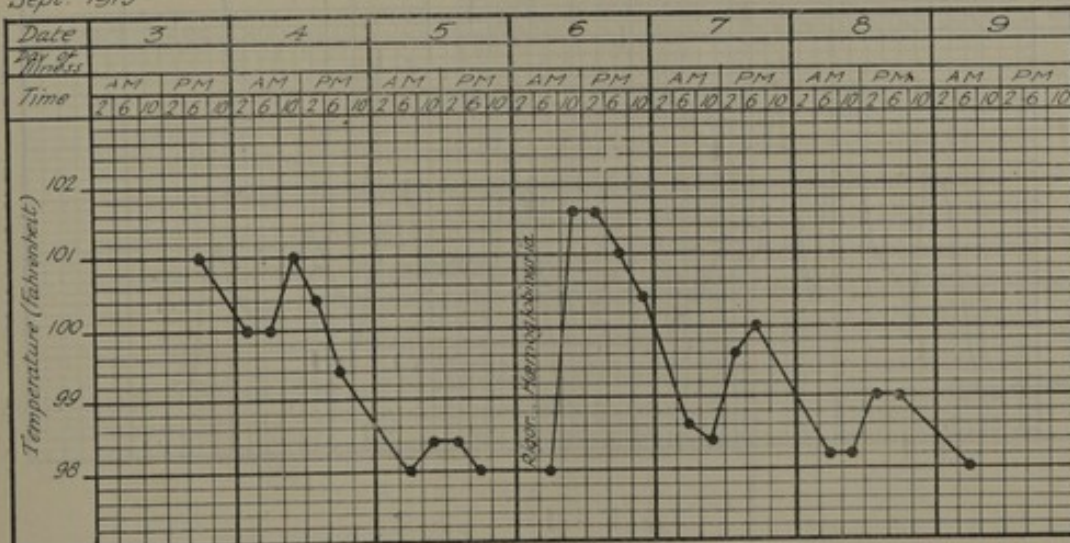
Case 12.

June 1913 July



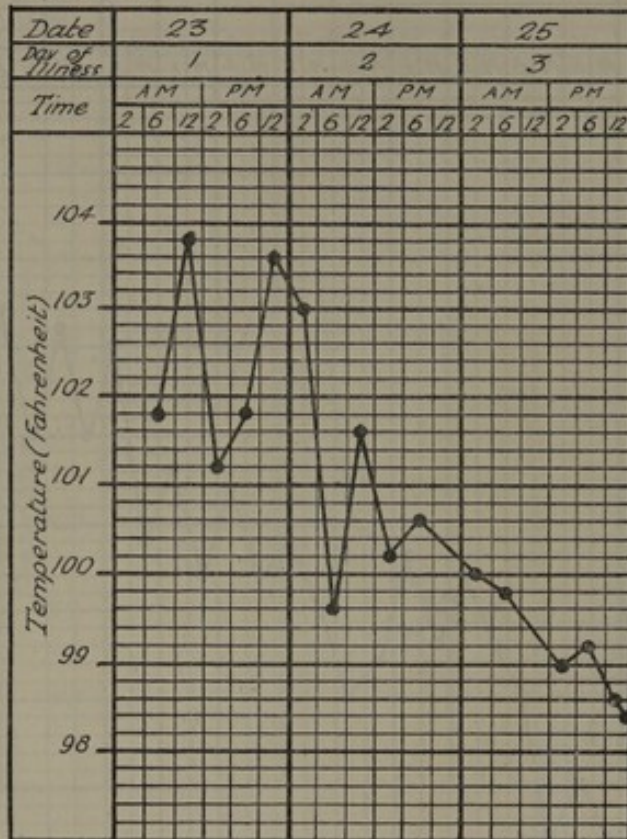
Case 13.

Sept. 1913



Case 14.

Sept 1913.



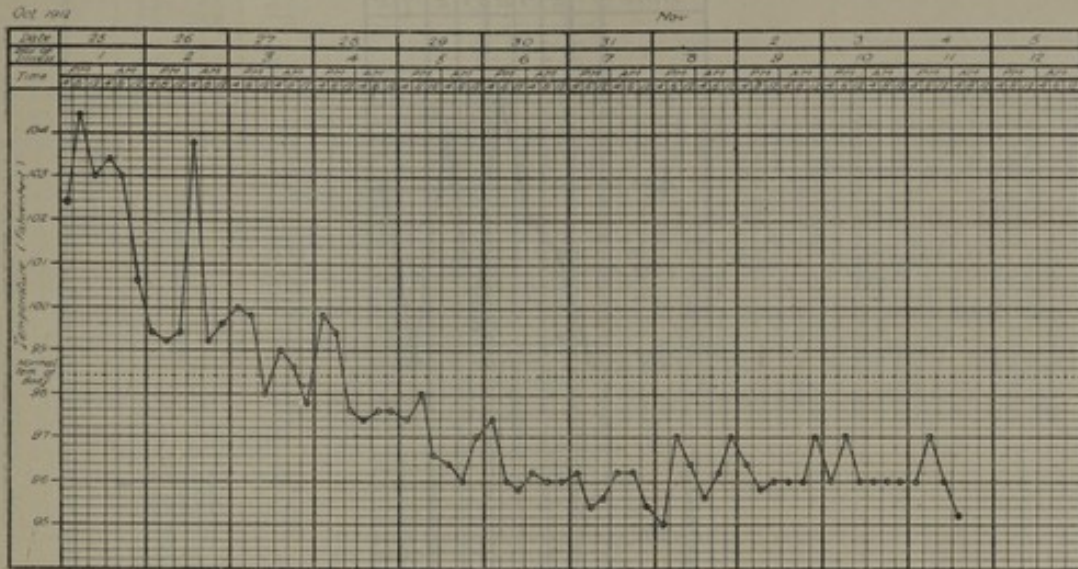
Case 15.

Oct 1913





Case 16.



Case 17.

Oct 1913.

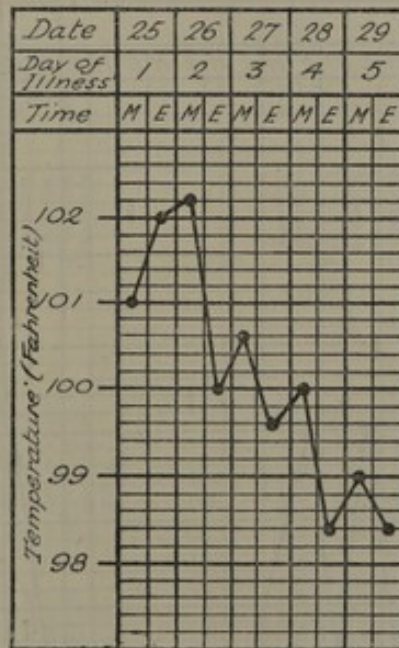






TABLE IV.

No.	Description and Date.	Locality.			Personal History.				Blackwater Fever.						
		Station, Quarters, and Physical Features.	Cases in same place.	Insect Fauna.	Seasonal Variations and Climatic Conditions.	Service and General Habits.	Previous Illnesses, Malaria, etc.	Previous attacks of Blackwater Fever.	Quinine prophylaxis and dose taken just before attack.	Hour of onset and time of jaundice.	Signs and Symptoms.	Duration of Hemoglobinuria.	Duration of Albuminuria.	Blood Examination.	Duration of Illness and Result.
1	Male. Age 26, British. Eyes greyish blue, hair red, complexion fair. Merchant. January 16.	Abonnema. Corrugated iron building on banks of Sombreire River, surrounded by native town; low-lying and swampy. Creeks subject to ebb and flow of river.	1 in 1911 1 in 1913	Anopheles, Culex, Ochlerotatus, Mucidus, Stegomyia, Temnorhynchus, Tabanus, Chrysops, Glossina, Stomoxys.	Dry season Harmattan. Rainfall for Degema (5 miles distant) is: Jan. nil, year's 88.51".	West Africa 3 years. Present tour 7½ months. Temperate.	Scarlet Fever in 1900.	None	5 grains irregularly. 10 grains.	11 a.m. 2nd day.	Pains all over body followed in twenty-four hours by the passage of typical "black water" of the colour of stout. Three severe rigors each lasting 20 to 40 minutes on first two days of illness. Distressing retching and bilious vomiting for four days. Deep saffron-yellow colour of skin and conjunctivæ. Pulse 80 to 110, small, regular and compressible. Spleen 4" below costal margin and very tender. Pains in back and loins.	9 days	11 days.	Negative	13 days; recovery.
2	Female. Age 24, French. Eyes blue-grey, Hair dark brown, complexion sallow. Missionary. February 5.	Topo. Old wooden house on sea beach, eight feet from ground. Numbers of native girls living in close proximity. Low-lying, swampy.	1 in 1913	Glossina, Tabanus, Stomoxys, Culex, Culicomyia, Myzomyia, Nyzorhynchus, Xenopeylla.	Dry season. Feb. rainfall 4.45", year's rainfall 59.51".	West Africa 1 year. Present tour 1 year. Abstemious.	Many slight attacks of malaria.	None	2 grains daily. 8-10 grains.	4 p.m. 2nd day.	Had been feeling ill for two or three days but did not go to bed. On morning of 5th February, 1913, she took an "extra dose" of quinine (about 10 grains). Black water commenced at 4 p.m. same day. There was a severe rigor just previously, lasting about 30 minutes. Vomiting was troublesome, pains in back not severe. "Black water" was passed many times, 8-10 ozs. throughout the following day. Fourth day (when first seen) she was very exhausted, in a clammy perspiration, anæmia profound. Complained of extreme weakness and want of sleep. Temperature 102° F., pulse 124, very feeble. Vomiting after all food. Soft systolic bruit over mitral area, and rough systolic bruit over pulmonary valve. Slight trace of jaundice in scleræ. Spleen palpable at costal margin. DR. BOOTH.	2 days	4 days	Subtertian parasites on sixth day.	11 days; recovery.

No.	Description and Date.	Locality.			Seasonal Variations and Climatic Conditions.	Personal History.				Black water Fever.					
		Station, Quarters, and Physical Features.	Cases in same place.	Insect Fauna.		Service and General Habits.	Previous Illnesses Malaria, etc.	Pre-vious attacks of Black-water Fever.	Quinine prophylaxis and dose taken before attack.	Hour of onset of time of onset of jaundice.	Signs and Symptoms.	Duration of Haemoglobinuria.	Duration of Albuminuria.	Blood Examination.	Duration of Illness and Result.
3	Male. Age 33. British. Eyes blue, hair light, complexion fair. Merchant. February 13.	Calabar. Good quarters, hilly country, densely covered with forest and much intersected by creeks.	2 in 1905 8 in 1906 5 in 1907 3 in 1908 2 in 1912 3 in 1913	Glossina, Tabanus, Chrysops, Myzomyia, Culex, Callicionymia, Ochlerotatus, Hodgesia.	Dry season. Feb. rainfall 2.71", year's rainfall 128.84". Average rain-fall 131.08", mean max. temp. 94° F., mean min. temp. 72° F.	West Africa 11 years. Present tour 9 months. Temperate.	Several slight attacks of fever during three months previous.	None	Took quinine only when feverish. None.	4 a.m. 1st day.	Rigors marked during first two days. Urine dark-coloured with brown deposit. No pain and only vomited slightly on 2nd day. Took fluids well. Urine started to clear on afternoon of 15th February, 1913, and was clear next morning. He went on well until afternoon of 18th February, 1913, when he had a rigor, temperature 104° F., and urine became black again. On 19th February, 1913, he had a bad day with several rigors and temperature rose to 106° F. He was very exhausted but had no pain. On 20th February, 1913, urine cleared and he made good progress. Jaundice was present on first day.	1st attack 4 days. 2nd attack 3 days.	9 days	Negative	11 days; recovery.
4	Male. Age 12. West African schoolboy. February 14.	Ibadan. Native-built house on European plan. A rolling plateau with low hills and hardly any virgin land.	1 case or more each year since 1907. 1 case in 1912. 2 in 1913.	Glossina, Hematopota, Tabanus, Callicoides, Myzomyia, Callicionymia, &c.	Dry season: Feb. rain-fall 0.85". Yearly rain-fall 49.19". Average rain-fall 49.87". M-an max. temp. 86° F. Mean min. temp. 58.5° F.	West Africa since birth.	Frequent attacks of malaria.	None	None. 2½ grains thrice daily from day previous to attack.	Un-known. 4th day.	Headache. Pain between shoulders and in back. Temp. 101° F., pulse rapid and thready. Skin moist, tongue pink and slightly furred. Vomited on evening of 16th February, 1913, and again next day, vomited matter being yellow. Also vomited a round-worm. Spleen enlarged to umbilicus. Urine continued dark in colour until morning of 18th February, 1913, and was passed in small quantities.	9 days.	13 days.	Negative	13 days. Recovery.
5	Male. Age 28. British. Eyes brown, hair brown, complexion medium. Lieut. S.N.R. March 13.	Ibadan. Some time in bush hut, latterly in mess bungalow. Was travelling for a week previous to illness.	See above	See above	End of dry season. March rain-fall nil.	West Africa 9 months. Had served in India. Present tour 9 months.	Diphtheria, 1910.	None	5 grains daily. 5 grains.	10 a.m. 1st day.	Was awakened at 3 a.m. 13th March, 1913, with violent pains in loins, back and abdomen; relieved by hot-water bottle. Was seen at 7 a.m. and asked as to urine; some had been passed but colour un-noticed. Again passed urine at 10 a.m., nearly black in colour. Began to clear on 15th March, 1913, but darkened again same day, and cleared again on 16th March, 1913. Again became dark on 18th March, 1913, but cleared on same day.	6 days.	6 days.	Negative	7 days. Recovery.

