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YELLOW FEVER COMMISSION

(WEST AFRICA).

SECOND REPORT.

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SECOND REPORT

OF

THE YELLOW FEVER COMMISSION

(WEST AFRICA).

In their First Report the Commission reviewed briefly the circumstances which led to their appointment and the steps which they had taken to organise the enquiry which they have been instructed to carry out.

2. Since their appointment the Commission have held forty-nine ordinary meetings and four laboratory meetings, for the examination of microscopical and other specimens, and have had interviews with forty-two persons whose knowledge on various subjects might prove useful in the research upon which they are engaged.

3. The Commission desire to express their acknowledgment to Surgeon-General Gorgas, formerly Chief of the Sanitary Department, Panama, for kindly attending one of their meetings and placing at their disposal his great experience of the administrative measures necessary in dealing with Yellow Fever. Surgeon-General Gorgas was accompanied by Dr. Darling, the Pathologist of the Colon Hospital,

who possesses an exceptional knowledge of the morbid anatomy and histology of the disease.

4. The epidemic of Yellow Fever which was in progress at Lagos at the date of their last report has not yet completely died out, and cases have also been reported from the following places: Lagos, Ebute Metta, Warri, Forcados, Burutu, Onitsha and Calabar in Nigeria; Accra, Quittah and Saltpond in the Gold Coast; Kintampo and Ayinam (near Obuasi) in Ashanti; Bole* and Tumu in the Northern Territories: Boia in Sierra Leone.

The total number of cases to May 31st, 1914, is seventy. Of these 41 occurred in Europeans, including 4 in Syrians, and 29 in natives. Twenty-one cases amongst Europeans§ and one case amongst natives proved fatal.

5. Reports have been received from time to time from the Investigators appointed by the Commission who have been working chiefly at Freetown, Accra, Seccondee and Lagos. Special investigations have been carried out by them and also by other Members of the West African Medical Staff, into the possible mode of origin and the clinical features of the cases which have occurred at a distance from those centres of work. Two officers of the West African Medical Staff in succession have suffered from Yellow Fever at Bole, in the Northern Territories of the Gold Coast, but fortunately both cases ended in recovery. A fatal case in a European Officer has occurred at Tumu, close to the northern boundary of the Northern Territories, a distance of more than 430 miles in a direct line from the coast.

6. At Lagos, a prolonged research has been conducted by Dr. J. W. Scott Macfie and Dr. J. E. L. Johnston of the West African Medical Staff, on the occurrence and significance of the bodies with which the name of Dr. Harald Seidelin is associated. Dr. Seidelin, who is one of the Investigators appointed by the Commission, was transferred from Accra to Lagos in order that he might have further opportunities of research on this subject of the enquiry, upon which the Commission reserve their opinion until the issue of

* Cases from Bole were notified previous to the date of the first report of the Commission, but were not included in the list of localities given in paragraph 16 of that report.

§ Three of these cases were Syrians.

their Third Report, by which time they will have completed the examination of the microscopical and other material which they have received, illustrating the appearances presented by the "Seidelin bodies" and their possible connection with the virus of Yellow Fever.

7. In accordance with their instructions the Investigators have examined a very large number of patients presenting symptoms of fever, with the view of determining the nature of the fevers prevalent amongst the Europeans and natives; this forms an important part of the enquiry upon which the Commission is engaged.

The classification of these cases, and also of those locally diagnosed as Yellow Fever, upon the basis adopted by the Commission is well advanced.

8. Pathological and microscopical material from the cases at Lagos and elsewhere has been examined and reported on by Members of the Commission, and by others to whom some of the work has been delegated.

9. Maps have been prepared showing the trade routes from the interior into the various colonies, as it is possible that along such lines of travel Yellow Fever may be brought into the British Colonies. A more complete examination is contemplated of the shipping (including the small craft and canoes) engaged in the coastwise trade, with regard to the possibilities of mosquito transference, where such a measure is possible.

10. The Commission desire to acknowledge the loyal support which they have received from all the Members of the West African Medical Staff, and specially to thank those who have been engaged upon such of the enquiries as are already completed.

11. The Investigators appointed by the Commission have devoted all their energies to the work entrusted to them and have furnished a number of valuable reports, which it is intended to publish separately, in order to preserve a complete record of the researches which have been undertaken by the Commission.

A list of these reports will be found in Appendix III.

12. Having given the above brief report of the progress of their work, the Commission now propose to consider certain questions of a preliminary character which are closely associated with the main object of their enquiry.

These are as follows :—

(A) An Historical Retrospect of the occurrence of Yellow Fever.

(1.) On the West Coast of Africa as a whole.

(2.) In the ships of the British Navy on the West African Station.

(3.) In each Colony, whether British or Foreign, on the West African Coast.

(4.) Health conditions in the West African Colonies in 1862.

(5.) An Analysis of the West African epidemics of 1910, 1911 and 1912.

(B) A consideration of the question of Racial Immunity to Yellow Fever and of the Clinical Types of that disease, as observed in whites and in coloured people.

(C) Yellow Fever in Childhood and early life.

(*D*) A Tabular Statement of the occurrence, as reported, of Yellow Fever in the various West African Colonies and Settlements from the year 1900 to April, 1914.

(*E*) General Conclusions.

(*A*)—AN HISTORICAL RETROSPECT OF THE OCCURRENCE OF YELLOW FEVER.

(1) ON THE WEST COAST OF AFRICA AS A WHOLE.

A knowledge of the history of the West Coast of Africa as regards Yellow Fever is almost essential to a right understanding of the epidemics of the last four years (1910-1913) and conclusively proves that the recent experience is but a repetition of that of the past which, owing to a fortunate freedom from serious outbreaks amongst Europeans for a long period, had been forgotten and had almost been replaced by a belief that Yellow Fever did not occur on the West Coast of Africa.

African Origin of Yellow Fever.

It would not, in the opinion of the Commission, serve any useful purpose to discuss the arguments which have been adduced to prove that Yellow Fever originated in Africa. Those who are interested in the question may be referred to the "History of Yellow Fever," by Augustin (1909)*, where it is fully discussed, and the theory of the African origin of the disease is rejected.

It has, however, received the support of authorities whose opinions, at any rate upon clinical questions, are entitled to respect, as, for example, of Faget, who was the first to point out the absence of the relation between the temperature and the pulse usually observed in fevers, viz. a high temperature associated with a quick pulse, whereas in Yellow Fever a high temperature is often accompanied by a slow pulse (Faget's sign).

Also of Sternberg, whose treatment of Yellow Fever (Sternberg's mixture) reduced the mortality in 374 cases treated in the United States, Cuba and Brazil to 7·3 per cent.

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* (7) p. 100 *et seq.*

The weight of evidence, however, appears to be decidedly in favour of the view that the disease had its origin in the West Indies and in the countries bordering upon the Gulf of Mexico.

Endemicity of Yellow Fever.

Apart, however, from the question of its African origin, there is another and more important question, which is thus stated by Bérenger-Féraud,† who may be regarded as the leading French authority on the disease. "Which are the countries where Yellow Fever appears so often that one may consider it to be constantly present *(maladie habituelle)* ?"

His opinion (1909) is that in America the limits of the region in which Yellow Fever is constantly present are from Charleston (32° 46′ North latitude) to Rio de Janeiro (22° 54′ South latitude); in Africa from Goree (14° 53′ North latitude), or perhaps the mouth of the Gambia, to Saint Paul de Loanda, about 10° South latitude.

A further question which he proposes is, "What regions in the Yellow Fever Zone are to be considered as generators of the disease? In other terms, what countries breed Yellow Fever?"

On this point there is great diversity of opinion, which he does not profess to be able to harmonise. It is perhaps best to give his own words with regard to West Africa. "La fréquence de la fièvre jaune à la côte occidentale d'Afrique a fait dire à plusieurs auteurs que peut-être elle y était endémique. Moi-même, j'ai incliné vers cette opinion dans mon livre sur *La Fièvre Jaune au Sènègal* (1874, p. 150); tout en faisant la réserve qu'au moment où j'écrivais, les documents venus à ma connaissance étaient insuffisants pour me permettre de juger la question d'une manière certaine, ou même quelque peu probante.

"Cette question d'endémicité de la fièvre jaune à la côte occidentale d'Afrique m'a beaucoup préoccupé depuis une quinzaine d'années; je dois avouer que tour à tour mon esprit a incliné dans un sens ou dans l'autre, sans avoir, pendant bien longtemps, pu se fixer d'une manière absolue. Cependant j'ajouterai que, de jour en jour, à mesure

† (6) Traité Theorique et Clinique de la Fièvre Jaune. Paris, 1890, p. 206.

que les renseignements me sont venus plus nombreux, j'ai penché vers l'idée de la non-endémicité ; et je suis arrivé, meme, à croire fermement à cette non-endémicité."

It will be observed that the author is not considering the constant presence of the disease in West Africa, a question which he has decided in the affirmative in the previous paragraph, but whether it is a place where the germs of Yellow Fever are, as he explains later,* "evolved, that is where the disease is born, develops, gives rise to new germs and dies, just as animals and plants are born and die."

It is not in this sense that most of those who at the present time believe that the disease has obtained a permanent foothold in West Africa use the term "endemic" ; they do so to express the idea that it is there a "maladie habituelle." In spite of the confident opinion of Béranger-Féraud that such breeding places, apart from human beings or mosquitoes, must exist, one may venture to doubt it ; certainly they have not yet been located.

If the constant presence of Yellow Fever on the West Coast of Africa is admitted, the question at issue from an administrative point of view may almost be regarded as settled ; what of it remains can safely await the advance of medical science.

Date of the Appearance of Yellow Fever in Africa.

Yellow Fever may have been brought to the Canary Islands in 1494 by the Spanish vessels "which returned to Spain after having landed Don Bartolome Colon at Ysabella, San Domingo," and it is possible that the great pestilence which visited the Island of Teneriffe in 1495, which was believed to have been introduced in a similar manner, may have been Yellow Fever. The inference that "this epidemic was undoubtedly Yellow Fever" † appears to be founded on the fact that the adventurers who returned home were of a "sickly saffron colour," but this can hardly be accepted as conclusive.

It would serve no useful purpose to consider further the evidence in favour of the presence of Yellow Fever on the adjacent islands or on the mainland of the West African coast during the sixteenth and

* (6) p. 233. † (7) p. 180.

seventeenth centuries, as in no case is it sufficient to carry conviction. As might be expected the records belonging to the eighteenth century are more detailed, and we are not likely to be in error in accepting the statements of many writers that in 1778 Yellow Fever was present on African soil.

The reasons for this conclusion are :—

(1) That it affected various towns on the coast ;

(2) That it spread from one Colony to another along the coast, e.g., the Gold Coast is said to have infected Sierra Leone, which in its turn infected the Gambia. From the Gambia it spread to Goree in Senegal, and thence to St. Louis, also in Senegal ;

(3) That it occurred as an epidemic, deaths following each other at such intervals as are characteristic of Yellow Fever epidemics ;

(4) That the period of the year, viz. June to September, is that during which many of the considerable epidemics have occurred in the Colonies on the West Coast of Africa ;

(5) That before its appearance in Senegal (end of July), it is stated that the garrison and the inhabitants were for that time of the year remarkably healthy, yet in the beginning of August "a sudden and most dreadful disease broke out" ;

(6) That the disease although chiefly affecting the Europeans was not confined to them, but affected also the native mulattoes and blacks ;

(7) That relapses occurred in some of those who had recovered, and that some of these died "as late as November" ;

(8) That the disease was apparently new to the inhabitants of that region ;

(9) That on the arrival in the following year of a large number of non-immune soldiers from France the epidemic again broke out and caused at least 180 deaths amongst these men ;

(10) That the documentary evidence furnished by Schotte, the Surgeon-in-Chief of the British garrison at St. Louis in 1778, was considered at the time to be of such importance that it was translated by the author from the Latin original into English, and by others into French and German ;

(11) The evidence itself; of which the following is an extract from

"A TREATISE ON THE SYNOCHUS ATRABILIOSA,

"By J. P. SCHOTTE, M.D. *(London, 1782.)*

"A CONTAGIOUS FEVER WHICH RAGED AT SENEGAL IN THE YEAR 1778 AND PROVED FATAL TO THE GREATEST PART OF THE EUROPEANS AND TO A NUMBER OF THE NATIVES.

"PREFACE.

"The disease, which is the subject of the following sheets, does not happen annually at Senegal, but only in those years when the rains are extraordinarily frequent, heavy and of a long continuance. The common diseases of the country during moderate rainy seasons are intermitting and remitting bilious fevers and fluxes. The first of these generally yield to antimonials and bark and are not very fatal; but the latter are very stubborn and if they are not overcome in the beginning they generally carry off the patients.

"In proportion as the rains are heavier and more frequent, those diseases are more malignant and fatal. During the first rainy season that I resided there, viz. in the year 1775, when the rains were pretty heavy and frequent, many were seized with the bilious fever, which in some few were attended with very bad symptoms and might be called, from the yellow colour which it induced on the skin, Yellow Fever. The next year, viz. 1776, when we had but a few showers of rain, and they fell at intervals of many days; for which reason the season was remarkably favourable and passed over without occasioning any mortality. In the year 1777 the rains were not quite so heavy as in the year 1775, and therefore the fevers were milder; but in the year 1778 the rains set in early, they were frequent and heavy, and continued for a long time; in consequence of which the island became partly overflowed, and the very dreadful disease, of which I am about to treat, made its appearance. Mr. William Bishopp, who was at this time at the head of the medical establishment in the Province of Senegambia, and had been in the same capacity for many years past, had only seen it happen once before, viz. in the year 1766, when the rains were so heavy and frequent as to occasion the overflowing of the whole island, and to oblige the Europeans to go in canoes from one house to another. He says that it then raged with the same fury, and proved in proportion as fatal as it did at this time."

"In the month of July, 1778, the garrison and the inhabitants on the island of Senegal were, for that time of the year, remarkably healthy, from which favourable circumstances I was induced to hope that the approaching rainy season might pass over without causing much mortality. But my hopes were much frustrated when on a sudden a most dreadful disease broke out, which, raging from the beginning of August to about the middle of September following, carried off the greatest part of the Europeans, and a great number of the native mulattoes and blacks. The Europeans suffered much more by it, in proportion, than

the mulattoes, and those much more than the blacks. It ceased to rage about the 18th of September, and those who had escaped its fury were, as far as I know, not attacked with it after that day, but some of those who had recovered were seized with relapses during the following month, and some of them died as late as the month of November. Out of the number of ninety-two white people, which were on the island, when it broke out, thirty-three only were left when the French invested the island on the 28th January, 1779, and eight of those were hardly able to walk. * * * * * *

"The symptoms attending the disease were so horrid and dreadful that it seemed almost impossible that anyone could have a chance of recovering; and it was so very contagious that it spread all over the island with an amazing rapidity. Most patients died, on the fourth or fifth day; a few were carried off suddenly on the third, and some others not before the sixth or seventh day. Out of so small a number of Europeans as ninety-two, not less than four died on the 23rd of August, four on the 26th, three on the 27th, five on the 5th of September, and there was hardly a day between the 9th of August and 18th of September without one or two. Those who survived the seventh day, either recovered, or fell into lingering dysenteries. A constant and uninterrupted fever attended the disease, from the beginning to the end, in all those who died; and in some who recovered, no apyrexy took place before the seventh day, or later; in others sooner. This fever, therefore, having no intermission, and in most patients as far as I have been able to observe, no remission, cannot but be called a continued one. * * * * * *

"Most of those, who were seized with the disease, felt, just before it made its attack, a *langour** and a giddiness of the head. This was soon followed by a *rigor*, which in some was but slight, and in most patients did not last longer than a quarter of an hour; yet those, who were suddenly infected by contagion, felt no *langour*, but were soon attacked with *rigors*. * * * * * *

"They all complained of sickness and *nausea* at the stomach, and soon after threw up its contents, sometimes mixed with bile. Now the rigor subsided; the body became hot, and the face red. The pulse grew full and quick, but rather soft. * * * * * The eyes were red and shining, and seemed to project from their orbits. * * * * * * Most patients complained of a great headache, and of a pain in their back, particularly about the region of the loins, and sometimes in their arms and legs. They felt a most acute pain above and across their eyes, which often affected the sight. Notwithstanding the fullness of the pulse, there appeared in some a dejection and lowness of spirits, with a failure of strength; in others an anxiety, with deep fetched sighs, and most of them despaired of recovery. All complained of a load, pain and heat about the *præcordia*, but particularly about the pit of the stomach. The vomiting of yellow bile now took place, and was often repeated. This gave no relief to the patient, nor did the retching cease, though the stomach was quite evacuated, but a convulsive motion took place, and continued the retching, though nothing was thrown up. This caused a

*NOTE.–The words in italics are so in the original.

great thirst, which could not be quenched by any kind of liquid ; for whatever was drank was immediately rejected. The respiration was very laborious, and the expired air felt very hot to the bystanders. Some few did not vomit, nor had hardly any sickness at the stomach ; and were also suddenly seized with strong convulsions, and entirely deprived of all senses, throwing up in the meantime great quantities of a black matter which resembled the grounds of coffee, but was commonly coagulated in small lumps ; the first convulsive fit abating a little, another took place, and they died within a few hours, without recovering their senses. * * * * * * The skin was, in most patients, at first dry and felt very hot to the touch. In some it remained in this state for some days, but in others profuse sweats soon broke out, although the fever did not apparently abate. The urine was high coloured, sharp and small in quantity. * * * * * *

" The tongue was but little altered, though its borders were rather tumid and more red than natural, and the middle part of it was in some a little whitish. * * * * * *

" As the disease advanced, some of the above-mentioned symptoms abated, some grew worse, and others more dreadful acceded in some patients sooner, in others later. The tongue became furred, and changed its whitish colour in the middle for a yellow or brownish one, particularly towards the root, which might be partly owing to a tinge of the bile, continually thrown up. Though the pain of the head and back abated in some degree, in those who had any evacuations by stool, yet the weakness and dimness of the sight remained, to which deafness was often joined.