DR. BEALE-BROWNE.



6	Male. Age 32. British. Eyes blue, hair dark brown, complexion fair. Missionary. April 4.	Various mission stations on Qua Ibo River. Bush huts and bungalows. Low- lying and swampy.	No record except in 1912, when 2 cases occurred. 1 case in 1913.	Glossina, Tabanus, Chrysops.	Beginning of rainy season. No statistics available.	West Africa 1 year. Present tour 3 months. Abstemious.	Neuritis in 1906. Several slight attacks of malaria in present tour.	None	5 grains daily. 5 grains.	6 p.m. 1st day.	There was no medical officer in attendance. At 6 p.m. on 4th April, 1913, he had a rigor and high fever. At 7 p.m. a large amount of very dark urine was passed. Vomiting began with the fever and continued all through the attack. At about noon on 5th April, 1913, suppression of urine occurred. On two occasions during the following week a small quan- tity of clear urine was passed. There was no fever after 5th April, 1913, and little restlessness, but there was constant vomiting, and much weakness until death at 3 a.m. 12th April, 1913. Dr. FORBES.	2 days.	Un- cer- tain.	None	8 days. Death.
7	Male. Age 27. British. Eyes blue, hair light, com- plexion fair. Merchant. April 5.	Warri. Good bungalow, not mosquito- proof. Low-lying and swampy.	One case in 1906, 1 in 1909, 1 in 1910, 4 in 1912, 2 in 1913.	Glossina, Tabanus.	Beginning of wet season. April rainfall 6.10". Year's rainfall 112.74". Average rain- fall 107.24". Mean max. temp. 92° F. Mean min. temp. 74° F.	West Africa 21 months. Present tour 21 months. Moderate.	For first year no malaria, 3 attacks in next 6 months and fever every 14 days in last 3 months.	None	5 grains daily ? 10 grains.	2 p.m. 1st day.	Had been in hospital for eight days with malaria. He had 39 grains quinine hydrochloride daily for four days, and 20 grains daily thereafter. At 1 p.m. on eighth day, after a light lunch, complained of "feeling rotten." At 2 p.m. temp. was 105° F. No rigor, no pain, only a burning heat. At 3.30 p.m. passed port-wine coloured urine, 6 p.m., temp. 104° F.; 10 p.m., temp. 100° F. Next day felt fairly normal; urine clear, but albuminous. No tenderness nor enlargement of liver or spleen. Dr. ASHTON.	28 hours.	60 hours.	Not examined.	6 days. Recovery.
8	Male. Age 46. British. Eyes blue, hair brown, com- plexion fair. Medical officer. April 22.	Omitsha. Good house, mosquito-proof. Hilly and open country, with patches of forest. 200 feet above River Niger.	One or more cases each year since 1907 none in 1911, 1 in 1912, 1 in 1913.	Glossina, Tabanus, Culex, Mansonioides, Myzomyia, Tentorhynchus, Phlebotomus, Ctenocephalus, Rhithrocephalus, &c.	Wet season. April rainfall 8.39". Year's rainfall 65.74". Average rain- fall 71.30". Mean max. temp. 92° F. Mean min. temp. 74° F.	West Africa 17 years. Present tour 7 months. Abstemious.	One attack of malaria in 1904, and one attack after first attack of blackwater fever. Numerous slight "bilious attacks."	One, 8 years ago.	5 grains daily, but had been neglected for 3 weeks. Large dose, probably 25 grains.	3 a.m. 3rd day	Slight fever and vomiting, and pass- ing "black water." Dr. ELLIS.	4 days.	11 days.	Negative	11 days. Recovery.

Blackwater Fever.															
No.	Description and Date.	Locality.			Personal History.				Signs and Symptoms.		Duration of Haemoglobinuria.	Duration of Albuminuria.	Blood Examination.	Duration of Illness and Result.	
		Station, Quarters, and Physical Features.	Cases in same place.	Insect Fauna.	Seasonal Variations and Climatic Conditions.	Service and General Habits.	Previous Illnesses, Malaria, &c.	Previous attacks of Blackwater Fever.	Quinine Prophylaxis and dose taken just before attack.	Hour of onset and time of onset of jaundice.					Signs and Symptoms.
9	Male. Age 46. British. Eyes blue, hair brown, complexion fair. Mining engineer. April 25.	Uwet (Calabar). Bush camp. See No. 3.	See No. 3	See No. 3	Wet season. April rainfall 8.19". See No. 3.	West Africa 18 months. Present tour 10 months. Served in South America. Temperate.	Frequent attacks of malaria in last 4 months.	None	Irregular 10 grains.	4 p.m. 2nd day.	Felt unwell all day. Had rigor about 2 p.m. Passed black urine about 4 p.m. Was seen by medical officer on afternoon of 26th April, 1913, when urine was clearing. Temp. was 99° F. There had been no vomiting. Except for a temp. of 99.5° F. in the evening of 26th April, 1913, he felt well during the whole attack. Dr. CRAIG.	1 day.	2 days.	Negative (not examined until third day).	12 days. Recovery.
10	Male. Age 36. British. Eyes grey, hair dark, complexion dark. Medical Officer. May 16.	Afikpo. Unfurnished house on a hill. Dense forest on one side of Cross River, open grass country on other side.	1 case in 1909, 1 case in 1910.	Anophelines, Culicines, Glossina, Tabanus, Culicoides.	Wet season. May rainfall 15.65". Year's rainfall 56.08".	West Africa 8 years. Present tour 8½ months. Temperate.	Several attacks of malaria in last 3 months, but few attacks previously.	None	5 grains daily, but had been taken quite irregularly during last 3 months. 10 grains.	1.30 a.m. (January) present one week before the attack, but increased on 1st day of illness.)	Rigors at intervals from 10 p.m. 16th May, 1913. Violent vomiting at 1.20 a.m. 16th May, 1913, and after that a pressing desire to pass urine, which proved to be black-coloured. Before morning about 80 ounces urine were passed. Came to Calabar from Ita in a launch, and on arrival vomiting and restlessness were marked, but there were no other untoward symptoms. Dr. CRAIG.	2 days.	8 days.	Negative (on second day).	10 days. Recovery.
11	Male. Age 36. British. Eyes brown, hair grey, complexion sallow. District Commissioner. June 29.	Ohogbo. Satisfactory house. Well-watered, undulating country. No swamps.	1 case in 1909, 1 in 1910, 2 in 1911, 1 in 1912, 1 in 1913.	Simulium, Glossina, Stomoxys, Tabanus, Chrysops, Hippocentrum, Hematopota, Myzomyia, Nyzerhynchus, Culex, Mansonioides, Culectomyia, Stegomyia, Ctenocephalus, Boophilus.	Wet Season. June rainfall 7.89". Year's rainfall 44.53". Average rainfall 50.01". Mean max. temp. 92° F. Mean min. temp. 68° F.	West Africa 7 years. Present tour 11½ months. Moderate.	Occasional gastritis. Three previous attacks of malaria.	None	5 grains daily. 10 grains.	4 p.m. 1st day.	28th June, 1913. Six loose motions, bright yellow. Vomited yellow-stained fluid twice. Temp. 102° F., fell to 101° F. 29th June, 1913. Morning temp. 98° F. At 11 a.m. a rigor lasting 45 minutes; temp. 103.2° F. at 4 p.m. and 8 ozs. portocoloured urine passed. At 6 p.m. 4 ozs. urine not so dark. At 11 p.m. urine clear. DR. BIERLEY.	3 hours.	1 day.	Negative	3 days. Recovery.
12	Male. Age 32. W. Indian. Eyes	Abeokuta. Mud-walled house. Numerous mos-	—	Hematopota, Chrysops, Simulium,	Wet season. June rainfall 6.20".	West Africa 6 years. Present tour	Frequent attacks of malaria.	Two previous	Very irregular. 10 grains.	2.30 p.m. 3rd day.	Shivering at onset. Pain in legs and back. Headache, fever, vomiting, hicough, jaundice. Tongue dry,	7 days.	12 days.	Negative 2nd, 3rd, 4th, 5th.	12 days. Death.



13	<p>brown, hair black. Agriculturist. June 30.</p> <p>Male. Age 25. British. Eyes blue, hair fair, complexion light. Merchant. Sept. 6.</p>	<p>quitoes, Hilly, near Ogun River.</p> <p>Lagos. House in native town. Low lying. On lagoon.</p> <p>6 to 11 cases in Lagos each year since 1905. 5 in 1912, 3 in 1913.</p>	<p>Stomoxys, Hippoboscina, Tabanus, Glossina, Phlebotomus, Culicoides, Anopheles, Culex, Stegomyia, Mansoniodes.</p> <p>Glossina, Tabanus, Haematopota, Chrysops, Culicoides, Culex, Culicomyia, Ochlerotatus, Anopheles, Stegomyia, Xenopsylla.</p> <p>See No. 3</p>	<p>Year's rainfall 44.49". Average rainfall 47.15".</p> <p>Wet season. Sept. rainfall 3.39". Year's rainfall 63.07". Average rainfall 74.65". Mean max. temp. 89° F. Mean min. temp. 77° F.</p>	<p>4 years. Native of Barbados. Temperate.</p> <p>West Africa 2½ years. Present four months. Temperate.</p>	<p>Frequent attacks of malaria.</p>	<p>Haemoglobinuria 8 or 9 times in England.</p>	<p>None on present tour. 2½ grains.</p>	<p>9 a.m. 1st day.</p>	<p>Admitted to hospital with malarial fever on 3rd September, 1913. Quinine, 2½ grains, given at 7 a.m. on 6th September, 1913, and rigor at 9 a.m. followed by haemoglobinuria which lasted 12 hours. There was marked jaundice. Dr. LEONARD.</p>	<p>12 hours.</p>	<p>3 days.</p>	<p>Before attack numerous subtertian parasites</p>	<p>and 6th days.</p>	<p>10 days. Recovery.</p>
14	<p>Male. Age 38. British. Eyes blue, hair dark, sallow complexion. Mechanical Engineer. September 23.</p>	<p>Calabar. Ordinary Government quarters. See No. 3.</p> <p>See No. 3</p>	<p>See No. 3</p>	<p>Wet season. September rainfall, 14.86". See No. 3.</p>	<p>West Africa 8½ years. Present four months. Temperate.</p>	<p>Occasional attacks of malaria.</p>	<p>None</p>	<p>5 grains on alternate days. 10 grains.</p>	<p>5 a.m. 1st day.</p>	<p>On the night of 22nd September, 1913, he did not feel well, and had some looseness of the bowels. To get rid of it he took 10 grains quinine and went early to bed. When seen in morning was at breakfast, and had passed a large quantity of dark urine, but felt quite well. For a day or two before the attack he had looked slightly jaundiced. On admission to hospital he had a sense of tightness round the abdomen and felt cold. A little later in the day he had two rigors. Urine cleared on 25th September, 1913. Dr. ADAMS.</p>	<p>48 hours.</p>	<p>3 days.</p>	<p>Negative</p>	<p>4 days. Recovery.</p>	
15	<p>Male. Age 28. British. Eyes grey, hair brown, fair complexion. District Commissioner. October 11.</p>	<p>Warri. Government quarters. See No. 7.</p> <p>See No. 7</p>	<p>See No. 7</p>	<p>End of wet season. October rainfall, 10.83". See No. 7.</p>	<p>West Africa 4 years. Present four months. Temperate.</p>	<p>Eight previous attacks of malaria. Hay fever.</p>	<p>None</p>	<p>5 grains daily. 5 grains.</p>	<p>2 p.m. None.</p>	<p>Usual rigor, vomiting and black urine. Dr. THORSON.</p>	<p>2 days.</p>	<p>12 days.</p>	<p>Negative</p>	<p>12 days. Recovery.</p>	

Blackwater Fever.												
No.	Description and Date.	Locality.			Personal History.				Signs and Symptoms.			
		Station, Quarters, and Physical Features.	Cases in same Place.	Insect Fauna.	Seasonal Variations and Climatic Conditions.	Service and General Habits.	Previous Illnesses, Malaria, etc.	Previous attacks of Blackwater Fever.	Hour of onset and time of jaundice.	Duration of Haemoglobinuria.	Duration of Albuminuria.	Blood Examination.
16	Male. Age 31. British. Eyes blue, hair brown, fair complexion. Boilermaker. October 26.	Ebute Metta. Government quarters. Low-lying and swampy.	Six to eleven cases in Lagos each year since 1905. 5 in 1912, 1 in 1913.	Glossina, Tabanus, Hematopota, Hippocentrum, Culicoides, Psychodidae, Stegomyia, Culicines, Anophelinae, Xenopsylla.	End of wet season. Oct. rainfall 6'31", year's rainfall 63.07", average rainfall 74.65". Mean max. temp. 89° F., mean min. temp. 77°.	West Africa 1 year. Present four 6 months. Temperate.	Malaria six weeks previously.	None	11.30 a.m. 6th day	11 days	Sub-tertian malarial rings, 1st day	12 days. Death
17	Male. Age 37. British. Eyes blue, hair fair, complexion fair. Lieut. S.N.R. October 27.	Obudu. Bush hut. Good station, well kept. Mountainous and hilly, open grass country with light bush. Dense forest and swamp in the south.	1 in 1910, 2 in 1913.	Ticks, Anophelinae, Culicines, Glossina.	End of wet season. Oct. rainfall 12.99", year's rainfall 68.43.	West Africa 3 years. Present four 6 months. India 1908-09. Temperate.	Several previous attacks of malaria.	None	11 a.m. 1st day.	3 days.	Sub-tertian malarial parasites two days before attack. Subsequent emanations negative.	8 days. Recovery
18	Male. Age 37. British. Eyes grey, hair brown, ruddy complexion.	Okroga. Bush house. Open hilly country with light forest.	None	Anophelinae, Culicines, Tabanus, Stomoxys, Glossina.	Beginning of dry season. Nov. rainfall nil, year's rainfall 57.12".	West Africa 5 years. Present four 12 days. South Africa	Influenza, "yellow jaundice."	None	4.30 p.m. 2nd day.	4 days.	Negative	4 days. Death.

Dr. LEONARD.

Dr. QUIRK.



19	Col.-Sergt. S.N.R. November 9.				Culicoides, Ticks, Stegomyia, Ceratopogon, Haematopota, Chrysops.	See No. 16	See No. 16	Dry season. December rain- fall 0.06". See No. 16.	West Africa 1½ years. Present tour 8 months. Temperate.	Several previous attacks of malaria. Enteric fever in 1907.	None	Took Quinine only when feeling "soedy." 5 grains.	6 a.m. 2nd day	Dark-coloured urine passed, which separated into two layers, an upper the colour of dark beer, and a lower consisting of yellowish white sediment which proved to contain granular and hyaline casts, epithelial cells and debris. Dr. MACLAINE.	4 days. 1 day	4 days. 1 day	4 days. 1 day	Subtertian parasites on 1st day.	9 days. Recovery.
20	Male. Age 59. British. Ship's captain. Fair. December 2.					See No. 16			?	Several attacks of malaria.	?	?	?	Fever, vomiting, haemoglobinuria. Temp. on admission 102° F., gradu- ally fell to normal in 3 days. Dr. LEONARD.	6 days.	6 days.	6 days.	Subtertian parasites.	10 days. Recovery.
21	Male. Age 32. British. Eyes brown, hair fair. Merchant. December 14.				Glossina, Chrysops.	See No. 16	2 in 1907 2 in 1909 4 in 1910 4 in 1911 3 in 1912 1 in 1913	Dry season. Dec. rainfall 0.05", year's rainfall 105.85". average rain- fall 102.12". Mean max. temp. 85° F., Mean min. temp. 72° F.	West Africa. 3 years. Present tour 11 months. Temperate.	Malaria frequently.	None	5 grains daily. 10 grains.	3 a.m. 1st day.	Jaundice, diarrhoea, vomiting. Tem- perature when first seen was 101° F.; after onset of haemoglobinuria and jaundice fell to 98° F., pulse 100, very weak. Urine, typical "black- water," acid, and turned almost solid on boiling. The temperature just before death was 99° F. Dr. SWYTHE.	4 days.	4 days.	4 days.	Negative	4 days. Death.

## SIERRA LEONE.

THE GOVERNOR to THE SECRETARY OF STATE.

(Received 25 September, 1914.)

SIR,

Government House, Sierra Leone, 5th September, 1914.

I HAVE the honour to transmit herewith copy of a minute by the Principal Medical Officer covering reports on ten cases of blackwater fever which occurred in the Colony and Protectorate during the year 1913, together with a table and a map\* indicating the localities in which the cases occurred.

2. The request contained in paragraph 3 of your despatch of the 31st March last, viz., that the European population should be stated, has not been complied with, but Medical Officers have been instructed to furnish this information in future.

I have, &amp;c.,

E. M. MEREWETHER,

Governor.

Enclosure in No.

FROM the PRINCIPAL MEDICAL OFFICER to the HONOURABLE THE COLONIAL SECRETARY.

I have the honour to forward herewith in quadruplicate for transmission to the Secretary of State the reports received on ten cases of blackwater fever which occurred during the year 1913. The reports are accompanied by a table and a map.\*

2. Since I had been only four months in the Colony at the end of the period covered by these reports I do not propose to comment on the subject, but perhaps the following facts, which refer to case No. 9 and two others not included amongst these reports, are not without interest.

Case No. 9 occurred at Yonnibannah in the month of August.

In the month of November a second European, occupying the same room as the above, contracted blackwater fever, and at the end of November a third, who occupied the room in which the second formerly slept, had a severe attack of malarial fever.

A European official, who was in the habit of visiting the bungalow referred to above, went home with the second European (referred to in the preceding paragraph), sharing his cabin, and contracted blackwater fever soon after his arrival in England.

THOS. E. RICE,  
Principal Medical Officer.

Colonial Medical Department,  
Freetown, Sierra Leone,  
12th June, 1914.

## CASE 1.

## CLINE TOWN.

This case may possibly be called blackwater fever, but in my opinion it should be reported as one of hæmoglobinuria, seeing that the course was unlike the classical clinical picture of blackwater fever. The case appears to conform with a type which may be classed with blackwater fever on account of the presence of hæmoglobinuria, and which is alluded to by Sir William Leishman and others in the November number of the transactions of the Society of Tropical Medicine and Hygiene (pages 2 and 21).

G. G. BUTLER.

\* Not reproduced.



*History.*—The patient, aged 31, was a fitter on the railway completing his second tour. His health had been previously quite fair, but he had been on the sick list for "intermittent fever" and periostitis of the tibia. The attack of intermittent fever was not confirmed by blood examination, and in the light of his statement that he takes quinine daily in a 5-grain dose, the probability that this illness was due to malaria must be considered as doubtful. For twelve days during his first tour he tells me he was "down with fever."

The man himself, I fancy, is not a very steady fellow, but I have not heard any complaints concerning him. He came under my notice, in the first place, on December 17th, when he called to see me about a painful swelling of his left tibia, which had been present since July, but had become worse since the beginning of December. This swelling I regarded as a gummatous periostitis, and I placed him on the recognised treatment for this condition.

On the night of December 17th he took his own temperature, and found it 103°. He complained of feeling "hot and cold," but there was no definite rigor. Thinking he had fever he took 10 grains of quinine, though he had taken his usual 5 grains that morning. I visited him at 8.30 a.m. on December 18th and found his temperature normal. He then informed me that he had taken two further doses of 5 grains of quinine that morning. In view of the fact that he had taken 20 grains of quinine within 12 hours, I decided that it was useless to examine his blood for malaria, and told him not to take any further doses of quinine.

At 1.30 p.m. I was re-summoned to see the patient, as he had passed "black urine," but, not receiving the note till 4.30 p.m., I did not see the patient until 5 p.m. There was no fever then, there had been no rigors, and no vomiting, but his urine was a dark port-wine colour, translucent and loaded with albumen; a total quantity of about eight ounces had been passed since noon. The patient was quite comfortable, and showed no signs of distress, except some slight mental excitement at the idea of blackwater.

The patient was removed at once to the Nursing Home, where frequent drinks of water were enforced and saline injections given per rectum every four hours. Not until about 3 a.m. did the patient pass any urine, the specimen then was only faintly blood stained, and on examination showed a fairly thick cloud of albumen and no red corpuscles; the next specimen passed appeared quite normal in appearance, and contained no albumen. There were no rigors and no vomiting or fever while in the Nursing Home, and the patient's convalescence was rapid.

The special points called for in reporting this case are:—

1. *Locality.*—This may be considered fairly healthy; there is a swampy area just below the house occupied, but the river, being tidal, covers the swampy area with brackish water twice a day. Within 200 yards there is a considerable quantity of "bush."

2. *Series of cases.*—There is no record of any other cases occurring recently in the neighbourhood.

3. *Insect fauna.*—*Stegomyia* are frequently seen during the rainy season, and the patient tells me that small black and noiseless mosquitoes are found in his house, though I have not observed this myself; but the description given corresponds with the common anopheline mosquito here (*Pyretophorus costalis*).

4. *The season.*—The case occurred during the early harmattans of the dry season. The temperature, in my own house, which is within a short distance, has varied between 80° and 90° during the twenty-four hours.

5. *Personal history.*—A fairly healthy man, I believe not very steady, and I fancy has had lues. He has had two attacks of "intermittent fever," but there was no blood examination on either occasion, so that the possibility of malaria is not confirmed. He states that he takes his quinine regularly and daily in 5 grain doses. The conditions of the life he leads are fairly strenuous, and occasionally, I fancy, entail a fair amount of standing about in the sun.

6. *Examination of blood.*—This was only undertaken on one occasion, namely, December 19th, the morning after the first occurrence of "blackwater." This



examination did not reveal the presence of any malaria ring forms or crescents, and the differential leucocyte count was as follows :—

	Total counted.	Percentage.
Polymorphonuclear leucocytes ... ..	148	49·3
Lymphocytes ... ..	115	38·3
Large hyaline ... ..	21	7·0
Eosinophil ... ..	16	5·3
	300	99·9

G. G. BUTLER,  
Medical Officer.

## CASE 2.

### KOINADUGU DISTRICT.

This patient did not report his illness at the time nor receive medical attention. I think it best to give his own account of his illness, more or less in his own words.

JOHN Y. WOOD,  
Medical Officer.

In answering your questions, I may state that I am not subject to repeated attacks of malaria, in fact, for the last two years or more I have had but once a temperature of 100°, excepting, of course, the blackwater in March, 1912.

Quinine I take in 5 grain (occasionally 10 grain) doses *regularly*, usually in the evening. I have done this for over three years.

My bowels are usually regular.

The first symptom I can detect about two days in advance, namely—lack of energy, irritability and general sluggishness. The next is a nervous headache, and a worn-out feeling similar to that of malaria. At this stage I consult the thermometer, and find it registers 100° or slightly over. Loss of appetite is to me always a red signal when combined with headache and sluggishness. This usually occurs about supper time. I immediately take to bed and take 10 grains quinine lest it be malaria. About 9 p.m. I note discoloured water, resembling at first very weak tea, which is followed by chill and great shaking. I apply hot water bags, drink hot tea or water, and in about 30 minutes my temperature is up to 104°, or perhaps 104·4°, and I suffer from heat, breaking afterwards into a profuse sweat. When I note the discoloured water I immediately stop quinine and phenacetin for the following reasons: (1) the quinine may upset my stomach and induce vomiting; (2) I was informed by a doctor that it was of little value in large doses in blackwater; (3) I drop the phenacetin to save my heart, and reserve it for the strain to follow.

My diet is restricted to milk, raw eggs and honey to avoid a full stomach. Liquid I drink in abundance, and with unceasing vigilance resist all attempts at vomiting or hiccuping. The latter I resist by deep breathing and holding my breath with inflated lungs till the desire leaves me. The water is discoloured only for four days and then clears, leaving me a physical wreck, as though I had been starved a month, and extremely weak, my heart being barely able to fulfil its functions, with the beat remarkably slow and irregular. The slightest motion causes faintness and exhaustion.

The urine in both attacks slowly clears on the fourth day about noon, and is normal in twenty-four hours.

The last attack was precipitated by undue exposure and exertion some six or seven days previously. Now, at the slightest sign of tiredness or lack of energy



I lay all work or exercise aside, take 10 grains of boric acid, and usually am fit in a short time, perhaps next day. This occurred about the middle of June.