" The vomiting continued, and the bile which was before thrown up of a yellow colour, and in a liquid state, was now changed both in colour and substance. It became green, brown, and at last black, and was coagulated in small lumps.* * * * * *

" The pulse was now not so full as before, but quicker ; most patients complained of a burning heat within the pit of the stomach, attended with an unquenchable thirst. * * * * * * A deal of liquid blood came away with the fæces, which seemed to issue forth from the hæmorrhoidal vessels. * * * * * * When they made any urine, which was seldom the case, it was very high coloured. The skin was hot, mostly moist, and sometimes quite wet. The face became of a lurid colour. Some hawked up and spit blood, which seemed to me to come from the lungs, and others had small and frequent bleedings at the nose, without any relief. All of them were in some degree delirious, but those, who had a dry skin, were most so. The *singultus*, which began soon after the vomiting, became more and more frequent ; the pulse died away by degrees ; a groaning took place, and death ensued. Those who survived the third or fourth day were still afflicted with some new symptoms. The skin became now full of petechiæ ; they made their first appearance about the eyelids and on the wrists, and soon after on all the other parts of the body ; but the breast was generally most beset with them. * * * * * *

" The delirium was generally rather mild than violent. Some of the soldiers in the hospital, on being asked how they found themselves, would answer that they found themselves exceedingly well, and fit to do their duty ; in consequence of which some had dressed themselves, and

wanted a discharge from the hospital to go to the barracks, though they could not utter many words without being interrupted by hiccoughs; but they were easily persuaded to stay in the hospital till the next day which they seldom lived to see. * * * * * * If we reflect on the horrid symptoms attending the disease in the order I have related them it would almost seem impossible that any one of the patients could have recovered. But it is to be observed that all those symptoms did not accompany the disease in each individual patient, nor were those which attended it equally severe in every one of them, for which reason some got through it. But they were so very weak and emaciated, and remained so long in this state of debility that they were much subject to relapses. * * * * * *

"The diagnosis of the disease, so as to ascertain with exactitude the species to which it belongs, is difficult to be formed. In the beginning it is not to be distinguished from the fever which is called *bilious*, or from that one which goes by the name of *yellow fever*, but by the severity of its symptoms. For in those the symptoms are the same, but milder, and I am persuaded that our disease only differs in malignity from those fevers which I conceive to originate from the same causes, but proportionably less deleterious. In its progress it is not so difficult to be distinguished from them; for the bilious fever has generally intermissions, and the yellow one slight remissions; yet sometimes it happens, that the first of those continues in hot countries to the third day, before it intermits, and that the latter has hardly any remissions on the first days. I also believe the bilious fever to be contagious sometimes, but I have observed the yellow fever to be more so. The voiding of black bile upwards and downwards is almost the only symptom in which our disease differs from the yellow fever. The petechiæ, hæmorrhages and some other symptoms which do not attend the bilious, are common in the yellow fever. It is to be observed, that the petechiæ are less in number in the yellow fever than in our disease, and in proportion as the skin is more yellow the petechiæ are fewer. The skin being most of a lurid colour in the disease, I am describing, makes it differ also from the yellow fever. Some medical gentlemen have informed me, that the yellow fever was sometimes attended with the vomiting of black bile, but during a residence of four years at Senegal, I had many opportunities of seeing patients in this disease and never observed it; yet notwithstanding this I do not in the least doubt it, because I think the greatest affinity exists between our disease and the yellow fever, and I believe, as I have already said, that they only differ in the degree of malignity. The *diagnosis* was more easily formed after the disease had raged for some time. For when healthy and strong people, who either had been waiting on the sick, or visited them, were suddenly taken ill with a similarity of symptoms, it was easily conjectured that they had received the disease from contagion, and from thence it was probable, that all those who might be taken in the same manner, would labour under the same disease, and that it was contagious.

"To institute the *prognosis* was as difficult a task as to form a *diagnosis*. In the onset of the disease, the issue it would take could not be foretold. There were no true prognostics in the beginning, presaging death or life, except that one might guess from the severity of the symptoms that death would soon be the consequence. A slight *diarrhœa* with

a cessation of the vomiting and the *singultus* together with an abatement of the rest of the symptoms, followed by a gentle and general sweat, gave the best hopes for recovery. The vomiting of black bile was a certain sign of ensuing death. Not one, as far as I know, who had that symptom recovered, and I have little doubt but that a similar evacuation by stools was also a mortal sign, yet as it was always preceded by vomiting and never happened alone, I cannot so positively assert it."

In 1842 a Select Committee was appointed by the House of Commons "On the West Coast of Africa," and Appendix 21 of their Report contains the views of Dr. R. R. Madden, the Commissioner appointed by them to report on the "Climate of the West Coast and its Influence on Health," and on other matters.

In considering the Fever to which Europeans are subject in that region, he refers to "the greater intensity of the symptoms of common bilious remittent fever and the grade of it which goes by the name of Yellow Fever," and continues as follows: "It is impossible to read the descriptions of the post-mortem examinations in cases of seasoning fever which have taken place in Sierra Leone and not to perceive how identical the pathological appearances are in both degrees of bilious remittent fever."

Examples are then given of lesions typical of Yellow Fever found in such post-mortem examinations, and it is stated that "with the exception of the yellowness of the skin and the existence of black vomit, which are considered peculiar to Yellow Fever, but which in the majority of cases of it do not take place in that fever, the symptoms are similar, and I would defy any man to point out the difference between those cases of Yellow Fever as they exist in Cuba or Jamaica and those of African local fever as it exists on the West Coast. Of the identity of West Indian yellow fever and African local fever I have no doubt, my acquaintance with them has unfortunately been of too intimate and personal a kind to leave me in ignorance of the similar symptoms and character of both."

The foregoing evidence is, we think, sufficient to establish the fact that in 1778 Yellow Fever was to be found on African soil. It does not suggest that this was its first appearance in that region, nor does it offer an explanation as to how it got there. Such questions, although of great interest and suitable for discussion in a treatise on the history of Yellow Fever, are beyond the scope of this report.

The Difficulty of Diagnosis.

In order to realise the difficulty of accurate diagnosis in the cases of fever which came under the observation of the surgeons, it is necessary to recall the state of medical knowledge at the time, and the variety of the diseases which were to be met with on the West Coast of Africa. The diseases represented were probably somewhat as follows :—

1. A fever of prolonged duration characterised by abdominal symptoms, delirium, abdominal pain and vomiting (perforation and peritonitis), diarrhœa and hæmorrhage from the bowel. Typhoid or Enteric Fever.

2. A paroxysmal fever, not in the majority of cases of severe character, presenting more or less regular remissions at varying intervals. Malaria or Intermittent fever.

3. A fever having somewhat similar characteristics to that just mentioned but of a much more severe type, possibly accompanied by vomiting, jaundice and diarrhœa. Æstivo-autumnal malaria.

4. A fever of a very severe type and often terminating fatally, occurring either as a first attack or in a person subject to the less severe forms of intermittent fever. Restlessness, delirium, diarrhœa and hæmorrhages from the bowel and dysentric stools, vomiting, jaundice and coma might accompany this form of fever. Pernicious malaria.

5. The disease now known as Blackwater Fever, which was first so named in 1855.

6. Various irregular forms of fever due to malaria complicated with other infections.

7. A fever of sudden onset, with rigors or chills and severe frontal headache and pains in various parts of the body, and possibly later accompanied by jaundice and vomiting, in which a remission occurred after two or three days. Yellow Fever of a mild type.

8. A fever of a similar character, but of a much more severe type, occurring in epidemics specially affecting Europeans and new comers, usually accompanied by black vomit and often terminating fatally Yellow Fever.

9. Relapsing Fever, Typhus, Dengue, Epidemic Jaundice and other febrile diseases.

10. Cases in which Yellow Fever occurred in a person already the subject of malarial infection.

11. Cases in which the characteristics of these various fevers were obscured by acute or chronic alcoholism and especially by diseases of the liver, e.g., cirrhosis.

12. Cases of dysentery with various complications.

For the differentiation of these diseases few of the facilities now at hand were available. The clinical thermometer did not come into general use until about 1860; the importance of examining the urine for the presence of albumen was not made known until 1827, whilst blood examinations and differential leucocyte counts were of course unthought of.

It was not until 1848, when a circular was issued by the Director General of the Army Medical Department advising the use of quinine in large doses during the paroxysm of Intermittent Fever, instead of when it had subsided, that the full benefit of that drug in treatment was realised on the Coast.

This is well shown in the Annual Report from the Gold Coast for 1849.†

Nineteen cases of Seasoning or Remittent Fever occurred amongst newly arrived Europeans, of these six, who received no medical attendance, died; and thirteen, who were treated with large doses of quinine, all recovered. "In the most obstinate cases the fever was checked within twenty-four hours." This establishes the fact that the disease was malaria and not yellow fever.

In the Gold Coast report for 1851†† it is noted that the system of giving quinine in large doses during the hot stage had rendered the fever comparatively mild in its effects; and in that for 1852††† it is stated that "no person who had the advantage of medical aid has died of fever for four consecutive years."

† "Reports on the Past and Present State of Her Majesty's Colonial Possessions . . . for the year 1849," presented to Parliament in 1850 (page 95).

†† Presented to Parliament in 1852 (page 186).

††† Presented to Parliament in 1853 (page 198.)

This experience of the effect of quinine must have proved of great use in the differential diagnosis of the various fevers.

The non-identity of Typhus and Typhoid fevers was first established in Britain by Dr. Patrick Stewart (afterwards Physician to the Middlesex Hospital) in 1840, in a communication presented to the Medical Society of Paris, but it was not until ten years later that owing to the work of Sir William Jenner (1849–51) the differential diagnosis of these two fevers became generally known to medical men in Great Britain. Typhoid Fever was certainly one of the diseases to be met with in Sierra Leone in 1845, and it would necessarily not be distinguished from Typhus or probably from Relapsing Fever.

(II) "FEVER" IN THE SHIPS OF THE BRITISH NAVY ON THE WEST AFRICAN STATION.

Probably the most trustworthy evidence of the nature of the fevers prevailing on the West Coast of Africa in years past, is to be found in the records of the vessels of the British Navy on that Station. These ships were in frequent movement upon the coast watching the slave runners, a duty which often compelled them to send boats to the shore to lie hidden until the slave ship moved with her cargo; they were also often in port, especially in Sierra Leone, and almost without exception the fevers from which the crews suffered were brought from the shore, and very often indeed from Freetown, Sierra Leone. Sometimes, as will be apparent later, the ships became infected, when the mortality from fever was appalling.

James Lind (1716–1794), a surgeon in the Navy who had served on the Coast of Guinea and was later, from 1758–1794, Physician to Haslar Hospital, was the author of an "Essay on Diseases Incidental to Europeans in Hot Climates" (1778), and of other papers on medical subjects. He was an accurate observer, and his precepts and practice were obviously far in advance of the teaching of the time.

The regulations for the preservation of the health of seamen of the Navy on the West African station were drawn up by him and embodied his teaching and practice.

"Since the last edition of this Essay, the ships of war on the Guinea Station are ordered to be supplied, at the expense of the Government, with a large quantity of bark in powder, and of wine, to be issued occasionally to those who are sent in boats, up rivers, or on shore; and instructions have been given to the commanders of these ships not to permit any of their men to remain on shore after sunset; two circumstances strongly recommended in the course of this work, and which, if strictly adhered to, must prove of the greatest utility.

"At present the English Settlements, on the rivers Senegal and Gambia, are remarkably unhealthy; but otherwise, the northern, or what are called the windward parts of this coast, are the most healthy, especially in places or factories near the sea. Thus, the island of Goree, the town of Sierra Leone, the fort of Dixcove, Seccondee, Cape Coast, and all the English, Dutch and Danish ports on the Gold Coast are, comparatively speaking, healthier than the country to leeward of them." (p. 56.)

"I am informed by a surgeon who practised some years at Senegal, that for several months during the dry season the country was as healthy and pleasant as any in the world; but soon after the rainy season began, a low malignant fever constantly spread itself among the Europeans." (p. 59.)

"It seemed to proceed from a poison, as it were, got into the stomach, beginning with severe retchings and often with a vomiting of bile." (p. 56.)

"In some the fever was very malignant and the patient died soon after its attack, the corpse appearing of a yellow colour, and the skin stained with livid spots or blotches."

This was probably Yellow Fever.

"An inflammatory fever is seldom observed during the season of sickness in this part of the world. The Flux (dysentery) chiefly occurs at this time, though it may sometimes make its appearance at other seasons, and is a distemper very common, and often fatal to Europeans in Guinea." (p. 60.)

"The most mortal epidemic, however, is that low malignant fever of the remitting kind, which rages only in the rainy season."

"The following is an accurate description of this fever which raged on board the "Weasel" sloop of war, during the rainy season at Gambia, in August, 1769, taken from the journal of the ingenious Mr. Robertson, Surgeon of that ship":—

"*The symptoms are arranged according as the fever appeared in a more mild or more malignant form.*

"*In its mildest form it began with a headache, a sickness at the stomach, thirst, universal uneasiness and pain, especially in the back and*

loins. The pulse is small and quick, the skin hot and dry. In the morning these complaints were greatly relieved, in the evening exasperated, which happened through the whole course of the fever.

" About the third day the violence of the symptoms increased, the tongue now becomes white and foul, the speech weak and faltering, the thirst insatiable, the pulse soft and weaker than natural.

" On the fourth day the patients lose the sensation of taste, and towards the evening become very hot and restless.

" On the third night there was a gentle moisture on the skin, likewise on this night several had profuse sweats.

" On the fifth day the weakness is increased. Hitherto the patients had not been confined to bed in the daytime.

" On the sixth frightful dreams and an incipient delirium prevent them from sleeping.

" On the seventh they grow worse, their tongues are brown, dry and chapped, the delirium is increased, with restlessness and universal uneasiness.

" On the eighth the remissions and exasperations happen as usual.

" The ninth is the worst day ; in the morning they are cool, but the symptoms soon return with increased violence.

" Their pulse, since the sixth day, has been very irregular and in general weaker than natural.

" After this day there is a perfect remission of the fever, but towards night they become a little feverish till the seventeenth. The crisis of the fever is a gentle purging.

" In the more malignant form of the fever all the symptoms are more violent ; there is from the beginning a great prostration of strength and spirits, universal uneasiness, giddiness, violent retchings, a strong, quick, and sometimes a hard pulse, a white and dry tongue, sometimes a severe purging with gripes, at other times a bad cough, a violent pain and stricture over the eyes and costiveness.

" On the second day there is no alteration for the better.

" About the third day, in the morning, there is a small remission, but in the evening they again turn ill.

" On the fourth scarce any remission could be perceived.

" When a remission happened it did not last above three hours, the patients seemed a little cooler, but their thirst was not abated, and the palms of their hands and the soles of their feet glowed with heat. Anxiety, restlessness and frightful dreams prevent them from sleeping. Their memory begins to fail. The tongue in a few is white and furred, in most dry and chopped. Bilious vomitings and frequent loose fetid stools have attacked several, but those who were costive in the beginning still remain so.

" Fifth, in the night several were delirious ; the tongues of some are become black and the teeth furred.

" Sixth, in the morning a few of them had a small remission, but all had been very ill in the night. The pain of the back and loins, giddiness, and a pain at the bottom of the orbit of the eyes are still very troublesome.

" On the seventh the delirium is more general, and in some the countenance is quite yellow, a wild look, heat of urine (not from blisters), an inclination to vomit, and loose stools, are frequent this day.

" Eighth, a few after severe bilious vomitings and purgings, which stain like saffron, had purple blotches on the face and neck. In one patient a swelling of the parotid gland appeared. Delirium, stupor, cold sweats, convulsive tremors and catchings, twitchings of the tendons, and involuntary discharge of urine and fæces are frequent this day. The pulse is very irregular.

" Ninth, all the bad symptoms continued. The blotches rose above the skin, and soon disappeared; the patients thought themselves better, while they remained on the skin. A bleeding at the nose occurred in one of them, which also tinged yellow.

" Tenth, a few had a slight remission.

" Eleventh, the dangerous symptoms continued; a large effusion of blood under the skin appeared on one patient, on the right side of the face and neck, a little before his death.

" Thirteenth, their countenances were much more yellow, and they were seized with a purging, but not attended with gripes. One of them had a gentle and universal perspiration. He was afterwards cooler and his complaints were relieved. Among others, the bad symptoms still remained; one was seized with faintings.

" Fourteenth, the purging was attended with gripes; the patients continued cooler, but very weak, and the bad symptoms still prevailed, with the subsultus tendinum.

" Fifteenth, the bad symptoms continued; the swelling of the parotid gland in one patient was opened. Those who had the purging and yellow countenance were better: one had the piles.

" Sixteenth and seventeenth, all continued better except one man.

" Eighteenth, a man who, for two days, had appeared to be in a very dangerous state, fell into a sound sleep, followed by an equable perspiration, which proved a happy crisis.

" In one patient the fever continued till the twenty-first day, but it had been very mild during its whole course.

" As to the critical days and symptoms that were most dangerous in this fever.

" On the third day in the evening a perfect remission was procured in one case.

" In another case a remission of thirty hours was obtained on the fifth day in the morning; but the fever afterwards returned for twelve hours with increased violence.

" On the eighth day four died, and in one a swelling of the parotid gland formed. In the mildest state of the fever, an imperfect crisis happened on this day.

" One person died on the tenth, and on the eleventh, three.

" On the thirteenth one died, and many were seized with purgings, which proved a favourable crisis. In one, an equable perspiration broke out, which was succeeded on the fourteenth by a gentle purging, and proved salutary.

" On the fourteenth also another patient died, who had had bleedings at the nose, and blotches on the neck.

" On the fifteenth, the swelling of the parotid gland was ripe for opening.

" On the eighteenth, the unexpected crisis happened in a very dangerous case, by means of a sound sleep and free perspiration.

" Costiveness, frequent discharges of bile, both by stool and vomiting, bleedings from the nose, blotches, a brown, rough, and husky tongue, a smacking of the lips, wildness of the countenance and despondency of mind, were in every case mortal. A cough proved fatal in two cases out of three, which third was the remarkable case that came to a crisis on the eighteenth day. An involuntary discharge of urine and fæces, except in two cases, was also followed by death ; in the first case, there was a swelling of the parotid gland ; in the second, an unexpected crisis happened on the eighteenth day. A pain either over the eyes, or deep within the orbit, faintings, drinking greedily and in large draughts, were dangerous symptoms. Upon feeling the pulse, a disagreeable sensation always remained on the fingers, especially if there was moisture on the patient's skin ; but where the perspiration proved critical, this did not occur.