	1st day.	2nd day.	3rd day.	4th day.
Fever ... ..	104 ... ..	100 ... ..	99 ... ..	98.
Headache ... ..	Not severe ...	None... ..	None... ..	None.
Pulse ... ..	Increased ? ...	Normal ... ..	Normal ... ..	Very slow.
Sweating and chills ... ..	Excessive ...	Slight chills	Cold feet ...	Entire body cold.
Urine ... ..	Like weak tea	Like strong tea	Like tea ...	Begins to clear at noon.
Sleep ... ..	Fairly good...	Good... ..	Good... ..	Good.
Urine quantity ... ..	About 8 ozs. e	very 6 hours.		
Kidneys ... ..	Dull ache ...	Dull ache ...	Dull ache ...	Dull ache.
Vomiting ... ..	None... ..	None... ..	None... ..	None.
Hiccup ... ..	None... ..	Slight ... ..	None... ..	None.
Appetite ... ..	None... ..	Slight ... ..	Slight ... ..	Slight.
Weakness ... ..	None... ..	After urinating, slight.	Increased ...	Extreme.
Remedies—Quinine ... ..	10 grains ...	5 ... ..	5 ... ..	5.
Boric Acid ... ..	10 grains every 6 hours.			
Oil of Turpentine ... ..	Half teaspoonful morning and evening.			
Diet—Soft boiled egg 2nd and 3rd day	All the milk, eggs (raw) and honey I could take.			
Bowels ... ..	Normal ... ..	Normal ... ..	Normal ... ..	Normal.
Pain ... ..	Bodily ache...	None... ..	None... ..	None.

### CASE 3.

#### BONTHE, SHERBRO DISTRICT.

The blackwater first manifested itself on the 17th October in the afternoon. The urine was the colour of stout, and had a copious deposit and two-thirds solid albumen on boiling. On the 18th the urine was clear sherry coloured, and showed slight albumen and débris. In a few days' time it was normal. On the 24th the patient got out of bed. On the 13th of November the patient had a variable temperature, and from the 6th November he had been taking 1 grain of euquinine three times a day. A recurrence of the blackwater took place on the 13th of November, and continued very severe till the 16th, when the urine became clear and albumen slight. The patient was very weak and I feared a fatal issue on the 15th and 16th; however, rectal saline injections were given along with hypodermic injections of strychnine and digitalin, after which the condition of the urine steadily improved and the patient regained strength. Jaundice and anæmia were very marked during this second attack. On the 21st a slight recurrence again took place, but the patient gradually improved, though some days later the urine was again, for a few hours, loaded with albumen.

Having come to the conclusion that the patient's present condition—intense anæmia, hæmic bruit, and slight jaundice, with slight trace of albumen in the urine—requires special nursing, I have advised that he be taken to the Nursing Home, Freetown.

ALEX. BREMNER,  
Medical Officer.

### CASE 4.

#### DEAH, NORTHERN SHERBRO.

*Locality.*—(a) The house is low, mud-walled, tin-roofed, and very hot in the daytime. At one side, about two hundred yards away, the River Wanjai flows. There are several native houses close up on this side. At the back and on the other side the bush has been allowed to grow right up to the verandah. The bush at the back slopes down to a swamp, two hundred yards away. In front there is a compound containing the stores and shop. This is about fifty yards square, and is kept clear of grass, &c.



The houses of the native town are only about twenty yards away from the boundary of the compound.

(b) There has been one other case of blackwater fever at Deah. This occurred last September. The patient was a German trader and lived in a house only twenty yards away from the house in which the present case occurred.

(c) *Biting flies*.—A few tabanus, mosquitoes, culex and *Stegomyia fasciata*. No other biting insects were seen.

*Seasonal variation*.—Both the cases above referred to occurred at the end of the rains.

*Personal history*.—(a) The patient has been resident in Sierra Leone for two years and four months. He states that he has had several attacks of fever, but can give no definite diagnosis as to what variety of fever. Patient has suffered from bad teeth for the last two years, and gets frequent attacks of indigestion. He has been in the habit of taking quinine, grains 3, daily, and says he has been fairly regular in this respect.

(b) He has spent all the time he has been in Sierra Leone in the Sherbro district. He was some months at York Island, was then moved up to Sumbuya, and from there came to Deah.

(c) No microscopic examination was made of the blood, as there are no slides or microscope in this district.

W. A. NICHOLSON,  
Medical Officer.

#### CASE 5.

##### FREETOWN.

The patient, a Syrian trader, living in Freetown, was admitted into the Colonial Hospital on December 23rd complaining of fever, some pain in the loins, and passage of bloody urine. On examination his temperature was 105°, pulse 120, tongue furred; he had some tenderness in the loins, and a spleen palpable below the costal margin. Urine was passed which was a little darker than port wine, and on examination showed albumen, a few blood cells, and hæmoglobin.

A blood examination showed the presence of subtertian malaria. Hot fomentations over the kidney region, and phenacetin in 10-grain powders, together with Sternberg's mixture, were prescribed, and a low milk diet with copious draughts of mineral waters given.

In a couple of days the urine began to clear up; but there was a good deal of vomiting, which was eventually checked by a mustard poultice to the epigastrium, and bismuth powders.

The temperature returned to normal on December 27. The quantity of urine passed was rather more than normal.

On the third day after admission he showed an icteric tint over his whole body, but it was not so pronounced as is usual in blackwater fever.

No quinine was given during the attack. He left hospital on January 2nd.

Before admission to hospital he had fever and pains in the loins for about three weeks, but did not report sick until he passed dark-coloured urine.

He states that he has had several attacks of malaria during his stay in Freetown.

H. E. ARBUCKLE,  
Medical Officer.

#### CASE 6.

##### BONTHE, SHERBRO ISLAND.

The patient, whose age is 21, was born in East Africa, and remained there till two years ago. He then went to Paris and Manchester, spending a year between the two places. He subsequently came to West Africa, and was sent to Sherbro; he had been there for one year.

He is a small, thin, weedy youth, with a pale, pasty, blotchy, unhealthy-looking complexion.



I had been treating him for a week previously for gastritis, from which he had practically recovered.

On Saturday, August 23rd, in spite of my advice with regard to dieting for his gastritis, he had beef steak and kidneys for lunch. This gave him considerable gastric pain, and he vomited. He then had a rigor with shivering and went to bed; getting up about an hour later to pass water, he found his urine black. I saw him at 5 p.m.; temperature 102.4°, pulse 123 per minute; sweating slightly; tongue furred; liver and spleen enlarged and tender; skin and conjunctivæ lemon yellow in colour. Vomiting had occurred once or twice, but had stopped when I saw him. The urine was not seen as it had been thrown away. The patient was told to stop in bed, and also warned as to the danger of getting out of bed or even sitting up. No medicine was given as he had already taken a good dose of Epsom salts.

24th, 9 a.m. Temperature 99°, pulse 80; had a fairly good night. Passed about 24 ozs. of urine, which looked at in chamber pot was black, but on tilting the utensil to get a thinner layer it showed a distinctly dark red colour. On diluting the urine the red colour became very apparent. There had been no vomiting; the skin was a deeper yellow. Given Sternberg's mixture every three hours, and advised to drink fluid, Vichy or Sauerbrunnen water and milk *ad libitum*. 5 p.m. same day: temperature 100.2°, pulse 96, of good volume and regular, no vomiting. Urine unchanged, and passing a good quantity, but not kept for measuring—only a sample kept; general condition fairly good; is not frightened, as he does not realise that he has blackwater fever; spleen and liver not now tender; spleen not palpable, though increased in size. Liver on percussion still slightly enlarged. Colour of skin and conjunctivæ somewhat darker. Complains of aching across loins. Advised hot fomentations to loins.

25th, 9 a.m. Slept fairly well; skin slightly lighter in colour; passing a good quantity of urine; urine not kept for measurement, and only a small specimen kept for inspection. Urine somewhat lighter in colour. Temperature 99.6°, pulse 94. Still complaining of loin pain. Treatment continued. 5 p.m. Temperature 100.8°, pulse 118. Vomited once during the afternoon; vomit consisted of green bile. Passed 35 ozs. of urine (measured), which is red, but a much lighter colour. Still complaining of loin pains, otherwise fairly comfortable, though weak.

26th, 9 a.m. General condition, good; is quite comfortable; the only thing he complains of is that he drops everything; he is very weak. Temperature 98.6°, pulse 82. Urine much clearer, and has now the colour of Madeira, and is not red. Skin same as yesterday. Soft systolic murmur heard all over cardiac area, due to anæmia. 5 p.m. Feeling very unwell; tried to sit up in bed, and changed his pyjamas himself, and, very naturally, fainted. Temperature normal, pulse 70, rather weak and occasionally intermittent. Urine normal, no albumen; passed about 30-35 ozs. since 9 a.m.

An hypodermic injection of digitalin and strychnine was given, and a friend of his was warned to keep him under special observation so as to prevent his trying to help himself. Champagne in small repeated doses was recommended.

The following mixture was ordered:—

R Ferri et Ammon. Cit.	...	...	grs. 5.
Liq. Arsenicalis	...	...	ʒ 2.
Aq. Ad.	...	...	ʒ ss. t.d.s. ex. aq. p.c.

27th. Convalescent. Skin nearly clear; very anæmic and weak. Urine quite clear.

31st. Systolic murmur has disappeared.

1st. Found out of bed, feeling and looking very well; has some colour (pink) in his face.

*Quinine history.*—Did not take quinine regularly, only if he felt unwell. Had taken 1.6 grammes of quinine in divided doses just before he developed blackwater fever.

*Locality.*—Sherbro Island; low-lying and marshy.

House a few yards from Heddle Swamp.

*Insect fauna.*—Tabanids, glossinæ, sand-flies, and mosquitoes.

*Previous cases.*—There have been several cases, but I do not know the number.

*Seasonal variation.*—Rainy season. Rainfall for month, 37 inches.

E. W. WOOD-MASON,  
Medical Officer.



## CASE 7.

## PUJEHUN, NORTHERN SHERBRO DISTRICT.

Pujehun is a trading station up the Wanje River; it is a very malarious place, being surrounded by marsh land; mosquitoes are very numerous. The patient, whose age is 24, lived in a wooden house raised above the ground about eight feet on concrete or stone pillars.

I am informed by others that the house and its surroundings were kept in a filthy condition.

The patient had a slight attack of hæmoglobinuria about a week ago. I was informed of this by a member of a trading firm who had visited him at the time and advised him to come down to Bonthe for treatment; this the patient refused to do.

On Saturday, 23rd August, he appears to have taken a large dose of quinine, about 25 grains of sulphate, having previously been very irregular in taking quinine.

The present attack of hæmoglobinuria started on Tuesday, 24th, and a dispenser brought him down to Bonthe by launch, the voyage lasting twelve to fourteen hours.

I saw the patient at 2 a.m., on the 26th; he was exhausted by the voyage and was collapsed; temperature  $98^{\circ}$ , pulse 78, thready and weak, with a tendency to be intermittent. He had been vomiting green bilious fluid on the way down, but vomiting had stopped when I saw him. The urine was not seen, as it had not been kept; he had passed a small quantity during the voyage down. Skin and conjunctivæ were a dark yellow colour; he was sweating slightly.

A hypodermic injection of digitalin and strychnine was given, and he was put to bed and kept warm with blankets and hot water bottles.

26th, 8.30 a.m. He has passed no urine since arrival; he vomited once or twice during the night. Temperature  $100.8^{\circ}$ , pulse 104, stronger and regular. Still sweating, but not vomiting.

Given Sternberg's mixture and champagne. Hot fomentations continuously to loins. A native nurse was sent to look after him and administer rectal injections of hot saline solution, 1 pint every two hours, in the hope of warding off anuria. General condition bad; prognosis grave. Given mineral water and barley water at regular intervals throughout.

26th, 5 p.m., temperature  $102^{\circ}$ , pulse fairly good, is more comfortable; has passed no urine, but feels that he wants to; treatment continued, but saline injection reduced to half pint, as they are not retained for very long; the fæcal matter voided with the saline solution is black in colour. The skin is lighter in colour.

27th, at 6 a.m., temperature  $101^{\circ}$ ; 10 a.m.  $102.6^{\circ}$ ; 2 p.m.,  $103.8^{\circ}$ ; 6 p.m.,  $103^{\circ}$ ; and 10 p.m.,  $101.8^{\circ}$ . Pulse 110 to 120, fairly good. Has passed no urine yet; vomited green bile once or twice. The following mixture was given:—

R Spt. Aetheris Nit.	...	...	...	...	5 iv.
Tr. Digitalis	...	...	...	...	5 i.
Tr. Aurantii	...	...	...	...	5 iii.
Spt. Chloroform	...	...	...	...	5 ii.
Aq. Ad.	...	...	...	...	5 xii. 5 i. three-hourly.

Rectal injections are continued and retained well now.