" Most of these patients were vomited and purged when first taken ill. The mortality of the fever, it is supposed, was greatly lessened by the ship leaving Gambia and being at sea. The captain, who was ill of it, took ten ounces of the bark. Hence we may in some measure judge how many pounds of that remedy would have been requisite in the case of thirty or forty such patients on board even a small ship and how far the allowance made to the surgeon for medicines was adequate to this expense."

This account, though lengthy, is given in full, as it is one of the best descriptions we have met with of a severe outbreak of fever on board ship at that period.

The sudden onset with headache, pains, vertigo, pains in the orbit, the bilious vomiting, the rapid occurrence of delirium ; the slight remission on the third day, the thirst, black tongue and sordes on the teeth, purple blotches on the face and neck ; parotitis, epistaxis, twitchings of the tendons, convulsive tremors, the appearance in one case of a large effusion of blood under the skin, and the mode and time of death, are all strongly suggestive of Yellow Fever and incompatible with any other known disease.

It is interesting to compare this account with that given of the outbreak of yellow fever on the " Bloodhound " in 1862 (*vide* p. 93). From the latter it is clear that undoubted cases of Yellow Fever may occur with others which the surgeon hesitates to describe as yellow fever. Also with the record of the cases of " Remittent Fever," and " Remittent Fever with suppression of urine," on board H.M.S. " Arrogant " in 1861, and the remarks of the Captain of the Port at Benguela (*vide* p. 96).

The " Report on the Pathology Therapeutics and General Aitiology of the epidemic of Yellow Fever which prevailed at Lisbon during the latter half of the year 1857 by Dr. Robert D. Lyons, late Pathologist-in-Chief in the Crimea," contains the most masterly

description of the disease in all its aspects which we have found anywhere. It is almost impossible to read of the infinite variety in which yellow fever may present itself in a single epidemic without becoming convinced that the disease which occurred in the "Weasel" was really Yellow Fever.

> "The clinical phenomena which characterise disease, whether endemic or epidemic, seldom observe a constant and invariable relation to each other. And hence it is that while in a given epidemic, in a given locality, at a given time, one set of phenomena will be prominent, if time, place or other circumstances be changed, the disease will present in salient relief another train of symptoms with perhaps a totally different clinical *cachet*, displaying another order of phenomena and being wanting in those which were described as all but essential to it in its former phase."

Chronological Account of Yellow Fever in the Ships of the Navy.

1823 to 1843.

Anyone who is desirous of realising the amount of suffering and loss of life amongst the men of the British Navy engaged on the West African coast in the suppression of the slave trade during the period covered by the above dates may be advised to read the "Report on the Climate and Principal Diseases of the African Station," by Alexander Bryson, M.D., Surgeon, R.N. (1847). It was prepared at the special request of the First Lord of the Admiralty from the official records, and is a page of history which no one, and least of all a medical man, can read unmoved. The devotion to duty of the Naval surgeons is beyond praise, but the medical treatment to which men seriously ill with "fever" were submitted was such as must have intensified their sufferings and deprived some of those who might possibly have survived if left to Nature, of any chance of recovery. The records shew that one surgeon after another learned that the pernicious teaching which he had received at home as to the proper treatment of "fever" was, at any rate, not applicable to the fevers of the West Coast of Africa; but before he had time to revise his methods by the light of experience, he was himself carried off by the disease and replaced by another fresh from "the schools."

Their "sheet-anchors" (appropriate term), were bleeding, often from the temporal artery, and the administration of mercury with the object of inducing ptyalism (salivation); the few who survived this treatment suffered terribly during convalescence from mercurial poisoning, with a horribly fœtid condition of the mouth and ulceration of the gums. The deadly nature of these fevers and the "heroic" treatment which was thought to be necessary have a very distinct bearing on the enquiry upon which the Commission is engaged. For the ordinary intermittent fever of the coast, as the following extract proves, quinine prophylaxis was as adequate then as it is to-day.

> "The 'North Star' arrived on the station from England in July, 1826, and whilst at Sierra Leone in August, the effects of the climate became manifest by the occurrence of a few cases of fever. On the 7th of the latter month twenty of the crew were employed in boats and on shore embarking provisions, they had wine and bark as directed by the public instructions with the exception of Lieutenant Boultbee, who conducted this service; he declined taking the prophylactic dose prescribed to the men and it is not a little singular that he was the only one of the whole party who suffered from fever. Several other cases of fever occurred both in this and the following month, but it is not stated whether the parties had been on shore or not: one proved fatal."(33 p. 218,219.)
>
> "The 'Hydra' subsequently, until November 1844, was employed pretty generally along the whole coast and continued healthy. During the latter month and December, fever however again made its appearance on board and seemed to assume two forms, 'one being mild and the other malignant'; the former was the more general, and occurred among men who had not been out of the ship, particularly amongst the stokers; the latter, few in number, occurred in the gig's crew, who were exposed to concentrated malaria for a period of forty-eight hours in the river Sherbro; of the four men, two had severe attacks, and one died; the third suffered to a less degree but had a lingering recovery; the fourth had feverish and dyspeptic symptoms for some days; the commander of the ship who was also in the boat being the only one of the party who escaped * * * * * * About the same time the pinnace and cutter were detached to watch the Turtle Islands, where they remained a fortnight; nevertheless not a man suffered in consequence. Bark and wine in the prescribed portions were sent with them and duly administered during the whole time. This is another instance wherein bark seems decidedly to have acted as a preventive of fever." (33, p. 167.)

It is possible, however, that there may have been infected Stegomyia in the river Sherbro and not near the Turtle Islands.

Constantly throughout this work a statement occurs of which the following is an example:—

> "The same ship (the 'Atholl') again suffered from fever after the rainy season, and a few days subsequently to her leaving Sierra Leone

where the men unfortunately had liberty to go on shore. They committed great irregularities to which the sickness was chiefly to be attributed. There were altogether forty cases of fever and three deaths." (p. 43.)

The years 1823 to 1825 were marked by a severe epidemic throughout the European settlements on the Coast, and a great influx of Europeans in consequence of the Ashantee war and a concentration of the squadron at Cape Coast Castle. This epidemic was almost certainly one of yellow fever, as "black vomit" is mentioned and all the typical symptoms of the disease as they were then known.

"The 'Bann' contracted the fearful scourge which swept off nearly one third of her crew in little more than two months at Sierra Leone." (33, p. 45.)

Other ships affected at the same time are mentioned and the following significant statement shews that in some ships the disease was Malaria, whilst in one other at least it was Yellow Fever.

"It however does not appear to have assumed a contagious form in any vessel but the 'Bann.' The total number of cases on board the 'Bann' was 99 and the mortality 34."

The fever was carried by the officers and crew of the "Bann" to the island of Ascension, where it caused an epidemic of yellow fever with 28 cases, and 15 deaths. The case of the "Bann" was warmly discussed at the time by those who favoured and those who opposed the theory of the specific and also of the contagious nature of yellow fever.

The following account of an outbreak of fever on the "Sybille" in 1827 is one of interest. The infection was apparently acquired at Fernando Po in June, 1827.

"The disease was evidently yellow fever and in the greatest degree of intensity. With two exceptions it was of the continued kind—the stage of excitement short. In the worst cases it terminated fatally between the third and sixth day, most frequently on the fifth. Death was preceded in a great number of cases by black vomit, often accompanied by a dingy or livid hue of countenance. Yellowness of the eyes and skin was very common before death, it varied from a pale lemon colour to a dark orange hue. An officer who died on the eleventh day of a relapse had previously suffered from yellow fever in the West Indies." (33, p. 53.)

The "Sybille" was again infected in January, 1830, at Princess Island from her tender, which had arrived from Sierra Leone, and had lost 23 of her crew from fever. In this outbreak there were 87 cases and 26 deaths, "with the usual symptoms of the most malignant

yellow fever." The fever broke out again in March at St. Helena, when there were 22 cases and six deaths. (33, p. 55.)

> "The disease throughout was considered by the surgeons as non-contagious, but by the officers and men as highly so. The Commodore, from humane motives, prohibited all Europeans, with the exception of himself and the medical officers, from visiting the sick. Dr. M'Kechnie mentions, 'that the frequent deaths produced such depressing effects, that at meal hours, when smoking was allowed, but more particularly in the evening, the men used to congregate together with despair depicted in their faces, to learn from one another who had gone to the doctor, or who was likely to die during the night.' The same gentleman has also kindly furnished the following incident, which deserves to be placed upon record:—
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> "To dispel as much as possible the state of general mental depression, and to convince the officers and the ship's company that the disease was not contagious, Dr. M'Kinnal directed me to collect some black vomit from the first patient who was attacked with that fatal symptom: accordingly I collected about a pint of it from a man named Riley, I think, about two hours before he died. Shortly after this the doctor came up to the starboard side of the half deck, when I told him what I had done. He then went down to the gun-room, and about half-past twelve o'clock (the men being then at dinner), returned with a wine glass. Mr. Green, the officer of the forenoon watch, was then going below, when he called him over, and filling out a glassful of the black vomit, asked him if he would like to have some of it; being answered in the negative, he then said, 'Very well, here is your health, Green,' and drank it off. There were no other persons actually present, but there were others on the deck at the time, and it became the theme of conversation all over the ship during the afternoon. Dr. M'Kinnal immediately afterwards went on the quarter-deck, and walked until two o'clock, to prevent its being supposed that he had resorted to any means of counteracting its effects. This took place in February, 1830, when the ship was cruising off Lagos, about one hundred and eighty miles from the land.
>
> "A more deliberate act of cool moral courage can hardly be conceived: but it is evident he had observed the fatal tendency of fear upon all around him. The sick being deprived of the kind offices and friendly consolation of their mess-mates, lost all hope of recovery from the moment they were seized: while the healthy, from brooding over the little probability they had of escaping, and from daily witnessing the mortal remains of some of their shipmates committed to the deep, were rendered peculiarly susceptible of the morbid poison, whether it were of a personal or of a local nature; it was, therefore, above all things, desirable to restore confidence by some means or other, and there was certainly none so likely to produce that effect as the revolting measure Dr. M'Kinnal imposed upon himself. It is almost unnecessary to add, that it did not impair his appetite for dinner, nor did he suffer any inconvenience from it afterwards."

It was very natural that the officers and men should have regarded the disease as contagious; whether it was so or not really mattered

very little to them, as it was certainly being conveyed from the sick to the healthy. Now, the explanation is of course simple, the ship was carrying infected Stegomyia. The name of the man whose act is here recorded deserves to be remembered.

The history of the "Eden" is of great interest, as it illustrates the effect of the administration of quinine in mitigating the severity of the attacks in a certain variety of fever, even when, as was at that period the practice, the drug was given only during a remission.

The "Eden" arrived at Sierra Leone on the 2nd of September, 1827, and sailed for Fernando Po on the 4th October. In April, 1828, whilst she was still at Fernando Po "fever became more general and six deaths resulted"; "the disease was contracted either at the hospital by the patients whilst under treatment or on shore by the carpenters and armourers employed there." "With regard to treatment it is observed that it varied from the practice followed on first arriving at Fernando Po and the results have been much more satisfactory, for latterly *two* out of three have recovered." Calomel was only given as a purgative, free bleeding was still employed and cold wet cloths were applied to the shaven head. * * * * * * "upon a marked remission being observed ten grains of the sulphate of quinine are immediately given. This in some cases has entirely prevented a return of fever and in others (the majority) rendered the disease milder and more manageable, smaller doses of quinine only increase the febrile symptoms." (33, p. 59.)

The fact that marked remissions occurred in some cases suggests that in such cases the disease was probably not yellow fever.

Between the 1st May, 1829, and the 1st December of that year the "Eden" lost 110 men, of whom 50 died on board and 50 on shore at Clarence Cove. Thirteen were natives of Africa, all the others were Europeans. (p. 64.)

The symptoms of this disease are described as follows:—

> "In some cases the symptoms in the stage of invasion were rapidly developed, in others more slowly and in an insidious manner. In the course of twelve or fourteen hours there was generally a remission of the symptoms, followed sooner or later by the next and last stage characterised by prostration of strength, remission of pain, the skin being covered with a clammy moisture or dry and below the normal temperature, pulse natural or flagging, or quick, small and weak: irritability of stomach, hiccough, yellowness of the eyes, frequent but ineffectual calls to stool and mental anxiety. As the disease advanced

the debility increased; the eyes became more yellow, bloodshot and glassy; the skin also became of a yellow tinge and covered with a cold perspiration, with sordes on the teeth, chapped lips and hurried respiration, vomiting of black matter (black vomit), sometimes delirium and convulsions, at others coma and insensibilty to surrounding objects closed the scene. All the deaths occurred between the third and ninth day of the disease, but the majority on the fourth or fifth." (p. 66.)

A febrile disease accompanied by black vomit, usually ending fatally on the fourth or fifth day, could only, so far as is known, have been Yellow Fever. The words "black vomit" and the brackets are in the original.

Evidence such as that here given could be multiplied indefinitely, but as the object of this retrospect is only to prove, so far as is possible from the records, that in addition to pernicious or malignant malaria and various other diseases, Yellow Fever was present in the ships on the coast during these years, it is unnecessary to do so.

The following table gives the deaths from disease from 1825–1844 and the ratio of deaths per 1,000, from disease in the ships on the West African Station.

Date.	Deaths from disease.	Ratio of deaths from disease per 1,000 mean strength.	
1825	41	61·8	
1826	57	54·7	
1827	40	41·9	
1828	81	84·6	
1829	202	255·1	Eden, Hecla and Sybille (p. 92.)
1830	72	107·9	
1831	22	28·0	
1832	18	35·1	
1833	12	21·4	
1834	18	29·0	
1835	19	23·3	
1836	16	16·6	
1837	105	128·8	
1838	115	129·9	
1839	55	69·6	
1840	32	37·4	
1841	68	63·6	
1842	43	32·3	
1843	23	18·2	
1844	43	25·1	

Total deaths 1,082. Average ratio of deaths from disease per 1,000 seamen, 63·2.

1856.

"In a mean force of 1,680 men there were only seven deaths from fever"—"How are we to account for this improvement?" "By a wise and humane regulation the deadly practice of sending boats away on detached service to watch or intercept slavers has been interdicted."

"Prize crews are no longer turned adrift to wander through the streets of Sierra Leone; the orgies of 'The Barn' have ceased, and last, though not least, the introduction of quinine wine as a preventive of fever has not only reduced the number of febrile attacks but has lessened the severity of those that do occur, and thus the mortality has been reduced to a level which does not materially exceed the death rate from fever on some of the more healthy stations."

"There has been a great change in the medical treatment of febrile disease; the so-called active measures which were in vogue but a few years since have given place to others of a more rational character." . . . . "If these changes have had no effect in reducing the mortality they at all events have lessened the sufferings and misery entailed on patients who though they survived the fever lingered long in a state of debility from the effects of blood-letting and mercury." (33, p. 115.)

No deaths are returned from Yellow Fever in 1856.

1857 and 1858.

No deaths are returned from Yellow Fever in these years, but there are reports of some very suspicious cases on board the "Hecate" at Loanda in 1858.

1859.

One hundred and eleven cases of Yellow Fever with fifty-five deaths are reported from the squadron in this year. The infection occurred at Sierra Leone.

"It is much to be regretted that owing to the accidental introduction of Yellow Fever into one ship, the 'Trident,' more men were lost in two months from that fatal malady than during the three previous years in the whole squadron from all kinds of fevers."

The "Trident" was infected at Sierra Leone. The crew consisted of:—

Europeans	110	Cases 109. Deaths 44.
Africans	33	
	143	

1862.

The "Bloodhound" was infected in August at Benin. The ship was at Fernando Po from September 4th to the 10th, where the disease prevailed and had "carried off more than one-third of the entire purely Spanish population of the Island." Between September 15th and October 16th thirty cases of fever occurred on board, of which eleven were returned as Yellow Fever, with seven deaths. The medical officer states that only those were classed as Yellow Fever "in whom the symptoms were unmistakeable." They all died with black vomit.

The details of some of these cases and the complete medical history of the "Bloodhound" are given on p. 90 in the description of the epidemic of 1862.

1860 to 1863.

In 1860 there were three cases, all of which proved fatal. No cases are reported in 1861. In 1862 eleven cases occurred with seven deaths. In the year 1863 the squadron is said to have been free from Yellow Fever.

1864.

The history of this year is interesting. No Yellow Fever is returned, but two fatal cases with black vomit occurred on the "Hankey." The infection took place at Lagos, where "bilious fever was raging on shore, where out of forty-two Europeans twelve died in six weeks." The surgeon saw three cases on shore, "death took place in all three cases within 36 hours of the appearance of the disease. There existed intense prostration from the commencement, deep yellow skin and at last black vomit." The failure to recognize this "bilious fever" at Lagos as Yellow Fever may have been responsible for the occurrences of the following years.

1865.

Sixty-five cases of Yellow Fever appear in the returns of the squadron for 1865, of which thirty-four had a fatal termination.

1866.

In 1866 there were thirty cases of Yellow Fever, with twenty-five deaths.

The report for 1866 contains a synopsis by Assistant-Surgeon Fleetwood Buckle, R.N., of notes of forty cases of Yellow Fever in the epidemic of 1865–1866. The infection was acquired at Sierra Leone from the store-ship "Isis." The ships concerned were the "Bristol," the "Espoir" and the "Isis."

1867 to 1873.

Two fatal cases of Yellow Fever occurred in 1867, and one on the "Dido" at Fernando Po in 1871. In 1873 a seaman infected at Cape Coast Castle was landed moribund at Ascension.

1874 to 1912.

No case of Yellow Fever is reported in the returns of the Health of the Navy from the West African Station during these years.

This concludes the record of Yellow Fever in the ships of the West African Squadron up to the date of the appointment of the Commission.

Continued Fever, Remittent Fever, and Intermittent Fever in the Ships of the Navy on the West African Station.

1856 to 1867.

During these years it appears from the returns that 6,381 cases of "continued fever" and "remittent fever" occurred in the crews of the ships on the West African Station, of which 108 proved fatal. During the same period there were 1,464 cases of intermittent fever, with only

three deaths, one in each of the years '65, '66 and '77. Intermittent fever is a recognized synonym for malaria, but the nature of the diseases classed as "continued fever" and "remittent fever" and grouped as one, is by no means clear. That such a disease as malaria should be responsible for only three deaths in twelve years amongst crews often totalling 1,680 men is a very remarkable circumstance, and suggests an enquiry into the nature of the fevers termed "continued" and "remittent."

(III) YELLOW FEVER IN THE COLONIES, BOTH BRITISH AND FOREIGN, ON THE WEST COAST OF AFRICA.

We are now free to consider the history of the various Colonies on the West African Coast in relation to Yellow Fever. This subject has been dealt with at length by Augustin, Bérenger-Féraud, Boyce and other writers, but it cannot be omitted here, if it is true, as already suggested, that a knowledge of the past is necessary to a right understanding of the occurrence of the disease in the various Colonies in recent times.

In any attempt to determine whether a febrile disease, of which the diagnosis is often attended with great difficulty, has appeared in a certain region, it is necessary to set up an arbitrary standard and to accept no evidence as proof of its presence which does not attain to the degree of certainty afforded by its most severe manifestations. This plan has been adopted by the Commission in regard to individual cases, and the same standard and the same plan have been followed in dealing with the accounts of the epidemics reported to have occurred in the various Colonies.

It is most important to remember with regard to these accounts that in no single instance, so far as we have observed, do they

deal with an epidemic which was confined to the natives. It is the occurrence of cases of Yellow Fever amongst the whites which leads to a conviction that the disease is present, and as a rule the evil day of announcement is postponed as long as possible.

The records therefore which follow may possibly indicate the years in which the disease has been epidemic amongst the Europeans, but it can hardly be claimed that they constitute a full and true account of Yellow Fever in the Colonies on the West Coast of Africa.

The occurrence of epidemics confined to natives is considered in Section B of this Report. (*vide* p. 136.)

(*a*) SIERRA LEONE.

Sierra Leone has a most evil reputation as regards Yellow Fever during almost the whole of the nineteenth century; indeed it was probably involved in the epidemic of 1778, described by Schotte, of which an account has already been given (p. 9).

"Sierra Leone Fever" probably included a variety of diseases, but it is certain that one of them was Yellow Fever.

1807 to 1884.

There are two papers amongst the records of the Colonial Office of great importance, not only as regards Yellow Fever in Sierra Leone, but also, incidentally, as throwing light upon the whole subject of Yellow Fever, and the attitude towards it of the medical mind in West Africa at that date, viz.: a despatch from the Governor to the Secretary of State, dated 30th July, 1884, enclosing the report of a Medical Board ordered by the Governor to consider the question of the special unhealthiness of a certain quarter of Freetown, and the general prevalence of fever of a dangerous type.

The following extracts from these papers contain all that is relevant to the enquiry upon which the Commission is engaged :—

From the Governor to the Secretary of State.

My Lord, 30*th July*, 1884.

During the months of May and June, the season of heavy rains sets in on this portion of the African Coast, after an almost uninterrupted period of drought of about five months' duration. Experience has shown that during the early portion of this rainy season, the malarious influences of the soil, which are at all times powerful, show a marked increase in activity and virulence. Cases of malarious fever become more than usually numerous and the disease itself, in many instances, assumes a more than ordinarily severe form. The history of Sierra Leone shows that, at intervals, seasons have recurred which have been marked by exceptional unhealthiness and by the development of the ordinary malarious fever into fevers of a most malignant type.

The present season has, as your Lordship will have learnt from recent correspondence, been marked in this manner. During the month of May last and the early part of June, a form of fever which was described by the Acting Colonial Surgeon as *typho-malarial fever** became prevalent. Europeans and especially Europeans who had recently arrived at Sierra Leone appeared to be more subject than others to the attacks of this disease. It proved fatal in many cases. The malignant symptoms of this fever became more marked from day to day. On the 27th of June, the Acting Colonial Surgeon described it as "*a pernicious remittent fever on the borderland of yellow fever.*" At the same time, one of the private practitioners in Freetown expressed his opinion that the fever in question had already assumed the form of *yellow fever of a mild type*; and the Senior Military Medical Officer reported the death from *yellow fever* of a soldier of the Second West India Regiment. On the 28th of June, a European died of the disease described by the Acting Colonial Surgeon as "*Black Vomit.*" On the 2nd July, two deaths of Europeans were attributed by the same officer to *Yellow Fever*. On the 6th July, another European died of yellow fever. The disease seems then to have begun to assume a less virulent type. Several cases of yellow fever were reported, but recovery was made in all instances except one, which ended fatally on the 16th instant. On the 12th July, the Acting Colonial Surgeon informed me that all cases of fever seemed to be becoming amenable to treatment. The final opinion with regard to the nature of the disease, which was given on the 17th instant by the Acting Colonial Surgeon, on his own behalf and on that of the other practitioners in Freetown was, that it was *a mild type of yellow fever, of a non-contagious nature.* A remarkable feature in the course of the progress of this disease is that, as it assumed a more virulent form its prevalence became more and more restricted to persons of European birth, till at the point at which it reached its worst stage and was admitted to be yellow fever, the natives seemed to have complete immunity from its attacks. With

* The words in italics are so in the original document.

the exception of the case of a soldier of the regiment in the garrison here, a West Indian negro, the cause of whose death is, as I have already mentioned, stated to have been yellow fever, there has not been a single authenticated case of that disease among the negro population.

"A considerable number of cases of serious illness resulting in death in the case of four Europeans having occurred during the latter part of May and the first fortnight of June, within a narrow area in the central and best quarter of Freetown, I appointed a Medical Board, composed of the Acting Colonial Surgeon, the Senior Military Medical Officer, and Dr. Cole, a private practitioner, to enquire into the causes of the special unhealthiness of the quarter in question, and of the general prevalence of fever of a dangerous type. I enclose a copy of the report. It emphasizes in a marked manner what is probably the chief cause of the development of the ordinary malarious fever into fever of a malignant type, such as typho-malarial and yellow fever, and that is, the existence of most unwholesome arrangements in Freetown for the disposal of human *excreta.* * * * * *

(Signed) A. E. HAVELOCK,
Governor.

(*Enclosure*).—The proceedings of a Medical Board ordered by His Excellency Sir Arthur Havelock, K.C.M.G., to assemble for the purpose of investigating and reporting upon the causes which have originated the Malignant Fever now so fatal in Freetown, particularly that part of it known as Westmoreland Street, Rawdon Street and Howe Street, and other localities.

The Board having assembled beg to lay the following report before His Excellency the Governor in Chief for the information of the Secretary of State for the Colonies.

DEFINITION.

The character of the Fever which has caused such extensive sickness and mortality amongst the natives and Europeans living in Freetown, and more especially in that limited area known as Westmoreland, Rawdon and Howe Streets, resembles Yellow Fever or that form of pernicious Remittent Fever of a malignant destructive Type having as its characteristics yellowness of the skin and conjunctivæ with dark coloured and very offensive alvine evacuations—dark coloured urine containing blood casts and very obvious albumen—a quick pulse and a persistently high temperature ranging from 102° to 105° Fahrenheit. Vomiting often persistent and very difficult to control, dark in colour and containing a large quantity of bile in some cases with distinctly Black vomit.

Duration of this form of pernicious Remittent Fever may be said to be from five to seven days—but in malignant cases four to five days. * *

The fevers occurring in these insanitary areas, limited though they may fortunately be, are always of a severe and malignant type. Individuals whether Native or European who contract Fever in these infected quarters of Freetown have its severity modified in them by prompt and immediate removal to healthier and higher situations. * * *

Intemperance.

Intemperance has always been brought forward and to it has been ascribed one of the causes of death during these Epidemics of Fever occurring so frequently in Freetown.†

It is an easy mode of disposing of a sore point more particularly when the death rate is highest amongst Europeans, and affords a feeling of self-glorification to temperate survivors. As a rule persons of intemperate habits possess iron constitutions and stand the climate well—whereas their more temperate companions do not stand the climate and are constantly down with Remittent Fever.

No person coming from a temperate climate to reside on the West Coast of Africa or in Freetown should do so until he has arrived at the age of 22 years and is of temperate habits and his constitution unimpaired. He should be physically and mentally strong and his character formed so as to resist the temptations which may surround him.

On every occasion that Origin Typho-malarial Enteric or Pernicious Remittent or Yellow Fever has appeared in Freetown epidemically it has nearly always been of sporadic origin, the undoubted product of Freetown itself, as all attempts to trace it to a non-sporadic origin have totally failed, except when brought here by a sailing vessel once from Rio Janeiro in 1872. The prevalence of this severe form of Typho-malarial Fever or Yellow Fever now so fatal among the European and native residents and many still ill with fever in the undrained insanitary areas of the town may be a warning of the approach of its more deadly sister Malignant Remittent Paludal or Yellow Fever.

History.

There may be stated to be three forms of Febrile disease usually met with on the West Coast of Africa, viz., Intermittent Fever or Ague, Remittent Fever, Enteric or Typho-malarial Fever and Pernicious Malignant or Yellow Fever.

Though the characters of these Fevers when fully developed have been freely and frequently described and showing a distinctness of type one from the other, yet so numerous are the connecting links which bind them together that much experience and careful investigation is required before absolutely and positively declaring the type to be of the Yellow Fever character or that modified form of it, viz., Typho-Malarial Fever. This Typho-Malarial or Fæco-Malarial Fever has always had seasons of Exacerbation. During some years assuming a mild form, at others a most severe, the mortality increasing with the severity of the type.

The earlier years of the existence of this Colony have been marked by seasons of extreme unhealthiness especially so in 1807, 1809, 1812, 1815 and 1819. In 1823 Yellow Fever was epidemic commencing in

† The paragraphs here placed side by side follow each other in the original. They suggest compromise and collaboration.

the earlier part of the year, the so-called healthy or "dry season," and running on through the early rains and ending with the "heavy rains." In 1825 Yellow Fever again become epidemic, and out of a known 902 persons attacked with that Fever 263 succumbed.

In 1829 during the months of April and May, Sierra Leone was again visited, and Yellow Fever then confined itself principally (as in the present instance May and June 1884) to the lower levels of the town. This epidemic was, however, stated to be most prevalent during the blowing of the Westerly winds and the falling of the heavy rain. It is recorded that out of 150 Europeans attacked with this Fever, 11 (?) perished.

In 1837 Yellow Fever commenced amongst the Europeans in the month of April, but many very suspicious cases of Endemic, Remittent, or the so-called African Fever occurred during the month of January, and two cases died having distinct black vomit. In March Yellow Fever declared itself amongst the Europeans in Freetown, and the first case occurring amongst the troops was on the 11th day of May, 1837. The disease is distinctly stated to have declined with the maturity of the rains and gradually decreased with the saturation of the ground and the atmosphere with moisture until it finally ceased by almost imperceptible and indefinable lines, merging again with the ordinary Endemic Remittent from which nearly all cases recovered. In October the disease again broke out but not in so malignant a form, and finally disappeared in December.

In 1838 Yellow Fever appeared in February and ended in March. In 1839 a severe form of Remittent Fever caused the death of six officers at Tower Hill—during the months of July, August and September every man of the Royal African Corps suffered, and the mortality amongst that Corps is stated to have been appalling. There were seven officers of the Royal Navy and 13 seaman attacked with Yellow Fever, and all died.

In 1845 Yellow Fever got amongst the crews of Her Majesty's squadron at anchor in the Roquelle River—the Eclair sailed from here on the 23rd of July and 60 of her crew perished from Yellow Fever. One case died in September from Malignant Remittent fever.

In 1847 Yellow Fever was epidemic in Freetown during June, July and August, and the "rainy season" was noted for great heat with little rain, only 38·45 inches falling, followed during the rains by days of extreme heat.

In 1859 there was no rain till April, May and June, which was then recorded as very slight. Yellow Fever was epidemic in Freetown and carried off 106 Europeans during this year.

In 1865 Yellow Fever again appeared and was epidemic in Freetown.

In 1866 Yellow Fever was again prevalent during the first quarter of the year there was no rain. Between the month of April and the 2nd of October, 100 Europeans had died of Yellow Fever.

In 1872 the fevers appear to have been of a malignant type during the months commencing May and ending in December.

In December there were 9 persons attacked with Yellow Fever, six died. The average death rate for this year has been rated at 250 per 1,000 amongst Europeans. But this appalling mortality does not indicate all the victims, as others died on shipboard trying to escape from the Colony.

1873 was unhealthy.

In 1877 there was considerable sickness from fever in Freetown. The year 1882 was not very healthy and was marked by cloudy and rainy weather for 72 days in the year only, and a total rainfall of 40·73 inches, being less than any on record during the past 32 years in Freetown * * * * * *

The Epidemic of 1884 *in Freetown.*

The extreme mortality occurring in Freetown during the months of May and June and an increase of sickness prevailing is mainly due to defective sanitation and almost total disregard for the disposal of excreta. * * * * * *

The extreme sick rate and mortality from fever amongst the "native population" occurring during the months of May and June in Freetown, and falling upon a great number of the inhabitants and attacking many persons at the same time with Fever pain in the bowels, bleeding from the gums, and vomiting in some cases black in colour has been a disease taking the form of the so-called "Sierra Leone Fever" and more severe in type than has been experienced for some years in this city.

The death rate since January has been estimated from the "burial records" as about 35 per 1,000, or 4 per cent. of the entire population. The Registrar General's return shows for May and June alone no less than 19 deaths amongst the resident natives, and this is the more remarkable since very few of these have been authenticated by "Medical Certificate," and the people have been left to make a report themselves as to the "cause of death," according to their own judgment, thereby proving the endemic of a fever by exposing a very obvious knowledge of its more fatal symptoms. We do not consider at present that there is a diminution of sickness, although we have reasonable grounds for believing that the advent of the "heavy rains" and by the adoption of Sanitary measures at once, so as to thoroughly remove the accumulated filth and thoroughly cleanse the town, that the general health may progressively improve * * * * * *

(Signed) ROBERT SMITH,

President.

An Appendix, headed "Mortality," "contains the names of the fatal cases occurring amongst Europeans and natives who died from Pernicious Remittent Enteric or Typho-Malarial Fever and Yellow Fever, residing in Rawdon Street, Westmoreland Street and Howe Street, also in other localities, with a brief history of their illness during the months of May and June."

An account follows of twelve cases numbered consecutively. It must suffice here to classify them on the basis adopted by the Commission.

Cases 1, 3, 6, 7, 9, would be classified as "Yellow Fever." Case 5 "Probably Yellow Fever." Case 2 "Possibly Yellow Fever." Cases 8 and 10 Enteric Fever. Case 4 (?) Enteric Fever. Cases 11 and 12 "evidence insufficient for classification."

It is easy with our present knowledge to deride the fantastic nomenclature adopted and the ignorance manifested in this document, but there are extenuating circumstances which may be realized by reference to p. 14 of this Report.

These papers are important and informing. It is clear that anyone who wished to arrive by easy stages at a diagnosis of "yellow fever of a mild type" would have every facility for doing so, and from another description* of the same epidemic it appears that twenty deaths amongst the Europeans within a short period would justify such a conclusion.

It will be observed that in the report just quoted there are periods of varying duration during which no mention is made of the presence of Yellow Fever in Sierra Leone, viz.:—

1830 to 1836.	1848 to 1858.	1867 to 1871.
1840 to 1845.	1860 to 1864.	1878 to 1881.

All these are inclusive.

It would be of great interest to determine whether the disease was really absent during these periods, but it is very unlikely that the most diligent search amongst the records would bring to light evidence of a convincing character.

* J. S. Lamprey, "British Medical Journal," 1885, Vol. 2, p. 594.

But a belief that a disease is habitually present in a given country by no means connotes a belief that it is invariably to be found in all its towns and villages. Measles is a *maladie habituelle* in Great Britain, but it is not present everywhere and at all times.

In the list given by Augustin (p. 311), which is based upon the work of Bérenger-Féraud, it is seen that the years in which it is not suggested that the disease was present are almost precisely similar to the above.

Nevertheless, scattered through the pages of Bérenger-Féraud and Augustin, there are accusations against the British Authorities of having wilfully suppressed the fact of the existence of Yellow Fever at Sierra Leone and elsewhere in various years. That very often they did not know the truth is certain, but, having tested these statements by the aid of the Naval records and the history of the Colony as regards Yellow Fever given in the Report from which we have quoted, and also from other official records, we are of opinion that, so far as official records are concerned, the case as regards Sierra Leone entirely breaks down.

These charges are reduced to the years 1868, for which Bérenger-Féraud and Augustin give no authority; 1864 which is dealt with below; and 1878, which is discussed on p. 52 of this report. The statement relating to the year 1864 is as follows:—

> "Yellow Fever did not 'officially' prevail in 1863 and we find no record of any cases. In 1864 an outbreak took place, the facts of which would no doubt have been suppressed, but a merchant vessel brought a case from Freetown to Falmouth, England, and the facts could not be hidden from the English public. The case, which proved fatal, caused much agitation in England, and the whole African coast was quarantined until the advent of the cold weather." (7, p. 324.)

This statement is based upon the following in Bérenger-Féraud (6, p. 141.)

> "Europe—Un navire contaminé à Sierra Leone apporta un case mortel de fièvre jaune à Falmouth, en Angleterre, et à la suite de ce fait on mit en suspicion toutes les colonies Anglaises de la côte d'Afrique."

No authority for this statement is given. We have searched the Annual Register and Palmer's Index to *The Times* without finding

any mention of this case, and no record of such an occurrence can be found in the Department of the Medical Officer of the Local Government Board, where it would certainly have been known. Lest it should be thought that this refers to the Swansea epidemic, which occurred in the following year, 1865, it may be mentioned that the "Hecla," the ship which carried the infection, sailed from Cuba, and touched at no port on the homeward voyage from Havana to Swansea.