28th, temperature normal at 6 a.m., pulse 102, fairly good. Skin much lighter; has vomited once or twice. No urine passed. Unfortunately I had left my transfusion apparatus in Freetown or I should have given injections of saline solution subcutaneously, and, if that failed, intravenously. At 10 a.m. the temperature was  $100^{\circ}$ , and subsequently  $101.2^{\circ}$  at 2 p.m., coming down again at 6 p.m. to  $100^{\circ}$ , and at 10 p.m. to  $99.6^{\circ}$ ; the pulse varied from 102 to 100. No urine passed; condition much the same as before.

29th. General condition much the same; no urine passed; skin lighter. Temperature rose at 6 p.m. to  $99.6^{\circ}$ , falling subsequently; the pulse varied during the day from 100 to 80.

30th. Nothing special to report. Temperature only rising during day to  $99^{\circ}$ .

1st September. Temperature dropped at 6 a.m. to  $97^{\circ}$ , and the pulse to 72. Hypodermic injection of digitalin and strychnine  $\bar{a}\bar{a}$  1/100 grain given and repeated at intervals; pulse dropped to 56 later on. No urine passed.

This condition lasted till the evening of 4th, when I handed the case over to Dr. Bremner, who informed me that uræmic symptoms, headache, and muscular twitchings set in during the night, and that the patient died on the 5th.



This case is of interest, owing to the length of time that suppression of urine lasted without uræmic symptoms developing.

I can give no details of Pujehun, as I do not know the place.

E. W. WOOD-MASON,  
Medical Officer.

#### CASE 8.

This patient was aged 25.

*Previous history.*—

Length of service on West Coast, 2½ years.

Leave of absence from Coast, 11 weeks.

Last tour, 23 months 1 week.

*Malarial history.*—Four attacks of malaria during tour, and one at home.

*Quinine history.*—Acting on medical advice, he says he took 10 grains of a salt of quinine (probably sulphate) once a week; this, he says, he did regularly.

*Quarters occupied.*—A house at Port Lokkoh, built of wood on concrete pillars, and about nine months old.

There has been no previous case in the house.

*Present attack.*—Captain MacEntire, R.A.M.C., was called in on June 22, and found him in a very weak condition; pulse bad and frequent, 110 to the minute; temperature 103·6°; urine normal in colour and reaction. He was given a quinine mixture and probably took three doses (grains 5 to 5i). He thus had 15 grains of quinine.

23rd. Now passing small quantities of urine with hæmoglobin in it; heart extremely weak, necessitating administration of strychnine hypodermically and champagne. Sternberg's mixture given. Vomiting continuously. Brought to Nursing Home by Captain MacEntire on 27th June. On admission patient came under my care; he was weak and anæmic, though his condition was fair; pulse fairly good, stood journey well. Tenderness over liver, spleen and bladder. Tongue fairly clean. No vomiting; jaundice slight. Mouth in a bad condition from pyorrhœa alveolaris. Urine not seen as none passed, but it had been distinctly red during the day. Sternberg's mixture continued, with hot fomentations to loins; instructions given to administer half pint of saline solution per rectum every two to three hours if urine remained scanty. Milk and soda and sauerbrunnen given.

28th. During last few days patient has passed good quantities of urine with hæmoglobin in it, which has now become clear, and the colour of dark tea with only a trace of albumen. Condition improved. Jaundice disappeared.

29th June. Urine greatly increased in quantity, and free from albumen.

30th. Pulse good; allowed to sit up in bed.

1st July. Allowed out of bed.

3rd. Discharged cured.

Convalescence rapid and uninterrupted. Blood examination at onset and the day after admission negative.

E. W. WOOD MASON,  
Medical Officer.

#### CASE 9.

##### YONNIBANNA DISTRICT.

This patient has had 3½ years altogether on the West Coast, at the Gold Coast and in Sierra Leone. He states that his time was spent mostly in the bush, and that "decent" quarters were usually provided for him.

Quinine prophylaxis, with him, was 5 grains of a salt of quinine, usually the acid sulphate, taken every alternate day. The amount always gave him "a buzzing in the ears." He states that the tablets were never sugar coated. He is at present in the seventh month of his tour, which has been spent in the Yonnibanna District. At first, for three months, he lived in a tent; subsequently he lived in a comfortable and good wood and iron house, which was mosquito proofed. He states that he also always used a mosquito net. The last five or six weeks he had observed mosquitoes in the house, and admits that he had found gorged specimens inside his net. While on the Gold Coast he suffered from a good deal of fever, but, being the only European



in charge of the place, he was unable to lie up for illness. As far as he remembered he had had altogether seven or eight attacks of fever. In March, 1913, he had what was thought to be a bilious attack, lasting for a fortnight "on and off," which the doctor said was "fever." Since then he has had a day occasionally in bed with "fever." In appearance the patient is rather slight, and of average height and size. He is a moderate smoker and drinker, does not suffer from dyspepsia, and has a good appetite.

*Present illness.*—About the 18th of July he felt a sensation of "all gone-ness," but did not "lie up" until the 23rd. He had during this time been taking 15 grains of quinine daily. On the 23rd vomiting began, which prevented him taking more. On the 24th he noticed he was passing blood instead of urine, which became darker on the 25th and 26th. Vomiting continued throughout. Patient was admitted into the Nursing Home on the 26th at 5.10 p.m., having arrived in Freetown by train from Yonibanna, a journey of eight hours, in a collapsed and exhausted condition. He suffered from distressing vomiting, and was markedly jaundiced. His temperature was 101.2° F., the pulse 100 per minute. Respiration 24 per minute. He was put to bed at once, and an enema of soap and water given. Brandy was prescribed in frequent small doses, and phenacetin, grs. xii, given.

27th. Urine, 42 ounces passed, hæmoglobin present, with albumen. The blood was examined, but no malarial parasites were found. Temperature was 98.6° F., the pulse 80, and respirations 20 per minute. Saline injections of normal solution were given every fourth hour. Vichy water and "Sparklet" were allowed *ad lib.* Wyeth's beef juice, one tea spoon, was administered every third hour.

28th. The urine passed measured 42 ounces and was clear. The temperature at 2 p.m. rose to 102.4° F., pulse was 106, and the respirations 20 per minute. The treatment was continued.

29th. Urine 30 ounces, temperature at 6 a.m. was 99° F. Urine contained a trace of hæmoglobin, and was pink. Temperature at 6 p.m. was 102.2° F., pulse 108, and respirations 20 per minute.

30th. Urine 38 ounces, and was clear. Temperature normal at 6 a.m., and 100° F. at 6 p.m.

31st. Urine 62 ounces, clear, temperature 102° F. at 10 a.m.

1st August. Sixty-two ounces, clear. Temperature ranged between 99° F. and 100° F.

2nd. Urine 72 ounces, patient convalescent.

6th. Patient was invalided to England—convalescent, extremely weak.

J. WALLACE COLLETT,  
Senior Medical Officer.

#### CASE 10.

#### FREETOWN.

The patient, a Syrian trader, called me in on 11th November, 1913, as he was passing urine which was reddish black. He had some pain in the loins, headache, and a temperature of 101.8°. He was placed in bed, given Sternberg's mixture every three hours, and copious draughts of aerated mineral waters and milk; he vomited once. The temperature in the evening fell to 100.6°, but the urine was still reddish black or brown; there was very slight jaundice. The urine contained hæmoglobin and albumen with a few red blood cells. Examination of the blood was negative for malaria.

On the 12th the temperature fell to 99.6° in the morning, and 99.2° in the evening; the urine was still dark, but that night began to get paler.

On the evening of the 13th the urine cleared, temperature was normal, and continued so.

The patient acknowledged one attack of fever previously, about three months before present illness. He had been in the habit of taking 5 grains of quinine occasionally, and until day of attack had not touched quinine for a fortnight; at 7 a.m. on the 11th he took 5 grains of quinine, and at 10 a.m. passed dark urine.

His residence was in one of the main business streets of Freetown.

H. E. ARBUCKLE,  
Medical Officer.



No.	Description, Date.	Station, Quarters, Physical features.	Multiplicity of cases.	Insect Fauna.	Season.	Previous illness.	Previous Blackwater.	Quinine habits.
1	Male, age 31. December 18th, 1912.	Clinetown. Railway Reserve. House near a swamp and tidal river. Flat, low-lying.	None ...	Chiefly Stegomyia.	End of rains	States two attacks of malaria.	None ...	States he has 5 grains daily. Took 20 grains within the twelve hours before attack.
2	Male, June, about 15th.	Kerifia ...	?	?	Early in the rains.	No malaria for two years. Blackwater in March, 1912.	March, 1912 ...	5 grains daily for last three years; 10 grains just before onset.
3	Male, October 17th	Bonthe ...	?	?	Rains ...	?	?	?
4	Male ...	Deah (Sherbro), 200 yards from river. Near native houses.	One case a few months before, in a German living 20 yards away.	Tabanus, Culex, Stegomyia.	At the end of rains.	Several attacks of "fever."	?	Takes 3 grains daily.
5	Male, Syrian, Trader	Kissy Road, Freetown. Thickly populated with natives. At the bottom of the hill.	None recently known.	Stegomyia, Culex, Anopheles. Not in large numbers.	Dry season...	Several attacks of "malaria."	None ...	?
6	Stores Assistant. August 23rd, 1913.	Sherbro Island. Low-lying and marshy. House a few yards from Heddle swamp.	Several cases previously reported.	Tabanids, Glossinæ, Mosquitoes.	Rainy season	Gastritis just before attack.	?	Only takes quinine if feeling ill. Took 1·6 gm. in divided doses just before attack.
7	Stores Assistant. August 23rd, 1913.	Pujehun, North Sherbro. Surrounded by marsh land. House wooden, raised from ground on stone pillars. Dirty.	—	—	Rainy season	—	Slight attack of hæmoglobinuria a week before.	Takes it irregularly. Took 25 grains previously.
8	Stores Assistant. June 22nd, 1913.	Port Lokkoh. Low-lying and marshy. House new, wooden.	No previous case in this house.	—	—	Four attacks of malaria in West Africa. One in England.	—	Takes 10 grains once a week. 15 grains in three doses just before attack.





No.	General Symptoms.	Duration of Haemoglobinuria.	Blood.	Treatment.	Result.	Reported by
1	Temperature stated 103°. Jaundice, none. Vomiting, none. Urine, colour of dark port wine. 15 hours. Albumen.	About 15 hours...	No parasites. Pn. 49.3%. L. 38.3%. Eos. 5.3%. M. 7%.	Copious drinks of water. Saline injections.	Rapid Recovery	Dr. Butler.
2	Temperature 104°; 2nd day 100; 3rd day 99. Jaundice and vomiting, none. Urine, like weak tea, darker on the 2nd day.	About 4 days ...	?	Abundant drinks of water. Boric acid (10 grains). Ol. terebinth, m. 30, m. and n.	Recovery ...	Dr. J. Wood.
3	Temperature variable. Jaundice, slight, but in the relapse on November 13th marked. Urine, stout colour. Albumen.	2 days. Relapse 4 days.	?	Rectal injections of saline. Strychnine, digitalis.	Sent to Freetown	Dr. Bremner.
4						Dr. Nicholson.
5	Temperature 105°. Jaundice, slight. Vomiting much. Urine, darker than port wine. Albumen.	2 days ...	Subtertian parasites found.	"Sternberg's" mixture. Copious drinks of mineral waters.	Recovery ...	Dr. Arbuckle.
6	Temperature 102.4°. Jaundice, present. Vomiting a little green bile. Urine, nearly black. Systolic murmur for a few days. Pain over loins. Liver and spleen enlarged and tender.	3 days ...	—	"Sternberg's" mixture three hourly. Water and milk <i>ad lib.</i>	Recovery ...	Dr. Wood-Mason.
7	Temperature 104°. Jaundice, marked. Vomiting green bilious fluid. Urine, suppression, followed by uraemic symptoms and death.	—	—	"Sternberg's" mixture. Rectal saline injections. Barley water to drink.	Death ...	Dr. Wood-Mason.
8	Temperature 103.6°. Jaundice, slight. Urine, colour of dark tea. Trace of albumen. Vomiting, none. Pain over liver, spleen and bladder.	About 5 days ...	Examination at onset and later both negative.	"Sternberg's" mixture. Saline solution per rectum $\frac{1}{2}$ pint every 2 or 3 hours. Milk and soda. Hot fomentations over loins.	Recovery ..	Dr. Wood-Mason.
9	Temperature, 101.2°. Jaundice, marked. Vomiting continuously. Urine, haemoglobin and albumen present.	About 4 days ...	Malaria parasites not found.	Saline injections every four hours. Vichy water to drink <i>ad lib.</i>	Recovery ...	Dr. Collett.
10	Temperature 101.8°. Jaundice, very slight. Vomiting once only. Urine, dark brown. Haemoglobin, albumen and red blood present in urine. Took 5 grains of quinine in the morning and in three hours haemoglobinuria, pain in loins and head developed.	2 days ...	Negative...	"Sternberg's" mixture. Copious draughts of aerated mineral waters.	Cured ...	Dr. Arbuckle.