Bérenger-Féraud in commenting upon the Swansea outbreak observes that "some authors state that it was brought from St. Mary, Bathurst" (i.e., Gambia). "Donnet says that it was from Havana." In the exhaustive and classical description of this incident by Dr. (afterwards Sir) George Buchanan, which was published in the eighth Report of the Medical Officer of the Privy Council for 1865 (p. 442, et seq.), the whole of the facts are minutely described, and it is absolutely proved, indeed there was no suggestion to the contrary, that the ship did not touch at any port on the homeward voyage to Swansea.

1862.

A despatch from the Governor informs the Secretary of State that the Director of Public Works died from an attack of African Fever on July 29th.

1865–1866.

In 1865 and 1866 there was a serious outbreak of Yellow Fever in the squadron and the infection is said to have been acquired at Sierra Leone from the store-ship "Isis," which was permanently in that port. In both these years Yellow Fever was epidemic at Freetown.

1872.

Bérenger-Féraud states that a Sister of Charity from Sierra Leone informed him that several persons had died in Freetown with black vomit.

1878.

In the report of the Board it is stated that the fevers in this year appear to have been of a malignant type.

Dupont (Archiv de Médécine Navale) states that Yellow Fever was raging in Sierra Leone on July 5th, "but this was absolutely denied by M. le Jemble, who applied to the English Colonial Office, and was shown the reports showing that in 1877 and 1878 there was no Yellow Fever either at Sierra Leone or the Gambia." Bérenger-Féraud refuses to accept these statements.

The question as regards the Gambia is discussed on p. 52 of this report.

1892.

The Colonial Surgeon at Sierra Leone reports twelve deaths amongst Europeans.

4 landed for burial from steamers in transit.
6 from "climatic fever" including three from the military.
1 influenza.
1 intemperance.

12

1893.

There was an epidemic of cholera raging at St. Louis, Senegal and in the Gambia and French Gambia; "fortunately the disease was not introduced into Sierra Leone." Four deaths occurred amongst the Europeans from "pernicious Malarial Fever."

1894.

"The public health during the year was most unsatisfactory; a good deal of sickness was prevalent amongst the natives and the European residents." Particularly during February, May, June, July and August when 'Malarial Fever of a pernicious type' was prevalent. During the latter half of the year diarrhœa (of a dysenteric type), bronchitis, and small-pox were very general." (Blue Book Report.)

Europeans, 16 deaths (including 1 case on board a steamer in port and 3 cases that died within 36 hours after landing in Freetown from the rivers).

13 *Bilious remittent hæmorrhagic fever.*
1 Convulsions.
1 Hepatic congestion.
1 died on his way to Freetown from Hinterland from Malarial Fever.

16

One would like to know more as to the nature of the cases described as "Bilious remittent hæmorrhagic fever."

1895.

"General health fairly good in 1895 as compared with the previous year."

"There were 6 deaths amongst the Europeans, but a considerable number of serious cases were invalided."

1896.

There were 11 deaths amongst the Europeans; 2 from Remittent Fever and 5 from Malarial Fever. Six European officials died and 6 were invalided.

1897.

There was a large amount of sickness amongst the Europeans and natives; 19 deaths occurred amongst the Europeans.

Remittent Fever	4
Remittent Malaria	3
Bilious Remittent	3
Bilious Malaria	1
Malaria	5
Blackwater	1
Hæmaturia	1
Suicide	1
	19

The recurrence in 1897 of the nomenclature of 1884, or of terms almost as unscientific, is highly suggestive of a desire to escape from the use of the words "Yellow Fever."

1900.

Seven deaths from Malarial Fever among Europeans (three at sea landed for burial).

" Yellow Fever was notified in Senegal in the early part of the year, and later on the Gambia was also declared infected. Fortunately the disease was not introduced here."

1901.

Isolated cases of Yellow Fever are mentioned as having occurred in Senegal. Quarantine declared. A list is given of the European deaths at Sierra Leone from 1886-1901 (i.e., 16 years).

Totals.

Landed for burial	36
Resident in Freetown, climatic causes ...	85
Otherwise	42

In 1894 and 1897 there were 13 deaths of Europeans in each year.

1902.

The registered deaths from fever in Freetown from 1897 to 1902 are given as follows :—

1897	41
1898	64
1899	55
1900	40
1901	42
1902	49

There were three deaths among the Europeans from Remittent Fever in 1902.

1903.

Deaths from fever 121. Three deaths of Europeans from Remittent Fever. One from Malarial cachexia. " Deaths from climatic disease among the Europeans in Freetown during 1902 and 1903 were the lowest number recorded for a very lengthened period."

1904.

Six deaths from Malarial Fever amongst Europeans. "Health of the general European staff exceptionally good." "Yellow Fever reported at Grand Bassam previous to the beginning of the year (1904)."

1905.

"Only three deaths of Europeans from Malaria."

1906.

"Only three deaths of Europeans from climatic causes."

1907.

"202 deaths from Malarial Fever amongst all classes." Two deaths from Remittent Fever amongst Europeans.

"The improvement in the health of the Europeans is to a large extent due to residence at Hill Station, where for the past three years a large number of the European officials on duty at headquarters reside."

1908.

Deaths from Malarial Fever 150. Deaths of Europeans from Malarial Fever 3.

1910.

The epidemic of this year is analysed on p. 110.

(*b*) SENEGAMBIA.

Senegal.

The medical history of Senegal is one long story of epidemics of Yellow Fever, beginning with that of 1778, of which an account has already been given (p. 8). The disastrous results to the French expedition which recaptured St. Louis in the following year have also been mentioned.

In the following table the number of cases and the mortality is given for each year. The information upon which it is based is

from Béranger-Féraud's work. It is impossible within the necessary limits of this report to analyse these numerous epidemics.

	Cases.	Deaths.	Locality or Town.
1779	—	180	St. Louis.
1828	34 on the Bordelaise	(?)	Goree-Dakar.
1829	—	14	Goree-Dakar.
1830	144	85	Goree-Dakar.
1830	600	328	St. Louis.
1837	160	46	Goree-Dakar.
1837	12	(?)	St. Louis.
1859	244	162	Goree.
1859	41	11	St. Louis.
1866	249	110	Goree.
1866	(?)	14	Gunboat "Surprise" in harbour at Dakar.
1867	Many cases and deaths	—	Rufisque.
1872	4	4	Goree-Dakar.
1878	(?)	373	Goree-Dakar.
1878	(?)	176	Logo Expedition.
1878	(?)	200	St. Louis.
1880	(?)	(?)	St. Louis.
1881	524	425	St. Louis.
1881	10	10	Makana.
1881	21	13	Bop-Diarra.
1881	16	14	Goree-Dakar.
1881	362	181	Unclassified.
1881	102	57	On vessels.
1882	27	15	Goree.
1882	40	30	Dakar.
1882	2	2	Rufisque.
1882	21	18	S.S. "Albatross."
	4	4	Carabane.
	142	76	Dakar.
	22	20	Goree.
	1	0	Mehke.
1900	1	1	N. Dande.
	18	15	Rufisque.
	218	102	St. Louis.
	7	4	Thies.
	3	3	Tivaouane.
Total in 1900	416	225	

1901.

"The disease did not become epidemic for the simple reason that those who had fled in 1900 wisely remained in France." "There were ten cases and five deaths."

1904.

Dakar was declared to be infected with Yellow Fever.

1905.

On May 31st, 1905, an engineer employed at the waterworks at Dakar died of Yellow Fever. A panic ensued and "a general exodus took place." Energetic measures were taken and only one other case occurred. The information is based upon the report of Mr. Strickland, American Consul (U. S. Public Health reports 1905: vol. 20, p. 1473), and Dr. Ribot (Annales d'Hygiène et de Médécine Coloniale; Paris, 1907: vol. 10, p. 79).

> "The chief health officer of Goree purchased two immense woven-wire cages which had been used by Consul Strickland during his sojourn in Senegal, one to sleep in and the other to enclose his writing table and book-cases. The largest cage was capable of accommodating two single beds, a chair and a table, while the smallest could contain a bed, a chair and a table. The cages were mounted in the hospital and all cases of suspicious fever were placed therein. Our representative says that he has used such cages since 1877, and attributes his immunity from the diseases incidental to the climate to this precautionary measure."
>
> (7 p. 306.)

Consul Strickland and "our representative" were clearly in advance of their times, and set an example which may be commended to the notice of such officials on the West Coast of Africa at the present day as object to the mosquito-proofing of their bungalows.

1906.

Yellow Fever appeared at Bamaku in Upper Senegal and at points along the Kayes-Niger Railway. The first case is said to have occurred at Ségou in the Soudan. There were 21 deaths.

The disease was reported by the British Consul-General at Dakar as present in September, October and November in the Upper Senegal and Niger Territories.

1910.

In October, in the Upper Senegal and Niger, seven deaths took place in the vicinity of Kayes, Dinguira and Satadougou. Three of these cases occurred at Dinguira and two in the district of Satadougou. As no medical officer was present at the time it was not possible to determine the nature of the disease. The sixth death took place at Kayes on November 5th, and was again classed as "Malaria," but on the same day one of the European Mission ladies from Dinguira died of Yellow Fever at the hospital at Kayes. After this stringent precautions were taken in the Upper Senegal and Niger, and no fresh outbreak occurred.

1911.

There was an outbreak of Yellow Fever at Dakar and Rufisque in the early part of the year, necessitating the temporary transference of several medical officers for duty at those places.

1912.

In January, February and March, cases continued to occur, and in September, October and November Yellow Fever again appeared among Europeans at the following places in Senegal :—

On the Dakar-Saint Louis Railway.

	Cases.	Deaths
Louaga	6 ...	3
Sakal	1 ...	—
Kelle	2 ...	2
Tivaouane	3 ...	3
Thiès	3 ...	3
Dakar	10 ...	7
	25	18

On the Thiès-Kayes Railway.

	Cases.	Deaths.
Khombole	1 ...	1
Diourbel	5 ...	4
Kaffrine	1 ...	1
Birkelane	1 ...	1
	8	7

Total ...	Cases	33	
	Deaths	25	Case mortality, 75·7%

At Dakar six out of the eight cases which occurred during the month of November were fatal.

Five of these appeared at different points on the railway line and were brought to Dakar for isolation in the lazaretto. Three other cases occurred amongst the railway staff at Dakar itself. Dakar was quarantined until December 14th.

(*c*) GAMBIA.

The incidence of Yellow Fever in the Gambia must have been affected by the custom of leaving the Colony during the unhealthy season which has apparently always prevailed, and does so to this day amongst those European inhabitants whose position enables them to go away : business is then almost suspended and a general exodus takes place.

For an epidemic of Yellow Fever to occur amongst a white population the presence of a certain number of non-immunes is necessary, and when the other factors are favourable for the appearance of the disease, and this is lacking, the result must be influenced.

1778.

It will be remembered that this is the earliest date as to which the evidence is regarded as adequate to prove the presence of Yellow Fever in West Africa. The Gambia is said to have been infected from Sierra Leone.

1825.

The disease is stated to have been again imported from Sierra Leone. Of a detachment of 108 men who were landed in 1825, 74 died of " Remittent Fever " within four months.

1828.

Yellow Fever is stated by Bérenger-Féraud to have been present in the Gambia in the years 1828, 1837, 1859, 1860, 1865 and 1866.

1837.

The disease was brought from Sierra Leone on H.M.S. "Curlew." That ship lost 16 men whilst at Bathurst, and there were many cases on shore.

Two doctors died, and at the end of June, 1837, the authorities at the Gambia applied to the French at Goree-Dakar for medical assistance, owing to the presence of Yellow Fever in the Gambia. A doctor was sent, and returned on July 21st with the report that the disease had subsided at Bathurst, but he advised that strict quarantine should be maintained. In August a coaster arrived at Goree-Dakar from Bathurst with three Europeans on board; two, who were sick, were allowed to land; all died from Yellow Fever. The disease spread to the town, and out of a white population of 160 there were 80 cases and 46 deaths.

1838.

It is stated in the Blue Book Report for 1849 that "the years 1837 and 1838 were fearfully unhealthy."

1839.

See under 1862.

1841-42.

Four cases of Yellow Fever are said to have occurred amongst the garrison, of which two proved fatal.

1845 to 1849.

In the Blue Book Report for 1849, it is stated that for the five years ending 1849 the total European deaths numbered 23, of which 12 occurred amongst sailors, and 11 amongst residents. There were three cases in which fever proved fatal in the first year of residence. The average strength of the European officers of all departments and non-commissioned officers during these years was 14.

The mortality amongst the military during this period was 10 (14·28 %); all the deaths were more or less due to climate, five occurred in the first year of residence. Amongst sailors and casual visitors only 12 deaths occurred in the five years, the number visiting Bathurst every year being little short of 1,200.

1859.

In the Blue Book for 1859 reference is made to the "lamentable epidemic in August and September." "Last September only six Europeans were alive, some of these were convalescent, there was one military officer fit for duty and 100 worn out black soldiers." "Such an epidemic as that of last year has not been known for 22 years" (i.e. since 1837, q. v.).

1860.

A despatch dated 6th September, reports the death of Staff-Assistant Surgeon B——— on July 21st, of Staff-Assistant Surgeon T——— on August 7th, and of Staff-Assistant Surgeon C——— on August 24th; "these three officers yielded to fever of a bad type after five days' illness at McCarthy's Island."

This outbreak is referred to in a despatch dated 20th August, 1866, describing an epidemic of Yellow Fever as follows:—

> "Remembering the fatality to all who occupied the same dwelling at McCarthy's Island during the epidemic there in August, 1860. * * * * * * I deemed it prudent to close Government House (Bathurst) for a short period, taking up temporary quarters on board the 'Dover.'"

Having regard (*a*) to the intervals between the onset of the illness in these cases, (*b*) to the fact that they all occurred in the same house and (*c*) all proved fatal in five days, there can be little or no doubt that the disease was Yellow Fever.

The following paragraph occurs in the despatch of September 6th, 1860:—

> "4. I have great pleasure in reporting that the Europeans in Bathurst have this year been free from a fatal epidemic, although they have nearly all suffered from a fever of a milder kind, generally called Coast Fever."

1862.

"It would be satisfactory to record a conviction that the stone buildings, well appointed houses, civilised comforts, and improved drainage had lessened the coast fever in the Island of St Mary's, but it is not so, and until the marsh situated to windward of the town is drained, I fear the mournful statistics will still place Gambia almost out of the pale of life insurance companies."

"During the winter, spring and summer, the upstairs ward of the Colonial Hospital devoted to European sailors, chiefly of the French nation, is empty; whereas now in August, whilst I am writing, it is full of cases in every stage of fever." * * * * * * The writer refers to "the saying 'that the Gambia is the finest climate in the world for nine months in the year, but the worst for three.'"

In a despatch sending home the Blue Book for 1862, the following appears:—

> "On the completion of this work" (draining a marsh) "the capitalist will no longer dread a residence in Bathurst, River Gambia, and the vacuum caused by the epidemic of yellow fever in 1839 will, I trust, be filled up."
>
> "While I write within the last week two European members of this Society have died from the Gambia or marsh fever. They were of temperate, steady habits, one was a youth in a mercantile house and the other * * * was remarkable for the regularity of his daily habits."
>
> "In Government House two members of the garrison were given over by their medical attendants but youth triumphed, and yet there is no epidemic of yellow or virulent fever, it is but our annual visitation."

1864.

It is stated that "the sanitary condition of Bathurst was never more satisfactory."

1865.

From the report it appears that from 1859 to 1866† the births number 1,018 and the deaths 2,272.

"1,254 deaths in excess of births speaks very unfavourably."

"In the rains the Europeans die and in the cold weather the Africans."

1866.

It is stated (Cedont, Archives de Médécine Navale, Paris, 1868, vol. 9, p. 334) that a coasting vessel, the "Marie Antoinette," arrived at Goree from Bathurst, where Yellow Fever was known by the authorities at Goree to be present, and through false representations was admitted to pratique.

The town of Goree was infected, and an epidemic followed, in which there were 249 cases and 110 deaths.

† This year is included in the report, the covering letter of which is dated December 10th, 1866.

A despatch, dated 20th August, 1866, from the Administrator to the Secretary of State, begins as follows :—

" With the deepest regret I have to report that this settlement has been, within the last month, visited by an Epidemic of Yellow Fever."

Fatal cases continued to occur until October 7th.

On November 14th the Governor-in-Chief at Sierra Leone informed the Secretary of State that he had received a despatch from the Administrator of the Gambia announcing " the disappearance of the Epidemic and a favourable change in the climate."

The following deaths were reported :—

1. A partner and two clerks in a French mercantile house.
2. An Assistant Surgeon in the Army.
3. The Private Secretary to the Governor.
4. The wives of three officials, and one child.
5. The Principal Medical Officer.
6. A Captain in the Mercantile Marine.
7. A German clerk.
8. A German missionary.
9. The brother of the Queen's Advocate.
10. A Civil Engineer.
11. The Deputy Commissary General.
12. The Captain of a French merchant vessel.

Mention is made of three European convalescents from the disease.

The following extract is from one of the despatches received during the course of the epidemic :—

" Since the 7th inst. (October) the settlement has been free of fever of a bad type, but the intermittent coast fever has attacked the Garrison in some violence ; all the officers are in the sick list, but they are doing well ; the Hospital likewise is crowded but only one soldier has died."

1872.

In the year 1872 there was a severe epidemic of Yellow Fever in the Gambia. Bérenger-Féraud states that the official records of the

Colony are a blank concerning this outbreak, but on reference to the Blue Book Report for 1872 the following appears under "Hospital":—

"The number of patients admitted into the Hospital shews an increase in (? on) 1871. The prevailing diseases being Yellow Fever and small-pox."

1878.

The same statement is made by Bérenger-Féraud with regard to an epidemic in 1878, on the authority of Dupont.