## EAST AFRICA PROTECTORATE.

THE GOVERNOR to THE SECRETARY OF STATE.

(Received 30th October, 1914.)

Government House, Nairobi,

British East Africa,

September 24th, 1914.

SIR,

I HAVE the honour to transmit herewith the Annual Report on Blackwater Fever in this Protectorate for the year 1913.

2. It is somewhat difficult to give the European population in each area. The approximate figures are as follows :—

<i>Locality.</i>	<i>European Population.</i>					
Mazeras ... ..	...	...	...	...	...	10
Rabai ... ..	...	...	...	...	...	15
Shimba Hills ... ..	...	...	...	...	...	10
Punda Milia ... ..	...	...	...	...	...	10
Magadi ... ..	...	...	...	...	...	50
Yonte ... ..	...	...	...	...	...	25
Eldoma Ravine ... ..	...	...	...	...	...	5
Mombasa ... ..	...	...	...	...	...	400
Mackinnon Road ... ..	...	...	...	...	...	nil.
Mariakani ... ..	...	...	...	...	...	nil.
Kisumu ... ..	...	...	...	...	...	150
Kilindini (Mombasa) ... ..	...	...	...	...	...	400

I have, &amp;c.,

H. CONWAY BELFIELD,

Governor.

Enclosure.

EAST AFRICA PROTECTORATE.

*Blackwater Fever.*

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Race, Age and Sex.	
Mazeras ...	—	—	—	—	1	—	—	—	—	—	—	—	European, 49, m.	Recovery.
Rabai ...	—	—	—	—	—	—	—	1	—	—	—	—	European, 40, m.	Death.
Shimba Hills	—	—	—	—	—	—	—	—	1	—	—	—	European, 26, m.	Recovery.
Punda Milia	—	—	1	—	—	—	—	—	—	—	—	—	European, 21, m.	Recovery.
Magadi ...	—	—	—	—	—	—	—	—	1	—	—	—	European, 56, m.	Death.
Yonte ...	—	—	—	—	—	—	—	1	—	—	—	—	Nandi, m.a. ...	Death.
Eldoma Ravine.	—	—	—	—	—	—	—	—	—	1	—	—	Indian, 25, m. ...	Recovery.
Mombasa ...	—	1	—	—	—	—	—	—	—	—	—	—	Indian, m.a. ...	Death.
Mackinnon Road	—	1	—	—	—	—	—	—	—	—	—	—	Anglo-Indian, m.a.	Recovery.
Mariakani ...	—	—	—	—	—	1	—	—	—	—	—	—	Indian, m.a. ...	Recovery.
Mariakani ...	—	—	—	—	—	—	1	—	—	—	—	—	Indian, m.a. ...	Recovery.
Kisumu ...	—	—	—	—	—	—	—	1	—	—	—	—	Indian, m.a. ...	Recovery.
Kilindini ...	—	—	—	—	—	—	—	—	—	1	—	—	Indian, m.a. ...	Recovery.
Kilindini ...	—	—	1	—	—	—	—	—	—	—	—	—	Indian, 30, f. ...	Recovery.
Kilindini ...	—	—	—	—	—	—	—	—	1	—	—	—	Indian, 27, f. ...	Recovery.

The above table sets forth the recorded distribution, in regard to both time and place, of those cases of blackwater fever which came under notice during the year 1913. Of the total number five were Europeans, one an Anglo-Indian, eight were Indians, and one an African. The two manifestations of the disease noted against Mariakani occurred in the same individual. In respect of professional attendance, eleven of the patients were seen by medical men and four by junior members of the Department. Thirteen of the patients were males, two were females.



I. *Locality.*—(a) *Physical Features.*—So far as the locality is concerned, Eldoma Ravine and Punda Milia have an altitude each of over 5,000 feet, while Mazeras, Rabai, Shimba Hills, Magadi, Yonte, Kisumu, Kilindini, Mackinnon Road, and Mariakani lie at lower levels.

Eldoma Ravine (7,145 feet) is situated on a small eminence among the Mau Hills, being located in the neighbourhood of considerable stretches of forest.

Punda Milia (4,560 feet, approximate), on the Nairobi-Fort Hall Road, is in rolling grass country, well watered, with bush and patches of marsh along the lines of the water courses.

Magadi (2,047 feet) is situated in a hilly and waterless area, intersected with sandy plains covered with scrub.

Mariakani (682 feet) is a station on the Uganda Railway. During the rainy season swamps are to be found in its neighbourhood.

Shimba Hills (1,476 feet), Rabai (680 feet) and Mazeras (564 feet) are all within a radius of twenty miles from Mombasa, and may be described as being on the verge of the Taru wilderness.

Mackinnon Road (1,174 feet) is a station on the Uganda Railway, situated in the Taru wilderness.

Kilindini and Mombasa are located on Mombasa Island, a place presenting considerable areas of cultivation as well as a certain amount of bush. The town of Mombasa is on its eastern side, and mangroves grow on its northern and western shores.

Kisumu (3,890 feet) is situated on the shores of Kavirondo Gulf at the lake terminus of the Uganda Railway. Swampy and bush-covered areas are to be found in its neighbourhood.

All the above places, except Eldoma Ravine, are situated in areas 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 Yonte and Kisumu.

(c) *Insect Fauna.*—The undernoted insects have been found at the following places mentioned in the opening table:—

Mazeras.—Mosquitoes are reported by one of the patients as having been troublesome at this place. Anophelines have been also observed here.

Rabai.—*Pangonia comata*, Aust.; *Hæmatopota pertinens*, Aust.; *Hæmatopota mactans*, Aust.; Anophelines.

Shimba Hills.—*Glossina pallidipes*; *Hæmatopota mactans*, Aust.; *Tabanus tæniola*, P. de B.; *Ornithodoros moubata*; Culicines and Anophelines.

Punda Milia.—*Hæmatopota hirta*; *Culex pipiens*; *Anopheles mauritanus*.

Magadi.—*Dorcaloemus woosnami*, Aust.; *Hæmatopota tumidicornis*, Aust.; *Hæmatopota vittata*, Lene; *Hippobosca capensis*, Olf.; *Hippobosca maculata*; *Hippobosca struthionis*, Jans.; *Lyperosia minuta*, Bezzi; *Lyperosia*, sp. nov.; *Ochelerotatus quasiunivittatus*, Theo.; *Olfersia pilosa*, Macq.; *Stomoxys calcitrans*; *Tabanus suffis*, Jaen.

Yonte.—Anophelines have been observed close to the present station during the rains.

Eldoma Ravine.—*Hippobosca maculata*; *Hæmaphysalis leachi*; Culicines.

Mombasa Island.—*Culex pipiens*, L. Var. *pallidocephalus*; *Culex tigripes*; *Glossina pallidipes*; *Glossina austeni*, Newst.; *Stegomyia fasciata*; *Banksinella luteolateralis*; *Pyretophorus costalis*; Tabanids.

Mackinnon Road.—Mosquitoes, culicine and anopheline, in the wet season.

Mariakani.—Mosquitoes, culicine and anopheline, in the wet season.

Kisumu.—*Mansonia uniformis*; *Nyosorhynchus mauritanus*; *Pyretophorus costalis*; *Banksinella luteolateralis*; *Culex tigripes*; *Tabanus africanus*, Gray; *Hæmatopota unicolor*, Ric.; *Culex*, sp. incert.

Kilindini.—*Vide* Mombasa Island.

II. *Seasonal Variation.*—Nine of the recorded cases occurred in the cool season of the year, *i.e.*, between the months of April and September inclusive.

III. *Personal History.*—(a) *Medical History.*—In fourteen of the cases histories of previous malaria are given. The fifteenth, it may be remarked, comes from Kisumu and probably had a like history. One of the patients—he who had two manifestations of blackwater in the year under review—is noted as a “regular



quinine taker," another was habitually administered five grains twice a week, and the remainder either took the drug irregularly or when they thought they had need of it.

In six of the patients, at least, quinine had been taken just prior to the onset of the hæmoglobinuria. One of the patients had undergone treatment for urethritis the month prior to the onset of hæmoglobinuria. So far as Europeans are concerned, their period of residence in the Protectorate varies between ten months and fifteen years.

(b) *Previous movements and personal conditions.*—A perusal of the histories of the various cases gives one to think that they show evidence of a want of self-attention so far as the treatment of antecedent malarial infection is concerned. The male patients would appear to have followed occupations which either brought them into close contact with Africans or exposed them to the attacks of mosquitoes and the vicissitudes of outdoor life.

(c) *Microscopic examination of the blood.*—Subtertian parasites were found in a blood film taken from one of the patients prior to the development of blackwater. Films made after its onset in nine of the cases were noted as negative on examination. In five either no record was made or no examination instituted.

From a consideration of the information afforded by the available histories of the cases under notice it may be stated that probably the patients.

- (a) had been infected with malaria prior to the development of hæmoglobinuria; and that the majority of them
- (b) have no record of having taken quinine systematically;
- (c) manifested the disease in localities rated as unhealthy, and
- (d) followed outdoor occupations.

In conclusion, I have the honour to transmit herewith the medical histories and an entomological list wherefrom this report has been mainly compiled.

J. A. HARAN,  
for Principal Medical Officer.

#### Case 1.

Male, *aet* 21, a planter. Admitted 7th March, 1913. This case came from Punda Milia, in the Fort Hall district. He had been only 20 months in the country, was temperate in his habits, and there was no history of contact with native women. He had had several severe attacks of malaria and had taken quinine very irregularly.

*History of attacks.*—On March 3rd and 4th he felt seedy and thought he had another attack of fever. Took quinine, grs. xv, that day and repeated it next day. On the 5th he vomited and noticed his urine very dark red and went to Fort Hall to get medical advice. Bowels opened five times that day. Yesterday he had a rigor, temperature 104.6°. Complains of pains across the loins.

On admission, temperature 97.6°, pulse 80, respirations 20. Slight jaundice present. Tongue dry and coated.

Spleen large and hard and reaches almost half-way to the umbilicus. Other organs normal.

Urine dark red and transparent. Albumen abundant. Blood cells absent. Casts abundant.

No parasites found in the blood.

*Treatment.*—He was put on to Sternberg's treatment.

Sod. Bicarb., grs. 150.

Hyd. Perchlor., gr.  $\frac{1}{3}$ ,

Aq. ad. ʒ ii,

of which 1 ounce was to be given every two hours.

Plenty of Bland fluids were to be given and he was put on to a milk diet.

Bowels opened well with an enema.

8th March, 1913. Urine, 7 ounces, passed during the night. No vomiting, and he seems quite comfortable. Temperature rose to 101° last evening, but is normal to-day. Urine less red.

9th March, 1913. No further rise of temperature. Urine still contains albumen but is no longer red. He passed 55 ounces in the last twenty-four hours.



Very comfortable.  
11th March, 1913. No albumen in urine now. Temperature remains down and he is very comfortable.

He was discharged fit on 24th March, 1913, and went for a trip to England. Has since returned and has kept in good health.

No quinine was given during his stay in hospital, but he was instructed to take small doses regularly for three months after discharge.

*Locality.*—Punda Milia is situated in a rolling grass country, well watered, with bush and patches of marsh along the lines of the water courses.

No other cases occurred in the locality.

The following biting insects have been noted in the district :—

*Hæmatopota hirta.*

*Culex pipiens.*

*Anopheles mauritianus.*

The case occurred during the dry season, before the onset of the rains.

JOHN L. GILKS,  
Medical Officer.

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### Case 2.

Male, *æet* 56, a planter. Admitted 4th September, 1913. This patient had been 15 years in the country and had constantly been moving about. He had recently come from Magadi. He was a married man, and there is no history of contact with native women. A heavy drinker.

Had suffered frequently from malaria, especially in the past two years, and gave a history of getting up at nights to pass urine.

*History of attack.*—Ever since 23rd August, 1913, he had been having fever. On 1st September, 1913, the blood showed subtertian parasites, and he was given two injections of quinine, grs. x, intramuscularly. The day before admission he passed urine looking like pure blood. Vomited once.

On admission, temperature 97·4°, pulse 68, respirations 22. Tongue coated. Face and conjunctivæ jaundiced.

Circulatory system degenerate.

Spleen and liver not felt.

Nothing found in blood slides.

*Treatment.*—He was put on a milk diet with plenty of bland fluids to be taken by mouth and given a half drachm of sodæ bicarb. in water every three hours.

5th September, 1913. Bowels opened after a small dose of salts.

Vomiting at intervals. No urine passed since admission. Pulse good. Put on to rectal injection of saline 0 i every two hours.

6th September, 1913. Only one ounce of urine passed since admission.