On August 8th, 1878, the Editor of the *African Times* addressed a letter to the Secretary of State to inform him that the French newspapers reported an outbreak of Yellow Fever at Senegal. He suggests that it may spread to the British Colonies, and that it may be thought advisable to warn them. The letter contains this statement:—"When the Europeans have Yellow Fever the natives have small-pox of a most virulent character. Many thousands have thus perished in a single outbreak." Also that "African fever and small-pox are very prevalent at Lagos this year." *

It was decided to warn all the Colonies immediately. It is, however, clear that the Government of the Gambia were already aware of this outbreak, as on reference to the despatches we find that on August 12th, 1878, the following public notice was issued:—

> "In consequence of an Epidemic of Yellow Fever having broken out at Goree, the public, and especially the inhabitants of Bathurst, are earnestly warned and enjoined to adopt, both individually and collectively, every precaution to guard against the introduction of this destructive disease into, or its occurrence within, the Settlement.
>
> "In furtherance of these objects, the utmost care should be observed by all, and every one in keeping clean the houses, out-yards, yards, and lots and the streets and drains thereto adjoining.
>
> "All refuse and offensive matter should be destroyed by being burnt, or rendered inocuous by being buried, and the frequent use of lime is strongly recommended.
>
> "By means of the strict system of quarantine which has already been put into operation and through the willing, earnest and intelligent co-operation with the Government of the inhabitants at Bathurst it is to be hoped that such a calamity as the visitation of an epidemic of Yellow Fever may be providentially avoided."

* Dr Rowe (afterwards Sir Samuel Rowe, K.C.M.G.), Governor of the West Africa Settlements, was of opinion that "the deadly West African Fever is very little different from Yellow Fever."

On August 15th the following Public Notice was issued :—

"In consequence of the occurrence of an Epidemic of Yellow Fever at Goree all boats or vessels arriving at Bathurst from any part of the Coast situated between Booniadoo Point and St. Louis, both places inclusive, that is between Latitudes 13° 36′ N. and 16° 2′ N. shall be placed in quarantine. Boats or vessels arriving at Bathurst from the River Cazamance or its vicinity shall also be put into quarantine."

In a despatch dated August 9th, 1878, the Administrator of the Gambia reports that the S.S. "Kinsambo" had arrived at Bathurst from Goree without any bill of health, and that "fever, presumably Yellow Fever, is raging at Goree."

"I have received no notification on the subject of the existence of fever at Goree from the French Authorities nor from the French Consular Agent at Bathurst, of which latter I made enquiries."

"As I write I am informed that several deaths at Goree from the fever there prevalent have recently occurred."

In a despatch dated August 19th, 1878, the following occurs :—

"The fever first appeared at Goree on or about the 13th ultimo.

"The number of deaths up to the 8th instant, which is the latest date up to which we have any news, amounted to 25, all of the victims being Europeans."

"Amongst those who died were the judge, two doctors, a dispenser and four Sisters of Mercy."

"The disease is supposed to have arisen spontaneously.

"A Goree correspondent of one of the French houses at Bathurst stated that the symptoms attending the disease were not of a similar nature to those characterising Yellow Fever. I saw it, however, stated in the *Moniteur du Sènègal* that the disease was Yellow Fever.

"The French Authorities have established a *cordon sanitaire* round Goree."

In a despatch from the Governor to the Secretary of State, dated 20th August, 1878, the following occurs:—

"I have not received any official intelligence from the French authorities, but I have been able to gather the following information from some of the French merchants here as to the mortality which took place at Goree and Dakar since the 8th instant."

"Although I have not received any communication from the French authorities I have requested the French Consular Agent at Bathurst to convey to them the expression of my deep regret at the calamity which has overtaken their Settlement and of my warm sympathy with them in their trouble and affliction.

From the above it is clear that although Yellow Fever was "raging" in Senegal, the Governor of the Gambia had received no official notice

of its presence. So far therefore from the French Authorities having cause for complaint as Bérenger-Féraud maintains, the exact opposite was the case.

In a despatch dated October 21st, 1878, reference is made to the " continued immunity of the Colony from epidemic disease. The latest accounts from the French Settlements are bad. The last death occurred on September 18th."

At a later period of the year, however, although the nature of the disease was not recognised, it is extremely probable that Yellow Fever spread to the Gambia.

Extract from Blue Book Report of 1878.

" The year towards its close became so unhealthy that an unusually high rate of mortality occurred amongst the European residents of Bathurst. Out of a small European community averaging between 50 and 60 persons for the year, including the floating population of ships, 13 persons died, of which number 10 died during the last quarter of the year."

" Of the resident European community averaging 33 persons for the year, 7 died, amongst whom were the Rev. F. Renown, Father Superior of the Catholic Mission, and who had not long before arrived at Bathurst ; a Sister of Mercy named Sister St. Clare * * The Rev. Mr. Lamb * * and the Chief Magistrate, Mr. John Carr, Junior." " But although this Colony had to deplore the loss of several lives the neighbouring French Settlements had to mourn the deaths of an appalling number of their white inhabitants, who were carried off by the Yellow Fever, which raged as a widespread and severe epidemic throughout the French possessions adjoining the Gambia."

In a despatch dated 26th December, 1878, it is stated :—

" This Settlement remains free from the epidemic. Since December 3rd there have been no deaths amongst the Europeans and only three cases, of which one has recovered entirely and two are convalescent."

" I regret to inform you that Yellow Fever has spread to Cazamance, a French Setttlement six miles south of Bathurst. The last death at Cazamance occurred on November 13th.

" I have no official report of the number of cases and of deaths at Cazamance, but from private sources I learn that the Yellow Fever at this place was of a less virulent type than that which scourged Goree, Senegal and Joal. From this I am led to hope that the pestilence which has been prevalent in this region is on the decline.

" It is worthy of note that concurrently with the existence of Yellow Fever 45 miles to the north and 60 miles to the south of this place

we have been visited with a 'Malarial Fever'† of extraordinary malignance and of startling fatality.

"Quarantine regulations continue to be strictly enforced."

It is more than probable that the "malarial fever" was Yellow Fever.

1884.

It is stated that "the Colony during the year remained gratefully free from any epidemic or contagious disease, although Freetown was subjected to what was alleged to have been the presence of Yellow Fever."

1891.

In the report for this year one death of a European is returned as having been due to "bilious hæmaturic fever," a disease which does not find a place in the nomenclature of the Royal College of Physicians.

1895.

No deaths in hospital from climatic causes.

No deaths amongst officials either European or native.

One death of non-official European from "bilious hæmaturic fever," and one from cardiac failure occurring during an ordinary attack of "Remittent Fever."

The former had previously suffered during the year from an attack of the same type of Malarial Fever.

Twenty-two cases of malarial fevers," including three cases of the hæmaturic type" amongst the non-official Europeans.

The writer refers to the influence of the annual exodus of Europeans in June and their return in November on the sick and death rates, "thus escaping the evil effects of the deadly period intervening between those months."

1896.

Health of the European population fairly good.

The report refers to the death of a Government official, a Roman Catholic priest and a French clerk, from "Fever."

† The inverted commas are in the original.

One death of a European official from Bilious Remittent Fever.

Two deaths amongst non-official Europeans from "bilious hæmaturic fever" and "malignant remittent (hyperpyrexia) fever."

"The malignant form of malarial fever was more common than usual."

1897.

"The Colony first saw a year pass without a death amongst the Europeans."

The number of attacks of fever were up to the average, but no case assumed a malignant type.

Thirteen European officials were admitted to hospital for Remittent Fever, four for Intermittent Fever and one for Tropical Fever.

Twenty native officials were under treatment for malarial fevers.

"Malignant and other varieties of malarial fever were particularly prevalent amongst the natives during the rainy season."

1898.

The deaths in 1898 exceeded those in 1897 by 74, which is accounted for "because the year was more unhealthy and not to any special causes, which I suppose must be accepted as correct."

"Towards the end of the last quarter the sick rate reached its nighest point, malarial fever cases being then numerous and severer in character."

1899.

A case of "pernicious Remittent Fever with hyperpyrexia" occurred, in which the temperature on the second day reached 107·8 F. Recovery followed.

1898.

Three Europeans died : not more than 25 Europeans in residence during the rainy season.

Four deaths from Blackwater Fever.

1899.

Thirty-seven cases of Remittent Fever amongst the non-official Europeans and three cases of hæmoglobinuric fever; all of the latter recovered.

In one case of "pernicious remittent fever with hyperpyrexia" (T. 107·8°) which recovered, "Quinine by the mouth had no effect upon the temperature." It was then given hypodermically. The temperature was reduced on several occasions by cold bathing. The patient was an alcoholic subject; the nature of the case is somewhat doubtful.

Cases such as the above suggest the idea that in Yellow Fever, as in rheumatic fever, the virus may, under certain conditions not understood, affect the heat regulating centres to an unusual degree.

1900.

An epidemic of Yellow Fever occurred in this year, of which the following edited description is given by Dr. Chichester, who attended the cases as Acting Senior Medical Officer.

(*a*) *Period of suspicious cases.*

"Case No. 1.—On 23rd May a Syrian was admitted into the hospital under the impression that he was suffering from influenza then prevalent in the town. He complained of fever, pain and headache. On the next morning he was very restless, semi-unconscious, had yellow tinging of conjunctivæ, and the urine was albuminous. He was removed to a hut erected for native smallpox patients, where he died that evening, having vomited just before death 'coffee ground' looking matter. All precautions were taken as if it had been a case of yellow fever. It was reported as death from fever 'of a doubtful nature.'"

"Case No. 2.—Taken ill on June 2nd was an inmate of the same house in which the first case had occurred. He was attended by a native qualified practitioner who certified that he died of remittent fever. The practitioner in question stated that it was an undoubted case of malaria, but I am inclined to think that it must have been a case of yellow fever. His death occurred on 7th June."

(*b*) *Presence of the disease recognised.*

"Case No. 3.—Also came from the same house. He was attended by the doctor above-mentioned, and I only heard of his being ill on 9th June. Little definite information was obtainable at the time, except

that he had headache and fever. No previous history could be obtained; the urine had not been examined. No malarial parasites were found. The next day the case looked very suspicious. He was in a semi-comatose condition, the conjunctivæ were slightly tinged, the urine was nearly suppressed and the small quantity drawn off was highly albuminous; liver and spleen were not enlarged; tongue was covered with a white fur and red round the edges. This looked to me very like yellow fever, and the question in my mind was, Was I sufficiently sure to have the place put in quarantine?

"The patient died that night, and a post-mortem next morning removed all doubt. It was declared to be a case of yellow fever."

(*c*) *Course of the Epidemic.*

The house was closed and watched, and those not attacked were placed in quarantine on the other side of the river.

"Case No. 4.—Also from the house in Russell Street; died from yellow fever in the hut on 12th June, having been removed thereto that morning."

"Case No. 5.—A young French clerk living some 150 yards from the house in Russell Street. Seen on 15th June, when he had been ill for some days. An undoubted case of yellow fever. He died on the 16th of hæmorrhage due to the rupture of a blood vessel in the stomach walls".

"Case No. 6.—An Englishman about forty-five years of age, who had been many years on the coast. He had been in very bad health for some time previously but only sought advice after he had had yellow fever for four days. Under treatment he improved a little but died of heart failure on the 19th."

"Case No. 7.—This case occurred on 16th June at the Telegraph Station. It was a mild case and ended in recovery."

"Case No. 8.—A lay brother at the Catholic Mission was taken suddenly ill on June 27th. An exceedingly severe case of yellow fever. He died within thirty-six hours from the time of onset."

c.[1]—*Apparent disappearance and recrudescence of the disease.*

"Case No. 9.—A long time elapsed before the occurrence of another case. The patient was a clerk in one of the companies. The source of infection was not traced. He was taken to the old Military Hospital on 4th August and died on the 6th.

"No other cases appeared at this period,

"The mortality was heavy—8 cases out of 9 died. More than half of the European population left in the early part of the epidemic."

C².—*Second reappearance of the disease.*

"CASE No. 10. A clerk in the employ of one of the European houses, arrived in Bathurst on 11th October. He came from Mandina Bar, a town on the banks of the river some thirty miles distant, through which passes much traffic from Cazamance, Carraban and the surrounding country. Cazamance and Carraban are towns in French territory in which yellow fever has appeared, and which are no doubt still infected.

"On 13th October he was taken suddenly ill with fever, very severe pains in head, loins, and limbs, vomiting though not severe. The headache pains lasted all the next day and on into the third day. The vomiting then ceased for nearly twenty-four hours, and the pain decreased. Temperature 103·4°: face a little flushed, eyes watery, pulse rapid. Tongue clean. No tinging of skin or conjunctivæ.

October 16th, 12 per cent. albumin in urine and day by day the percentage increased, until on the sixth day it amounted to over 60 per cent.; urine not measured but the amount much diminished. A few plasmodia found at the first examination, but none later. Quinine seems to have caused their disappearance, but it had no effect on the temperature which, from October 15th up to the day of his death, ranged between 102·4° and 103·8°, except when on the sixth day it when up to 104°. On each day he was given 6 g. of quinine hypodermically.

"On October 17th the eyes were more suffused and beginning to assume a yellow tint.

"On the 18th the skin began to assume a yellowish tint, but it did not become marked. The *pulse rate was at no time in proportion to the temperature, and on the fourth day began to lessen to* 84.76 *and* 72.

"He died on the evening of the eighth day of his illness.

"Delirium was not present till the last twenty-four hours. After the cessation of the initial pains *he constantly expressed himself as feeling quite well.* I have noticed this in nearly all the cases of yellow fever I have attended.

"*A limited post-mortem examination* was made. Stomach coats softened and swollen, blood vessels prominent, some mucus of a chocolate colour was present. No coffee-ground matter was found. The small intestines presented similar appearances. Spleen not enlarged. Liver slightly enlarged. hyperæmic. Post-mortem staining of the body was very marked."

"CASE No. 11.—Another case is at present under treatment, a European belonging to the same firm. It is up to the present a mild case; but I have little doubt that it also is a case of yellow fever, and that it was contracted at Madina Bar whither he had gone to take an inventory of the stock after the death of the man, of whose case I have just given the history."

Commentary.

1. In his report on the epidemic, Dr. Chichester states that "it is now some 34 years since the disease has appeared here."

Reference to the preceding pages, however, shews that in 1872 Yellow Fever was certainly present in the Colony, and probably also in 1878.

2. No source of infection was discovered. "There appears to have been no communication by sea to account for it."

3. The following passage occurs in the report :—"Perhaps, and not improbably, in this case mosquitoes were the agents responsible for the Yellow Fever spreading from its original centre." * * * "It is worthy of note that all the cases (with one exception) occurred in the front street of the town, the street most infested with mosquitoes, and in people who slept without mosquito nets or with nets in a bad state of repair." The Report is dated 13th October, 1900.

The American Yellow Fever Commission which established the mosquito transference of Yellow Fever published its first report at the Annual Congress of the American Public Health Association held at Indianapolis on October 22–26, 1900.

4. "Yellow Fever (?)" is mentioned amongst the diseases of the Europeans in the official Medical Report of the Gambia for the year 1900.

The Senior Medical Officer, who was at the time absent on leave, expresses a doubt as to the disease prevalent in June and July having been Yellow Fever; he is "more inclined to consider it malarial in origin." The discrepancy between this opinion and the facts as shewn in the report of the outbreak by Dr. Chichester here given is a matter of very great importance. It is to be particularly noted that with a change in the observer temporarily in charge "Yellow Fever" immediately appears in a place where "bilious remittent fever," "bilious hæmaturic fever" and "malignant remittent (hyperpyrexia) fever" had recently been present.

1901.

One death of a Commissioner whilst travelling from "Bilious Remittent Fever" and one death from Blackwater Fever.

One death from pernicious Malarial Fever took place in port: the disease was contracted outside the Colony. The expedition from the Liverpool School of Tropical Medicine, under the late Dr. Dutton, visited the Colony in this year and made valuable recommendations.

1902.

Two deaths of Europeans during the year. Only nine cases of fever amongst the Europeans. This improvement was probably the result of the anti-mosquito work suggested by Dr. Dutton.

1903.

One death of a member of the French Catholic mission recently arrived from Senegal, from a severe attack of "Bilious Remittent Fever". Death rate amongst the natives was high; this was attributed to an exceptional rainfall.

1904.

The public health was very satisfactory. There was no epidemic disease. There were no serious cases of illness among the European population, and no one was invalided.

1905.

"No serious illness amongst thirty-five European Officials".

Remittent Fever, eleven cases.

One death in hospital from "Malignant Fever with Hyperpyrexia."

1906.

One case of Remittent Fever, ending in malarial cachexia, and one of Malignant Remittent Fever with hyperpyrexia. "In the latter case quinine was not for some reason assimilated, though given by the mouth in large doses, the liver being at the same time acting freely, the hyperpyrexia could only be subdued by ice-packs and intra-muscular injections of quinine produced an immediate beneficial effect on the course of the fever, causing an uninterrupted convalescence to set in."

In the case of a similar nature previously reported in detail (1899) it was clear that the ice-packs and not the quinine caused the fall of temperature. The exact nature of these cases is doubtful.

1,075 more cases treated at the hospital, "due to appreciation by the public of the improved facilities for the treatment of the sick."

1907.

Deaths of children under five years of age equal to 32·62 per cent. of all the deaths registered during the year.

One death of a European from "Malignant Malarial Fever."

1908.

A table is given shewing the number of Europeans who died in the Colony from climatic causes for each year since 1899.

	Climatic.
1899	—
1900	7
1901	4
1902	1
1903	4
1904	—
1905	2
1906	1
1907	1
1908	2
1909	3*

Table shewing the number of cases of illness and invalidings and deaths among Europeans and the number resident in the Colony :—

	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.†
Resident	85	98	105	100	114	232	128	107	151
Treated	89	26	47	42	43	49	42	27	53
Died	4	2	2	0	2	2	2	7	4
Invalided	3	2	2	0	1	3	2	3	3
Malarial cases	54	11	15	24	22	21	287	30	38

1909.

"Of the 151 Europeans who have resided in the Colony during the year not one, so far as I can gather, slept at night time outside a

* From report of that year. † From the report of that year.

mosquito house or net; protection at night time being now regarded as essential. The question of providing mosquito proof accommodation in Government quarters for the use of officers in the day-time is now under consideration."

"The health of the European residents in the Colony was fairly good, although four died as the result of malarial infection."

1910.

"Fortunately, although Yellow Fever is said to be endemic, no suspicion of such a case has occurred in the Gambia during the past four years; this is somewhat remarkable considering that the stegomyia is the most numerous of all mosquitoes in Bathurst."

"The health of the Europeans has been extremely good during the year."

1911.

The epidemic at Bathurst in this year is analysed on p. 121.

"Three deaths occurred amongst the European officials—two being members of the Royal Engineering Surveying Department on their first tour of service, and the third an engineer who had been in the Government service for many years."

1912.

"The general health of Bathurst and the Protectorate was satisfactory."

"Every European now lives in a protected room."

Death Rate per 1,000 of the population, 1901 to 1912, calculated on the census of 1911 :—

1901	...	...	28·53
1902	...	...	30·60
1903	...	...	38·53
1904	...	...	31·01
1905	...	...	28·58
1906	...	...	27·27
1907	...	...	29·33
1908	...	...	29·41
1909	...	...	25·08
1910	...	...	29·26
1911	...	...	24·19
1912	...	...	25·53

(*d*) PORTUGUESE GUINEA.

1910–11.

The Bissagos Archipelago.

Boulama.

An outbreak of Yellow Fever occurred at Boulama in December, 1910, and lasted until June, 1911. "Twenty-six Europeans and a few natives died." The presence of the disease was subsequently confirmed; quarantine was declared against the Port of Boulama and was continued until July 1st, 1911.

In December, 1911, a European engineer was reported to have died from Yellow Fever on a vessel at Boulama.

At Bissau Island and Boulama it is stated that cases of Yellow Fever have occurred which did not come under official notice. In May, 1913, "there were several people sick with fever at Bissau under rather suspicious circumstances," and "it was not unlikely that they were suffering from Yellow Fever." It appears that "epidemics are constantly occurring" at Bissau.

Is it possible that this Island may be what Bérenger-Féraud calls "un foyer générateur"? Yellow Fever ("Bulam Fever") was at Boulama in 1793.

The close attention of the Government of Portuguese Guinea should certainly be given to the sanitary condition of the Colony and the Islands, as they may be a source of danger to other Colonies on the West Coast.

(*e*) FRENCH GUINEA.

The chief town of French Guinea is Conakry. Yellow Fever is reported to have occurred there in 1901.

(*f*) SOUDAN.

A country in Central Africa south of the desert of Sahara and extending from the Atlantic Ocean to the Red Sea. There is a railway from Kayes on the River Senegal to Kulikoro on the River Niger.

1828.

Yellow Fever is said to have broken out at Christmas at Sangarrah, " 30 days journey north east from Medina " ; whole villages are said to have been depopulated on the road from Kayes to Kita.

1829.

The epidemic of Yellow Fever in Sierra Leone in this year is said to have spread from Sangarrah.

1862 to 1865.

There is a good reason to believe that the epidemic at Khartoum about this period was Yellow Fever and not plague. (*vide* p. 103.)

1878.

A French force was sent from St. Louis in Senegal where Yellow Fever was epidemic to Bakel on the Upper Senegal River 350 miles from St. Louis, and out of 317 Europeans 180 died of Yellow Fever. At Medina 12 deaths occurred amongst the few white inhabitants. This is said to have been the first appearance of the disease in the French Soudan.

1879.

A few cases occurred in this year.

1880.

Yellow Fever was present amongst the labourers building the rail-road from Kayes to Kita.

1881 to 1882.

A French column is said to have spread Yellow Fever wherever it stopped.

The chief victims were Chinese and Moroccans employed on the railroad.

1883 to 1885.

In these years a serious mortality occurred amongst the French troops from "Typhoid Fever."

1885 to 1886.

"Typhoid Fever" became rare, but "Continued Fever" decimated the troops from November to February.

1886 to 1887.

"Typho-malarial Fever" appeared.

1887 to 1888.

"Typho-malarial Fever" continued, but was of a less severe type. In discussing the nature of these epidemics it is mentioned* that "the errors in diagnosis" were due to the absence of "black vomit" in more than half the cases, owing to the fact that the patients died before there had been time for the appearance of this symptom. Epistaxis and tarry stools were, however, noted in some of these cases. The conclusion is arrived at, that under various names the disease throughout was really Yellow Fever and that there has been an annual epidemic from 1878 to 1888.

1891.

In October caravans from Medina to Kita and from Kayes to Niore and Bafoulabe suffered severely from Yellow Fever. 56 deaths of Europeans were reported.

1892.

Bakel, Kita and Bafoulabe were infected during this year.

*Historique de la Fièvre Jaune au Soudan Francais par M. le Dr. Primet (1893). (T.I. p. 433.)

1897.

Fourteen deaths occurred on the Kayes-Kita railroad from Yellow Fever and five elsewhere.

The digging of the soil along the line of the Kayes-Kita railroad, " where are interred thousands of yellow fever victims " (!!), is given as the active cause of the epidemic of 1897.

Augustin, who is rarely at a loss for a suggestion as to how Yellow Fever may possibly have been imported into any place where it appears, remarks, " How the fever was imported into the Soudan in 1897 will therefore remain hidden behind the mists of conjecture." Is it not possible that it may have been there previously?

1901 to 1902.

Outbreaks occurred in both these years along the railroad and at Kayes.

1906.

There was an epidemic between Segou and Kayes in which 20 deaths occurred amongst 32 patients attacked. Four " suspected cases " also proved fatal.

1907.

From November 1st to 30th 34 cases with 16 deaths were reported from " the same localities visited by previous epidemics. "

1908.

Yellow Fever was epidemic in this year, according to Augustin.

(*g*) LIBERIA.

We learn from the Inspector-General of Hygiene that no cases of Yellow Fever have been observed on the coast or for 30 miles inland.

(*h*) IVORY COAST.

The chief towns of the Ivory Coast, a French possession, are Grand Bassam, Assinie and Dabou.

1852.

The mortality among the French troops at Grand Bassam from Yellow Fever in this year is stated to have been over 50 per cent.

1857.

In February of this year the disease appeared at Grand Bassam and continued until April, when it died out, but was revived on the arrival from France of many non-immunes, and a considerable number of deaths occurred amongst them and amongst the inhabitants who had escaped the disease during the earlier period of the epidemic. Twenty-two deaths occurred amongst the 66 white inhabitants. The mortality amongst the natives is not known. The disease was carried to Dabou by two men, both of whom died there.

1862.

The epidemic in this year is described on p. 100.

1863.

The case which occurred in 1863 is mentioned in the account of the 1862 epidemic.

1899.

An outbreak of Yellow Fever occurred in April and May, and the disease reappeared in July and August. Amongst the 40 white inhabitants at Grand Bassam there were 33 cases and 29 deaths. There was no evidence of importation of the virus. There was also an epidemic of plague amongst the natives, preceded by a great mortality amongst the rats.

1902.

A severe epidemic occurred in this year. At Grand Bassam there were 13 cases with 11 deaths. At Abidjah one case was introduced from Grand Bassam. At Eloca one case, which was fatal, also came from Grand Bassam. No evidence that the disease was imported could be obtained.

1903.

The outbreak in January began amongst the Syrians and continued during that month. There were no cases during February, but the disease reappeared in March, when several fatal cases occurred amongst the Europeans. The decision was then taken to remove the white inhabitants from Grand Bassam in small batches of two and three to neighbouring places, the result being that the disease was spread and new foci appeared.

The following summary of the epidemic is given :—

	Cases.	Deaths.
Grand Bassam	10 ...	7
Adjeo	1 ...	1
Imperie	2 ...	2
Arriounna	1 ...	1
Schucider	1 ...	1
	15	12

1904 to 1905.

The disease re-appeared, and is said by Augustin, on evidence that can only be described as fantastic, to have been imported.

His own conclusion is as follows :—

"This circuitous mode of infection may seem a little far-fetched, but it is plausible and in the absence of proof to the contrary is just as good as any other theory."

1910.

In October a native was admitted to hospital at Grand Bassam for fever which was classified as "malaria." Seven days later a

native, who had been living in close proximity to the first was attacked with the same symptoms. Another native, who had recently arrived from Sierra Leone, was subsequently attacked.

Although these cases were officially entered as "malarial fever," they were, nevertheless, treated as suspected cases, and the usual precautions were taken. All these patients recovered.

1911.

It is said that there was no epidemic on the Ivory Coast in this year.

(*i*) GOLD COAST.

The chief towns of the Gold Coast Colony are Cape Coast, Elmina, Accra, Seccondee, Saltpond and Winnebah, all of which are situated on the Coast, and Quittah.

1819 to 1824.

It is very probable that in the years 1819 and 1821 Yellow Fever was present on the Gold Coast, and practically certain that it was so in 1824. The disease of that year was called "bilious remittent fever," a term the exact significance of which has yet to be decided, but as death usually occurred on the third, fifth or seventh day, and the patients were as "yellow as an orange," its true nature is hardly doubtful; 217 deaths are reported, chiefly amongst the regiments in garrison (Blue Book Reports).

1853.

It is recorded that "fever and dysentery have proved fatal to many during the year, particularly the white residents."

1855.

This year was "fully an average unhealthy one if not more than that."

In letters from the Clerk of the Court at Annaboo to the Medical Magistrate it is stated that "the people are dying here somewhat like fowls," and later "I have the same report to give of the people as in my last letter." The nature of this disease is not stated; the "people" were natives.

1856.

It is stated that there was "much sickness; many of the military officers were invalided home; two died here and one on passage; the wife of another died here." The nature of the diseases is not mentioned.

1862.

The Acting-Governor on the 6th of August reports the death of Mr. Joseph Moseley, the Chief Justice.

"The cause of his death was the same terrible cause which, without a single note for preparation, has carried off so many Europeans before him—fever."

There is no other disease than Yellow Fever known on the West Coast of Africa of which the above statement could have been made.

In August an official threatened with dysentery, and having already suffered from fever, was granted "leave to proceed for a few weeks to sea in the mail steamer 'Athenian,' on board of which he had come from Accra and on board of which he was then lying sick."

1867.

"In this year the European population suffered very much from losses by sickness."

1885.

"The Europeans suffered particularly from malarial fevers of various types of severity, grave cases of intermittent and remittent fevers placing the patients' lives in extreme peril came under my care, the symptoms of which were uncontrollable vomiting of dark green matter mixed with blood, rapid discoloration of the skin and dark coloured urine which was temporarily albuminous. In one case there was marked intestinal hæmorrhage." (Report of the Colonial Surgeon.)

1886

Three cases of Blackwater fever proved fatal and two cases of "remittent of another type."

In this year at Accra "the health of the European officials in the last quarter was unsatisfactory, and one death occurred from 'hæmorrhagic malarial fever,' also a Venetian coral seller died from 'hæmorrhagic malarial fever.'"

1888.

The death rate amongst the resident Europeans at Quittah was 40 per cent. and there was much sickness.

"The deaths were chiefly due to the adynamic form of malarial fever complicated with hæmoglobinuria, which has of late been so common on the coast."

Deaths also occurred from "ardent remittent fever," and there was one case of "sporadic yellow fever."

Of five officers at Quittah, one died from "pernicious malarial fever," one was invalided for the same disease, and three had attacks of "remittent fever" of varying intensity.

1893.

ACCRA. "General health very bad amongst all classes, one European official died from bilious remittent fever, nine were invalided and many cases of illness occurred."

CAPE COAST. "In the second quarter almost all the resident European population suffered from severe forms of remittent fever."

ELMINA. "General health could not have been more unsatisfactory. * * * * Four of the five traders exhibited grave and complicated forms of fever. The prevalent diseases were remittent fever of a serious type—intermittent fever * * * *"

QUITTA. "The incidence of disease was so excessive that among the community there was a state which I venture to call 'fever panic.'"

1894.

ACCRA. "In the last two months of the year there were several cases of a severe type of remittent fever."

ADA. "Health very unsatisfactory. Two cases of malignant remittent fever."

CAPE COAST. "Malignant remittent fevers common."

CHAMA. "Unsatisfactory."

ELMINA. "Good until November. All officials except one ill with fever."

QUITTAH. "Three Europeans ill with malarial fever, one of the so-called bilious, the other of the remittent type."

"May and June, 60 per cent. of the non-officials on the sick-list."

SALTPOND. "Health fairly good."

1895.

"General health of Colony extremely bad; the endemic fever assuming a pseudo-epidemic form of a malignant type closely approaching in its clinical manifestations the Vomito Negro or Yellow Fever of the West Indies. The death rate was enormous amongst Europeans, and the excitement induced thereby amounted almost to a panic and served to intensify the fatal tendencies of the prevailing fever in the latter part of the year."

"The disease was *practically* limited to Axim, Chama, Elmina, Cape Coast, Saltpond and Accra, but with varying intensity at each of these places."

ACCRA. *In August malignant fever at this station. This disease in the opinion of the medical officer "is of the same type as has during the last few years appeared occasionally at Sierra Leone, Bonny, Lagos and other places on the West coast of Africa."

CAPE COAST. "Remittent fever of a very pernicious nature with a tendency to hyperpyrexia, suppression of urine and amaurosis."

CHAMA. The health of the Europeans during the first quarter "could not be imagined worse."

* Three deaths from this fever occurred among the officers of the African Direct Telegraph Company.

ELMINA. Unusual prevalence of malarial fever. "Of ten officials eight suffered from more or less violent fever, of whom three died and two were invalided."

SALTPOND. Health most unsatisfactory. "One official died from remittent fever complicated with suppression of urine."

1896.

"General health shows little or no improvement on that of 1895."

High death rate due to the fact that "the epidemic of the malignant type of fever which prevailed during the last half of 1895 continued during the first four months of the year, the period in which the greater number of deaths occurred."

European mortality.	Among officials per 1,000.	Non-officials per 1,000.
Accra	22·72	60·97
Axim	nil.	7·76
Cape Coast ...	307·	89·29
Chama	250·	nil.
Elmina	200·	nil.
Saltpond... ...	250·	142·8

1896.

"Little or no improvement on 1895."

	Deaths of officials.	Non-officials.
1895	15	23
1896	11	30

Fifty-eight Europeans were invalided as in 1895.

"An epidemic of a malignant type of fever was prevalent during the first four months of the year, the period in which the greater number of deaths occurred."

"The health of the native population was also unsatisfactory."

1895 to 1906.

Sir Rubert Boyce* gives extracts from the case books at (1) Elmina, (2) Quittah, (3) Saltpond, (4) Axim, (5) Cape Coast, (6) Accra, (7) Tarquah.

These cases on the basis adopted by the Commission would be classified thus :—

(1) ELMINA.

March, 1895	...	"Yellow fever."
April, 1895	...	"Yellow fever."
January, 1902	...	"Yellow fever."

(2) QUITTAH.

1894	...	...	"Yellow fever."

(3) SALTPOND.

1895	...	...	"Yellow fever."
1897	...	...	"Probably yellow fever.'
1898	...	...	"Possibly yellow fever."

(4) AXIM.

1905	...	...	"Details insufficient for classification."

(5) CAPE COAST.

1895	...	...	"Probably yellow fever" (two cases).
1901	...	...	A series of cases, "possibly yellow fever."
1902	...	...	"Yellow fever" (two cases), "probably yellow fever" (two cases).
1903	...	...	"Yellow fever" (case diagnosed as yellow fever by Dr. Rome Hall). "Negative" particulars not given. Five cases diagnosed as yellow fever by Dr. G. L. Barker.

* (8 pp. 75-76.)

(6) ACCRA.

April, 1899	...	"Possibly yellow fever."
April, 1904	...	"Yellow fever."
June, 1905	...	"Yellow fever."
July, 1905	...	"Probably yellow fever."
February, 1906	...	"Yellow fever."

(7) TARQUAH DISTRICT (Mantrain).

1902	... ...	(8 cases.) "Negative" details insufficient for classification.

See pp. 115, 119 and 124 for analyses of the epidemics of 1910 1911 and 1912.

(*j*) TOGOLAND.

1905.

In Appendix H. to the Report on certain outbreaks of Yellow Fever in 1910-1911 (Colonial Office) there is an interesting report, of which the following is an extract, on Yellow Fever in Togoland in 1905, by Dr. G. E. H. Le Fanu, of the West African Medical Staff. This is stated to have been the first record of the disease in that Colony.

In 1895 the Government was removed from Anecho to Lome, in consequence of the "very high rate of mortality amongst the European population. This was at the time attributed to severe malaria, but there is a strong probability that the disease was Yellow Fever."

"Up to 1905 there had been no European deaths in Anecho for two and a half years, but between January 27th and February 2nd, three Europeans died." Two of these were members of the Catholic Mission. The first, a Catholic brother, died with apoplectiform symptoms and high fever, after scarcely one day's illness. The second, a Catholic sister, died on February 2nd, "with jaundice and black vomit"; neither of them was medically attended. Light was

thrown upon these cases by the death, on January 31st, of a young merchant who had resided in the Colony for a period of four years. He died on the third day of his illness "with symptoms which at first suggested an attack of renal colic. He showed some improvement soon after the onset of his illness, but on the third day a remarkable slowing of the pulse, with high temperature, jaundice and black vomit revealed its true nature."

"On February 10th, a Father of the Catholic Mission was attacked and exhibited similar serious symptoms. He embarked on a homeward bound steamer, but was obliged to land at Lome, where he died on February 14th. A few days later another local merchant was attacked by the disease. He recovered.

"On March 23rd, a young merchant, who came from Grand Popo, in Dahomey, was brought into hospital unconscious, and died on the same day at midnight. He had been in the tropics four months. The cause of death was Yellow Fever.

"On April 19th, the Mother Superior of the Convent of Agoué in Dahomey, who was visiting Anecho, was attacked by Yellow Fever, which she had contracted in Agoué, and died after a few days. She had been in the tropics for twenty years. A sister from the same Convent, who came to Anecho to nurse the Mother Superior, also died of the disease. Her illness lasted eight days, and jaundice became very pronounced, the skin turning almost a brown colour.

"In April also, a convalescent from Yellow Fever, who came from Grand Popo, was put under treatment in the quarantine station at Hilakofi.