Urine dark red and goes almost solid on boiling.

Microscopically it is full of débris with a very few blood cells.

7th September, 1913. No more urine passed. Had intravenous injection of saline 0 i last night and again to-day.

Vomiting. Pulse remains good.

8th September, 1913. Has passed a little urine, which is clearer and less albuminous. No vomiting now. Taking fluids well. Two pints of saline infused intravenously last night. He is getting puffy.

9th September, 1913. Passing a few drachms of urine.

11th September, 1913. Urine very scanty, only one ounce passed in the past twenty-four hours, but it is not red and is much clearer as regards albumen; weaker.

13th September, 1913. Urine increasing in amount but the general condition is worse. Extremities œdematous.

15th September, 1913. Urine increasing rapidly in amount and is quite clear, but he is worse in himself.

17th September, 1913. Urine passed 48 ounces in the past twenty-four hours, and there is only a trace of albumen present. Œdema increasing.

19th September, 1913. Very twitchy to-day, face and arms constantly working. Urine passed is over a hundred ounces in the past twenty-four hours. Bled a pint this morning. Very ill indeed.



20th September, 1913. Had several fits during yesterday afternoon and evening, and died at 5 p.m. from uræmia.

Temperature remained normal during his stay in hospital.

*Locality*.—Magadi is situated in a hilly and mountainous country intersected with sandy plains covered with scrub, waterless.

No other cases were noted as occurring in the locality.

The following biting insects have been recorded :—

*Ochlerotatus quasiunivittatus*, Theo.

*Dorcaloemus woosnami*, Aust.

*Hæmatopota tumidicornis*, Aust.

*Hippobosca capensis*, Olf.

*Hippobosca maculata*.

*Hippobosca strutheonis*.

*Liperosia minuta*, Bezzi.

*Liperosia*, sp. nov.

*Obfersia pilosa*, Macq.

The case occurred after the rains.

JOHN L. GILKS,  
Medical Officer.

### Case 3.

Male, Indian. Admitted 3rd February, 1913, died 7th February, 1913.

#### I. *Locality*.

(a) Mombasa. Thick bush in parts. Mango trees. Mangrove swamps. Well cultivated in parts.

(b) No other cases had occurred in the same house.

(c) Insect fauna :—Mosquitoes—*anopheline*, *culicine* and *stegomyia*.

#### II. *Seasonal Variation*.

February, dry season.

#### III. *Personal History*.

(a) Not a regular quinine taker. Patient had suffered from malaria previously.

He stated that he had been suffering from fever for some three days previous to his admission to hospital. On admission his temperature was 100° and the urine of a port wine colour. He had very bad jaundice and his bowels were constipated. Pulse feeble and rapid. On 4th February, 1913, his temperature came down to 99°, but the general condition got worse, the urine retaining the same colour and diminishing in quantity, the patient having passed only about eight ounces during the day. Vomiting was a marked symptom, making it difficult to retain any food. On 5th February, 1913, the patient showed symptoms of collapse after having passed a very restless night. Urine evacuated got less in quantity but lighter in colour. Vomiting continued the same. On 6th February, 1913, there was no change in the symptoms and the patient continued in the same state. On 7th February, 1913, the patient died of cardiac failure.

(b) The deceased was an engineer on a Government launch which travels up and down the coast.

(c) No parasites were found in blood.

J. PUGH,  
Medical Officer.

### Case 4.

Male, Anglo-Indian. Admitted 25th February, 1913, discharged 10th March, 1913.

#### I. *Locality*.

(a) Mackinnon Road Railway Station. Scrub forest. No swamps in neighbourhood.



- (b) No other case had occurred in same house.  
 (c) Insect fauna :—Mosquitoes (culex and anopheline) in wet season.

II. *Seasonal Variation.*

February, dry season.

III. *Personal History.*

- (a) Took quinine occasionally. Had suffered from malaria previously.  
 (b) Patient works as a permanent-way inspector on the railway. This necessitates frequent journeys on the railway.  
 (c) No parasites found in blood.

Admitted to hospital on the morning of 25th February, 1913, accompanied by the Sub-Assistant Surgeon from Voi.

On admission the temperature was 100°. The patient was badly jaundiced and the urine of a port wine colour. He stated that the urine had developed that colour a day previous to his admission to hospital, after taking quinine, grains 20, for a dose. The next day the temperature came down to normal and the urine assumed a lighter colour. The urine was analysed and found to contain albumen. Since the fall of the temperature the patient made an uninterrupted recovery, and was discharged as cured on 10th March, 1913.

J. PUGH,  
 Medical Officer.

*Case 5.*

Male, Indian. Admitted 4th June, 1913, discharged 13th June, 1913

I. *Locality.*

- (a) Mariakani. Station on the Uganda Railway. Forest. Swamps in neighbourhood in wet season.  
 (b) No other case occurred in same house.  
 (c) Insect fauna :—Mosquitoes (culex and anopheles) in wet season.

II. *Seasonal Variation.*

June, rainy season.

III. *Personal History.*

- (a) A regular quinine taker. Has had several attacks of malaria previously.  
 (b) Patient is a fuel contractor for the railway. He spends most of his days in the forest cutting wood.  
 (c) No parasites found in blood.

Admitted to hospital on 4th June, 1913, suffering from fever of three days' duration. The urine of a port wine colour. He was very badly jaundiced and the bowels constipated; the next day the bowels moved after an aperient and the urine became lighter in colour. Vomiting was a very troublesome symptom. The fever, which was 104° on the day of admission, came down to 99°. On the third day the fever came down to normal. All the symptoms showed signs of improvement, and after that the patient made an uninterrupted recovery. The patient was discharged on the 13th June, 1913, as cured.

J. PUGH,  
 Medical Officer.

*Case 6.*

Male, Indian. Admitted 22nd July, 1913, discharged 28th July, 1913.  
 This is the same patient as Case 5.

I. *Locality.*

Same as previous case.

II. *Seasonal Variation.*

July. End of rainy season.

III. *Personal History.*

- (a) Blackwater fever one day previous. Patient had been told to take 5 grains quinine daily when he left hospital after his previous attack. He was admitted for the second time to hospital with blackwater fever. He stated that he was suffering from fever for a week, and that he passed urine of a port wine colour since last night. The temperature on admission was  $101.5^{\circ}$ . Markedly jaundiced. Vomiting troublesome. Next day the temperature came down to normal and vomiting became less troublesome. Since then the temperature kept at normal, and the patient was discharged as cured on the 28th July, 1913.
- (b) Fuel contractor, Uganda Railway.
- (c) Parasites not found in blood.

J. PUGH,  
Medical Officer.

*Case 7.*

Male, Indian. Admitted 18th August, 1913, died 25th August, 1913.

I. *Locality.*

- (a) Deceased had been residing at Kisumu in the Public Works Department landies. Lake shore, low scrub, swampy.
- (b) Other cases have occurred at Kisumu. Some years ago the disease was common.
- (c) Insect fauna:—Mosquitoes (anophelines and culicines), flies (hæmatopota and tabanidæ).

II. *Seasonal Variation.*

August. End of rainy season.

III. *Personal History.*

- (a) Not a regular quinine taker.
- (b) On his journey down from Kisumu he had an attack of fever between Lumbwa and Nakuru. At this spot it is very cold at night, and a chill, coupled with the sudden change of altitude, probably was the immediate cause of the attack.
- (c) No parasites found in blood.

On admission the temperature was  $101^{\circ}$  and vomiting was very troublesome. He passed a very small quantity of urine. On the 20th August, 1913, patient passed no urine. The temperature came down to  $96^{\circ}$ . On 22nd August, 1913, patient passed only one ounce of urine. On 23rd August, 1913, he passed no urine and hiccup was very troublesome. On 25th August, 1913, uræmic convulsions set in, and patient died from suppression of urine.

J. PUGH,  
Medical Officer.

*Case 8.*

Male, Indian. Admitted 15th October, 1913, discharged 29th October, 1913.

I. *Locality.*

- (a) Kilindini. Congested district. Many mango trees; fairly well cleared of bush.
- (b) No other case has occurred in the same house, or in the immediate vicinity, as far as can be ascertained.
- (c) Insect fauna:—Mosquitoes (anopheles, culex and stegomyia). Bugs numerous in the majority of the houses.

II. *Seasonal Variation.*

October. Dry season.



### III. *Personal History.*

(a) Not a regular quinine taker. Has had several attacks of malaria previously.

Patient was admitted to hospital at 2 p.m. on the 15th October, 1913, and stated that he was passing urine of a port wine colour. On admission his temperature was  $98.8^{\circ}$  and bowels were constipated, very anæmic. The next day his temperature rose to  $101.5^{\circ}$  and the urine was of a port wine colour. On the third day the temperature again came down and the urine became lighter in colour. The patient was discharged as cured on the 29th October, 1913.

J. PUGH,  
Medical Officer.

#### Case 9.

Female, aged 30 years.

Residence.—Railway brick quarters.

Station.—Kilindini.

*Previous History.*—She was suffering from malaria since a fortnight; she was not taking quinine regularly.

*Present History.*—On 21st March, 1913, at 10 a.m., suddenly she passed black urine, of which she was frightened, and informed me at 11 a.m., when her husband came from duty.

*Temperature.*—It rose to  $102^{\circ}$  in an hour's time and came down to  $101^{\circ}$  next morning; it gradually dropped down, and on the morning of the fourth day it was quite normal and never rose again.

*Urine.*—It was dark red on first visit, and after twenty-four hours' time it turned into red colour, and gradually turned into high colour and yellow in next twenty-four hours' time.

*Jaundice.*—There was slight jaundice.

*Vomiting.*—Remained only for twelve hours and stopped itself.

*Liver and Spleen.*—These were slightly tender and enlarged.

*Kidneys.*—Were painful and tender on both sides.

*Treatment.*—Medicinal.—Soda bicarb: and liq: hydrarg: perchlor. mixture was given thrice daily.

Dietetic.—Milk and soda-water and barley-water were given in frequent and big quantities.

External.—Liniment: terebinth: was rubbed over the kidneys and tr: iodine was painted over the liver and spleen.

HARKISHAN DAS,  
Sub-Assistant Surgeon.

#### Case 10.

Female, aged 27.

Residence.—Railway quarters.

Station.—Kilindini.

*Previous History.*—She was suffering from chronic malaria since two months and having attacks now and then during the period. She was not taking quinine except a few times when she was suffering with severe attacks.

*Present History.*—On 27th September, 1913, at 8 a.m., when going round to see the cases in quarters, she reported me that she had passed black urine. On examination I came to know that it was a typical urine of blackwater fever.

She took 10 grains of quinine beforehand.

*Temperature.*—For first forty-eight hours it was between  $102^{\circ}$  and  $103^{\circ}$ , for next twenty-four hours it was between  $100^{\circ}$  and  $102^{\circ}$ , for next twenty-four hours it was between  $99^{\circ}$  and  $101^{\circ}$ , for next twenty-four hours it was between



98° and 100°. After next twenty-four hours evening temperature came down to normal. On seventh day there was no rise of temperature.

*Urine.*—It was black for first twenty-four hours and turned into dark red in next twenty-four hours; it was red for next twenty-four hours and turned into high colour for next twenty-four hours. On the fifth day the urine passed in its normal colour.

*Jaundice.*—There was slight jaundice, which subsided on the third day.

*Vomiting.*—It was troublesome first twelve hours, in next twelve hours she was keeping in milk and soda and not the barley-water. On third day it was totally checked by an application of a mustard plaster.

*Delirium.*—There was no delirium in the period of disease.

*Liver and spleen.*—Were enlarged and tender to touch.

*Kidneys.*—They were painful and tender to touch over both sides.

*Treatment.*—Medicinal.—Soda bicarb : and liq : hydrarg : perchlor mixture, was given three times a day.

Dietetic.—Milk and soda-water and barley-water were given in frequent and big quantities. Ice was given to check the vomiting.

External.—Mustard plaster was applied over the pit of stomach to check the vomit; kidneys were kept warm by means of liniment : camph : and cotton wool. Tr. iodine was painted over liver and spleen.

HARKISHAN DAS,  
Sub-Assistant Surgeon.

#### Case 11.

A lay missionary, aged 40. Had suffered from frequent attacks of malaria. He had been in the habit of taking quinine irregularly.

Length of time in the country—six years.

He had been living at Mazeras many months.

This was his first attack of blackwater fever, which came on suddenly after a 10-grain dose of quinine.

He was admitted into hospital on the third day of illness. No telegram or message of any sort was sent to us to meet him or to make any arrangements for his reception. He was extremely jaundiced, and stated that he had been vomiting since the day before. The urine, though dark, was not the thick, porter colour which was said to have been the condition the previous day.

*Pulse.*—Weak, and inclined to be "thready."

*Blood.*—No parasites found.

The next day the urine, in fair quantity, was much clearer, but vomiting persisted and hiccup developed, which was continuous until just before death the following day.

*Treatment.*—Hearsey's mixture. Absolute rest. Hot packing to the loins. Enemata. Transfusion. Injection of strychnine and one of morphia, gr.  $\frac{1}{3}$ , on the first day.

The fatal termination of this case, in spite of the clearing up of the urine and with no suppression, emphasises the danger of moving the patient.

On the third day of illness the man was carried to Mazeras Station, about a mile, and then shaken up in the train. On arrival at Mombasa he was put in a trolley in a sitting position and jolted off to the hospital.

C. L. CHEVALLIER,  
Medical Officer.



## Case 12.

SIR,

In reply to your No. 28/750, I have the honour to give you the following particulars of a blackwater fever case treated by me at the Mombasa European Hospital in May, 1913:—

1. The patient, aged 49, just previous to his attack had been living at the Government Farm, Mazeras, for about three weeks.
2. He then accompanied the Director of Agriculture in the direction of Port Reitz Creek, Mtwapa, Freretown, and Mtongwe. The weather was wet, and on one occasion he had to wade through water to the boat. The patient was then suffering from malaria, but did not lie up. Heavy doses of quinine—probably 25 to 35 grains per day—were taken for three days before the blackwater attack.
3. Mosquitoes had been troublesome at Mazeras, and at the hotel in Mombasa, where the attack came on.
4. The patient's first attack of malaria occurred in St. Vincent, West Indies, in 1890.
5. During the 10½ years of the patient's residence in East Africa he has been treated for frequent attacks of malaria, both in and out of hospital.
6. The patient had an attack of ague unlike anything experienced before, prior to his attack of blackwater fever.
7. The patient was in the habit of taking quinine when he travelled in a malarious district.
8. I only saw the patient the night before his admission into hospital. I made an examination of his blood, but found no malaria parasites.

I have, &amp;c.,

W. OWEN-PRITCHARD,

Senior Medical Officer.

The Principal Medical Officer,  
Nairobi.

## Case 13.

Private soldier, 3rd King's African Rifles, died of blackwater fever in Yonte hospital on 27th August, 1913.

*Locality.*

## (a) Physical features.

The lines of Yonte, where the fatal case of blackwater fever occurred, stand on an elevated ground which is surrounded on one side by Juba River and on the other three sides by low lying ground. Consequently the site is well drained. The place cannot be called a swamp, bush, or forest area.

(b) No case of blackwater fever was recorded in 1911 and 1912.

(c) Insect fauna: not recorded at the time of the occurrence of the case nor immediately before or after it.

*Seasonal Variation.*

August is one of the months of great malarial activity.

*Personal History.*

## (a) Medical History.

	Nairobi.				
Venereal sores	...	...	...	10 days	in 1910.
Venereal sores	...	...	...	29	.. ..
	Ngabotok.				
Malaria	...	...	...	4 days	in 1912.
	Nairobi.				
Fever Int.	...	...	...	7 days	in 1912.
Fever Int.	...	...	...	3	.. ..

The deceased was always given five grains of quinine twice a week.



(b) The deceased carried the letter post to Gobwen every other day in the evening, stayed there for the night and came back to Yonte next morning, for about three weeks previous to his being attacked with blackwater fever.

(c) Microscopic examination of blood not performed.

As no other case of blackwater fever is recorded during 1913, or the two previous years to it, Yonte cannot be marked on map as blackwater fever area.

IMAM BAKHSH,  
Sub-Assistant Surgeon.

#### BLACKWATER FEVER IN JUBALAND.

The patient, a private in the 3rd King's African Rifles (Case 13), was admitted into hospital at Yonte on the 23rd August, 1913, with fever temperature 106, profuse perspiration, severe vomiting and jaundice. He passed three ounces of urine with blood first day, and he never passed any more of it during his illness of about five days.

I reached Yonte on an urgent call at 7 p.m. on 26th August, 1913, and found the deceased in a state of collapse and quite senseless, and he died at 6 p.m. on the 27th August, 1913.

The deceased had always been getting five grains of quinine twice a week for some months and had not been away from Yonte, but on post service to Gobwen by new road, which always keeps at a distance from the river.

History of blackwater fever in Jubaland up to the present :—

In 1902 the Medical Officer who relieved me at Yonte when I was posted to Camel Corps, 3rd King's African Rifles, had an attack of blackwater fever while at Yonte.

The next case was of an Indian fireman, s.s. "Rose," Government steam launch in Juba River. This man, after being twice successfully saved from the claws of blackwater fever at Gobwen, died of it in Yonte hospital, after six days' illness, on the 1st October, 1910. He was brought with the malady from lower Gosha, and Dr. T. F. Lumb, who treated the deceased, told me at Serenli that the most serious thing was the suppression of urine.

The third case is of a Goan tailor, 3rd King's African Rifles, Yonte.

This man suffered twice of blackwater fever at Yonte, though I cannot find any record in the admission and discharge book.

He was saved both times by intramuscular injection of quinine. This man's profession always kept him indoors, and he always spent his extra time sewing to make some more money.

The fourth—and to my knowledge the last—case in Jubaland was the private soldier (Case 13), who, as mentioned above, died of blackwater fever on account of collapse and suppression of urine on the 27th August, 1913.

From the above I conclude that Yonte is a blackwater fever area. I believe the deceased fireman of s.s. "Rose" always contracted disease near or above Yonte. It must be a disease of bush or dampness. The site of Yonte military lines and native quarters are free from blackwater fever, though always infected with malaria. I believe very strongly that some persons are predisposed to blackwater fever.

The Nandi private, 3rd King's African Rifles, on whose death from blackwater fever I am taking this opportunity of making this report, took enough quinine to keep him sufficiently safe from malaria, and so, I am certain, also did the deceased fireman of s.s. "Rose." I am certain prophylactic quinine could not insure them both against blackwater fever or death from it.

I have also seen a compounder of a mission hospital at Mombasa, who always took enough quinine to be safe from ordinary malaria, get blackwater fever at Mombasa, be treated at Mombasa Native Hospital, without help of quinine or any other anti-malarial drug, and be cured. This was about the end of January, 1913, while I was on my way to India on leave. On the evening of the last day of June, 1913, I met this man and he told me he was going to the Native Hospital, Mombasa, for the treatment of blackwater fever, from which he was suffering since that morning, notwithstanding his taking a lot of quinine almost every day. He asked me for some advice, and I readily told him to leave Mombasa as soon as he is cured this time and go to India or Nairobi.



The fireman of s.s. "Rose" and the Yonte tailor were twice saved by the injection of quinine, and then the fireman died under quinine injection treatment system.

To my knowledge of fifteen years of Jubaland I know of these four cases of blackwater fever only, against thousands of malaria in every station in Jubaland from Kismayu to Serenli. Another point in this connection is that the natives of Jubaland do not seem to have any idea of this disease.

In short, it must be a very very rare form of malaria, if it may be so, and should be very very severe, or a small minority of men is specially predisposed to it, or the germ which produces it is rarely brought in contact with man. I believe blackwater fever is a disease of bush, long grass and dampness.

In conclusion, I beg to state my views upon the treatment of the disease, on which, I think, much difference of opinion exists.

I believe in the injections of quinine twice or thrice daily until the temperature is about normal. I cannot possibly understand why it should be contra-indicated. It cannot possibly be a food of any germ, though certainly a poison for many. Then it is a remarkable agent to keep the temperature down, to regulate the liver and to subdue malaria, which state must be present even taking it for granted that blackwater fever is a non-malarial disease, as we have always found cases of blackwater fever in the regions with malaria all round.

The second point, in my opinion, is of jaundice, which is also responsible for the presence of blood in urine or complete inaction of kidneys. To meet this a dose of white mixture every time after the patient vomits should be given until bowels move freely and frequently, and then 10 grains of sodium bicarbonate : in mixture in frequent doses until one drachm is kept in daily for three days. If this does not answer the purpose transfusion of saline mixture seems to me to be the only thing which should be practised on third day. Hot fomentations or dry cupping in the region of kidneys should not remain without trial.

If cured of one attack the subject of blackwater fever should never stay in the vicinity of the place where he had contracted the disease, and he should never go and stay near the place where any case of blackwater fever is ever found. A country of a very dry or cold climate should be the country of his living.

IMAM BAKHSH,  
Sub-Assistant Surgeon.

#### Case 14.

##### *Eldama Ravine.*

Adult male, Indian.

##### *Previous History.*

Indefinite : patient had been living in Uganda, and had there had previous attacks (number and date not known) of blackwater fever. He had taken quinine at intervals (quantity unknown).

##### *History of present illness.*

The patient had come from Uganda, and on his safari came into Eldama Ravine.

At the onset of the attack the temperature rose to 104°, and reached 105° the same evening; there was much pain in the limbs and head, and the patient vomited bile.

On the first day the urine became pink, and soon turned to a dark brown.

There was some jaundice, and the spleen was enlarged. Recovery took place and the urine recovered its normal colour in a week.

##### *Locality.*

Eldama Ravine station is situated on a small eminence among the Mau Hills. The station itself is fairly clear of vegetation, but there is cedar forest within a short distance.

The river is about 300 feet below the station.

There are no bad swamps in the vicinity.

##### *Occurrence of a series of cases.*

There have been no other in the district.



*Season.*

The case occurred in the dry season.

*Microscopic examination of blood.*

Not made.

*Insect fauna.*

Biting flies, culex, mosquitoes, &c.

WADHAWA KHAN,  
Hospital Compounder

Case 15.

Male, engineer, aged 26, first time out in British East Africa; out 10 months. From Christmas, 1912, employed on waterworks in Shimba Hills working hard, and had frequent attacks of malaria, on recovering from which he resumed work immediately; frequently before he was fit to do so.

On 9th September went to bed with temperature 103° and vomiting. On 10th was jaundiced, sight affected—everything looking red—came into hospital.

On admission, jaundiced, collapsed, temperature 100°, pain over stomach and left side, spleen slightly enlarged, urine dark stout colour. Hæmoglobin found. Given Hearsy's mixture.

On 11th much better, urine not so dark. No parasites found in blood.

From this onward made an uninterrupted recovery. Had taken quinine in 10-grain doses for his malaria. Blackwater not attributed to quinine.

F. L. HENDERSON,  
Medical Officer.

SIR,

Entomological Laboratory, Kabete, June 17th, 1914.

IN reply to yours of the 11th instant, I have pleasure in giving you the following records of biting insects in the places which you mention in your letter. I only mention below the places for which we have any records:—

Mombasa Island.—*Glossina austeni*; *Stegomyia fasciata*; *Culex tigripes*; *Banksinella luteolateralis*, Theo.; *Culex palidocephalus*, Theo.; *Glossina pallidipes*.

Rabai.—*Hæmatopota mactans*, Aust.; *Hæmatopota pertinens*, Aust.; *Pangonia comata*, Aust.

Mtwape.—*Ornithodoros moubata* (tick) recorded at "Mtwapa."

Shimba Hills.—*Hæmatopota mactans*, Aust.; *Ornithodoros moubata*; *Tabanus tæniola*, P. de B.; *Glossina pallidipes*.

Kisumu.—*Culex tigripes*; *Hæmatopota unicolor*, Ric.; *Anopheles (Pyretophorus) costalis*; *Tabanus africanus*, Gray.; *Banksinella luteolateralis*, Theo.; *Mansonioides africanus*, Theo.; *Anopheles mauritianus*, Grandpré.

Fort Hall.—*Hæmatopota* (near *distinctipennis*, Ric.); *Ornithodoros moubata*; *Anopheles (Pyretophorus) costalis*; *Tabanus denshami*, Aust.; *Tæniorhynchus fuscopennatus*, Theo.; *Stegomyia fasciata*; *Anopheles (Myzomyia) transvaalensis*, Theo.; *Auchmeromyia luteola*; *Banksinella luteolateralis*, Theo.; *Culex duttoni*; *Anopheles mauritianus*.

Nairobi.—For complete list of mosquitoes in the different Nairobi areas, see "Report of the Nairobi Sanitary Commission, 1913."

Also there are records of the occurrence of: *Hæmatopota hirta*; *H. tumidicornis*, Aust.; *H. unicolor*, Ric.; *Ornithodoros moubata*; *Uranotania alba*, Theo.; *Stegomyia pseudonigeria*; *Ochlerotatus dentatus*, Theo.; *Chaoborus ceratopogenes*, Theo.

Eldama Ravine.—*Hippobosca maculata* (on horse).

I have, &c.,

ROLAND H. DEAKIN,  
Assistant Entomologist.

The Principal Medical Officer,  
Nairobi.



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BLACKWATER FEVER IN THE TROPICAL  
AFRICAN DEPENDENCIES.

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REPORTS FOR 1913.

(For Reports for 1912 see [Cd. 7211], January, 1914.)

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