"Before the outbreak of Yellow Fever in Anecho. cases of Yellow Fever had occurred in Dahomey. At the beginning of the year Togo and Dahomey were visited by the French steamship 'Tibet,' which had come from the French ports in North Africa. Two members of the ship's company, one of them the surgeon, died on the voyage with symptoms of Yellow Fever, and the entire crew were placed in quarantine in Dahomey for five days.

"In April cases of Yellow Fever were still occurring in Agoué and Grand Popo. In the latter place all Europeans were finally removed to a neighbouring village, where they were kept for some time. After their return, no further cases occurred.

"At the Convent at Agoué, the two remaining sisters (two had died in Anecho) also died of Yellow Fever. No cases were observed amongst the natives in Anecho."

The above is taken from the Annual Report for Togoland 1905–06, "Blätter und Briefe," by Dr. Külz. Dr. Külz mentions that possibly other but slight cases suggestive of Yellow Fever occurred in the Catholic mission at Anecho.

At a later period of 1905, Dr. Sunder, observed two fatal cases in natives in the district of Lomeland.

1906.

Yellow Fever appeared in January at Badja on the Lome-Palime Railway, 43 km. to the north of Lome, where six Europeans were attacked, of whom four died in a little more than a week. Another case ending in recovery occurred at Badja shortly afterwards.

In August a case infected at Tovega, to the north of Badja, ended fatally.

1907.

In March of this year Dr. M—— died of Yellow Fever at Palime. He had been infected in Anecho and died shortly after being transferred to Palime. Four cases in natives, of which one was fatal, occurred later at Anecho.

1910.

In January a case occurred at Anecho in a native: he recovered.

In August an epidemic occurred at Anima in the Trans-Kara region, 60 km. to the north of Sokodé. From July 26th–July 30th, twenty-five deaths and thirty other cases of illness were said to have occurred. A medical officer was despatched and thought the report exaggerated. He saw one fatal case of Yellow Fever, and two slight cases, which recovered. He concluded that the epidemic had probably been one of Yellow Fever. Two suspicious fatal cases in natives occurred at Sansane-Mangu in September.

A prisoner at Misahohe in June of this year died of Yellow Fever and pulmonary tuberculosis. A suspicious death also occurred in a European at Sokodé in September.

The Commission have considered the reports of 29 of these cases and have classified them as "Yellow Fever."

Dr. Le Fanu remarks on the high rate of mortality (66·6 per cent.), especially amongst the Europeans (85 per cent.), and the diffusion of the cases over the Colony.

In 1905 Dr. Külz was unable to discover cases amongst the natives, but in 1906 two were observed: four in 1907, four in 1910 and one in 1911.

We have prepared the following table to illustrate the extension of the disease as shown by these cases and the time it took to travel from the coast, assuming that it did so travel, which, of course, is not proved. Sansane-Mangu, Anima and Sokodé may have been infected from the interior.

Year.	Month.	Locality.	Distance from Coast.	Period from appearance in 1905.	Infection possibly carried.
1905	January...	Anecho ...	—	—	—
	February	Lome ...	30 miles	14 days ...	By rail.
	April ...	Anecho ...	—	—	From Agoué, in Dahomey.
1906	April ..	Lomeland	30 miles	—	By rail.
	April ...	Badja ...	57 miles	16 months	From Lome.
	August ...	Tovega ...	? (North of Badja)	—	—
1907	March ...	Palime ...	110 miles	2 years and 2 months	Rail from Anecho to Palime via Lome.
1910	August ...	Anima ...	257 miles	5 years and 7 months	Rail to Ackampe, Lome-Sokodé.
1911	June ...	Misahohe	—	—	Sokodé-Anima.

(*k*) DAHOMEY.

1905.

There are no records of the occurrence of Yellow Fever in Dahomey previous to 1905; but very little is known of the sanitary conditions prevailing there prior to that date.

In January of 1905 the disease appeared at Agoué, Ouidah and Grand Popo, and in six weeks from that date there were 13 cases with 10 deaths. The remaining Europeans, 14 in number, then left for France.

1906.

The disease reappeared at Ouidah in April and continued until June; out of 15 cases known to have occurred 12 ended fatally.

Locality.	Cases.	Deaths.
Kotonou	1 ...	1
Grand Popo	3 ...	1
Ouidah	7 ...	6
Togo	4 ...	4
	15	12

Cases were also reported from Porto Novo and Kaonu (? Kotonou).

1907.

The disease reappeared in January of this year.

(*l*) NIGERIA.

Southern Province.

The Administration of Lagos was taken over by the British Government in 1861. The chief towns of Southern Nigeria are Lagos, Forcados, Burutu, New Calabar, Bonny, Opobo, Calabar, Warri and Sapele.

Lagos.

1864.

On reference to p. 28, it will be seen that two fatal cases occurred on the "Hankey" with black vomit. The infection took place at Lagos. They were not returned as Yellow Fever, but the Surgeon of the "Hankey" reported that "at Lagos bilious fever was raging on shore, where out of forty-two Europeans twelve died within six weeks." He saw three cases on shore, all of which died with black vomit within 36 hours of the onset of the disease.

Bérenger-Féraud states (p. 141) that Yellow Fever was present at Lagos in 1864.

1894.

It is stated* that ten non-natives, nearly all of whom were Syrians, died in January. Several had hæmaturia and black vomit. Death occurred from the fourth to the sixth day. They were regarded as cases of "bilious remittent fever." The same writer states that during the year 31 Europeans died out of 150 resident.

1905.

The mortality amongst Europeans from Malarial Fever and Blackwater Fever during the years stated is given as follows :—

	Malarial Fever.	Blackwater Fever.
1897	11	2
1898	4	0
1899	12	3
1900	10	7

The European population is given as about 233, including ships in port.

1901	6	4
1902	4	5
1903	5	2
1904	6	2
1905	6	2
1906	5	4

1906.

Mortality from Malaria in Lagos and Ebute Metta :—

	Natives.	Europeans.	Total.
1905 ...	705 ...	5	710
1906 ...	542 ...	5	547

It is mentioned that an isolated case of Yellow Fever was reported from Dakar in September and one from Grand Popo in January.

1907.

No deaths occurred among the European officials from Malaria or Blackwater Fever.

Amongst the other Europeans, and white Asiatics, there was one death from Malaria : none from Blackwater Fever.

* Dr. G. Rome Hall, "British Medical Journal," 1911, 2, 1263.

Benin.

Benin now forms part of the Southern Province of Nigeria. It has a long history as regards Yellow Fever.

1828.

The disease is said to have been imported from Sierra Leone by the ship "La Bordelaise."

1862.

Benin shared in the epidemic of Yellow Fever which affected almost the whole of this part of the Coast.

Calabar.

1862.

Calabar was involved in the epidemic of Yellow Fever which "ravaged the whole African coast from the Congo to Sierra Leone," (*vide* p. 84).

1905.

"Many of the residents now realise the fact that a very narrow margin separates the slight fever from the malignant one, the former being as a rule a milder type of the latter, and they send at once for a medical man when they become ill instead of waiting to see what will happen."

Warri.

1906.

Four cases of Hæmoglobinuric fever occurred in persons of German nationality in the employment of one commercial firm.

Bonny.

1862.

It is stated that in 1862 an epidemic of Yellow Fever almost decimated Bonny and Wa, as fatal among the blacks as among the few white settlers of the Colony (Augustin). Two thirds of the inhabitants are said to have perished. Of 140 Europeans 70 were attacked in one month. Between April 4th and May 5th there were

62 deaths among the crews of vessels at Bonny. A complete account of this epidemic will be found on reference to p. 84, taken from the admirable report of Assistant-Surgeon W. J. Eames, R.N., H.M. Sloop "Bloodhound."

1891.

An epidemic is said to have occurred in this year of which details are not available.

CENTRAL PROVINCE.

1908.

"Mosquito nets are used by practically all the European community, and are becoming popular amongst the natives."

(IV) HEALTH CONDITIONS IN THE WEST AFRICAN COLONIES DURING 1862, A YEAR OF EXCEPTIONAL PREVALENCE OF YELLOW FEVER.

It appeared possible that a study of the health conditions in all the Colonies during a year in which there was a widely-spread epidemic of Yellow Fever might throw light, not only on the origin of the epidemic, but also on the mode of spread of the disease from one Colony to another, if it should prove that it depended for its wide distribution upon such transference.

It might also incidentally reveal the fact that during such a year, in Colonies in which Yellow Fever had not been officially notified, fevers had occurred to which certain names had been given which are known to be often applied to diseases closely resembling and probably identical with Yellow Fever.

Observation of the conditions immediately preceding and following such a wide-spread epidemic prevalence might also give results of interest.

The year 1862 has been selected because the disease is stated to have been present then in a larger number of Colonies and Islands than in any other year, viz: Angola, Benin, Bonny, Calabar, Canary Islands, Cape Verde Islands, Congo Coast, Fernando Po, Gold Coast, Ivory Coast and Sierra Leone.

Cape Verde Islands.

It is stated, but no authority is given, that the fever was brought on this occasion to the African Coast by some trading vessels plying between the Cape Verde Islands and Bonny.

Those islands were infected in 1862, but at what period of the year is not known. The epidemic there "was not very severe."

The earliest mention of the disease in West Africa in this year is at

Bonny.

"The epidemic of 1862 almost decimated Bonny, and was almost as fatal among the blacks as among the few white settlers of the Colony. Two thirds of the inhabitants of Bonny are said to have perished. Out of a population of 140 Europeans 70 were attacked in the space of a month. In one day as many as twenty bodies were taken out of the same house. The mortality in the shipping was heavy. The bark "Phrenologist" lost its captain, pilot, first mate and two sailors. The ship "Gran Bonny" lost four men.

"Between *April 4th and May 5th* there were 62 deaths among the crews of vessels at Bonny. (7, p. 167.)

"*Early in May* the fever broke out among the natives huddled in the towns and hamlets located along the banks of the Bonny River and spread rapidly to the officers and white portions of the crews of the palm oil vessels in the river * * * * * *. The contagion then successively attacked the crews of vessels lying at anchor in the numerous rivers flowing into the Gulf of Biafra, more especially the Old and New Calabar and Brass rivers. * * * * * *

"The epidemic, although of a vicious and generally fatal type, was of short duration, disappearing from all the rivers and bordering villages by the *end of June*."

Calabar.

Bérenger-Féraud states that Yellow Fever was in activity in 1862, but no particulars are given. It is suggested that it was "no doubt imported into Calabar by the palm-oil vessels trading along the coast." (7, p. 177.)

Fernando Po.

Fernando Po, a Spanish possession, forms one of a group of four islands in the Bight of Biafra, 20 miles off the coast of Guinea.

> "*In the early days of July*, 1862, yellow fever broke out amongst the Spanish population. The disease was first observed in one of two convict hulks in Clarence Bay and spread rapidly to the convicts and sailors in the other hulk, whence it attacked the soldiers composing the small garrison and the mechanics on shore.
>
> "In a very short time 76 out of 200, composing the entire purely Spanish population, were carried away by the disease. A remarkable phase of this epidemic is that it was confined exclusively to the Spaniards of unmixed blood, and did not attack the coloured Cuban settlers *(Emancipados)*, although the latter nursed the sick and visited freely all the foci of infection. This proves conclusively that the disease was the genuine West Indian yellow fever for the *Emancipados*, who evidently had experienced an attack in their own country, escaped unscathed." (7, p. 221.)

The source of importation is disputed. Some stated that "the inter-colonial mail steamer 'Retriever' brought the disease from Bonny, others that it was brought by the English ship 'Ferrol' from Havana." The "Ferrol" is stated by Augustin to have left Havana with 200 *emancipados* on board on *June 10th*, 1862. (7, p. 221.)

We have to thank the courteous Secretary of Lloyd's for the following information :—

"The 'Ferrol' was a Spanish ship and not British as stated. The only entry in 1862 or 1863 of the arrival of that ship at Fernando Po is on the 12th February 1863."

We know that there was Yellow Fever at Fernando Po when the "Bloodhound" arrived there on July 27th, 1862.

The Niger, Benin River, Brass River, Lagos, Fernando Po and Batanga.

Much light is thrown upon the nature and extent of the epidemic of 1862, and on the conditions preceding it, by the admirable account given by Assistant-Surgeon William J. Eames, R.N., in charge of H.M. Sloop "Bloodhound," of the fevers affecting the crew of that ship in 1860–61, 1861–62 and 1862–63.

ABSTRACT FROM THE JOURNAL OF H.M. SLOOP "BLOODHOUND," WEST COAST OF AFRICA.

MR. WILLIAM J. EAMES, *Assistant-Surgeon in Charge.*

Between the 25th July, 1860, and 30th June, 1861.

"With regard to the movements of the ship * * * * * * since our arrival on the coast a larger amount of river service has fallen to our share than to that of any other ship in the Bights division, this may be owing to the advantages which the ship is supposed to possess over any other for such service, a lighter draught, better ventilation, and being a paddle steamer which is considered to be better suited than the screw for this description of work, however that may be, it necessarily follows that the company of a ship so engaged are proportionately more exposed to the deleterious influences of the climate than that of a cruiser which has the advantage of being constantly at sea.

"I find that out of 222 cases which have been placed on the sick list during this time 106 or nearly one half are cases of Remittent Fever * * * * * (Note.—The Ship's Company numbered 68). Of these cases of Remittent Fever the larger number were attacked after leaving the River Niger in November last (Note—i.e. November, 1860. 'Febris' December, 1860, cases 48; January, 1861, cases 15; from December 6th to 16th, there were 40 cases of 'Fever' on board the ship). Since then although cases occasionally appear the disease has never assumed the form of an epidemic. The character of this Fever is as far as I have been able to judge similar in all its symptoms save one, to what is known as the Fever of the Mediterranean, the exception I allude to is the almost constant sequence of Articular Rheumatism in the latter disease, which as far as my experience goes is absent in this.

"The similarity of the two fevers consists first in the manner of attack. The patient complains for a few days perhaps of a feeling of general lassitude, disinclination for food, a sensation of cold, dull aching pains in loins and back; this if taken in time may pass off, but more frequently, about the third day, a distinct rigor takes place, followed by sweating. The tongue in these cases is sometimes covered with a brownish fur, but more frequently presents a white appearance and the pulse indicates that the circulation is disturbed. By the administration of proper remedies in five or six days the patient may be sufficiently well to return to duty, or complain perhaps of nothing more than slight debility. In unfavourable cases, however, the abdominal viscera in both fevers appear to be alike susceptible of becoming engaged, and in both the same symptoms indicative of this change exist. The tongue presents a red centre and tip, the edges being covered with a white fur. Pain is referred to the epigastrium, sometimes so severe as to prevent the slightest pressure being exercised without considerable increase of

it. Vomiting and diarrhœa are usually present in this stage. With regard to the origin or cause of this fever, I do not feel competent to give an opinion. No doubt much is attributed to Malaria, but what is Malaria? To ascribe a cause for producing an effect, it is necessary to know first what that cause is, and with regard to malaria so many authorities differ as to what it is * * * * * * that one is obliged to confess nothing yet is satisfactorily known on the subject. Experience proves that an influence exists in the rivers of Africa and on some parts of the coast which is not felt at a certain distance from land; that when the European constitution is exposed to this influence a certain train of symptoms follows, but farther than this I cannot see the present state of our knowledge warrants us to go. *We do not yet know whether it may be one or many causes which contribute to produce the same result.* An opinion prevails to a large extent amongst European residents here, that like some eruptive fevers, one attack renders a return of the disease very improbable, and that to become acclimatised it is necessary to have one attack. With regard to the first of these opinions, I need scarcely say that, over and over again, it has been proved within my own experience to be a fallacy. By referring to the sick list the names of many men will be seen entered some six or seven times for the same disease. With regard to the second I have not such good data to form an opinion on, but I think it highly improbable that anyone could be very long exposed to the influences of the climate without being the subject of an attack. The prophylactic influence of quinine in the fevers incident to this coast has been so well established that comment is unnecessary, although it does not secure perfect immunity from the disease there can be no question that by strictly attending to its use the chances of contracting the disease are very much lessened, and when it does appear the symptoms are generally of a mitigated character. Connected with this subject, however, a circumstance came under my observation lately which affords room for speculation as to how far and under what circumstances quinine operates in securing immunity from the disease, or rendering it when it does appear less fatal.

"Of the ships' and boats' crews comprising the *expedition lately undertaken against Porto Novo*" (Note.—In Dahomey, close to the frontier of Southern Nigeria; June, 1861), "some were exposed the whole time in boats, others were on board ship under cover. To all the same amount of quinine was given daily, almost all were engaged in precisely the same duties. Fever prevailed amongst all after our return, but in a ratio least expected. Amongst the men of the 'Arrogant' who, with the exception of ourselves, were better provided for than any other, the disease assumed a most virulent form. I cannot say the number attacked out of a force of about 150 which were sent, but up to the 30th June, during a space of 25 days, six deaths had taken place, the disease *carrying them off with alarming rapidity*. Amongst the boat's crew of 'Alecto' and 'Espoir', who were constantly in their boats and frequently in wet clothes, fever existed to a very limited extent and of a mild form, whilst amongst this ship's company 11 cases were placed on the sick list up to the 2nd June, the aggregate days of sickness amongst them being only 43,

or scarcely 4 days for each man, and this appears still more strange when it is remembered that immediately on our leaving the Lagoon we proceeded up the Brass River, where we remained six days. Quinine having been administered without any intermission from the date of entering Lagos, this would seem to argue that at least the medicine does not lose its prophylactic properties in any degree by a long continued administration of it. The only cause that I can assign for the large percentage of cases amongst the crew of the 'Arrogant,' is that the ship (one hired for the occasion) *when brought to Lagos* contained a quantity of green wood for fuel, which was removed, and the ship thoroughly cleansed preparatory to the embarkation of the men, some morbific influence may have, however, still remained."

This refers to a hired paddle-wheel steamer, which carried some of the men of the "Arrogant." That vessel was a ship of the Navy. The question is discussed on p. 100.

"The next class of diseases, viz., of the abdominal viscera have been with only one or two exceptions of a comparatively mild character, consisting chiefly of cholera, colic and diarrhœa. On our passage out after touching at Madeira a few cases of the former disease appeared. I attributed its appearance to the use of water which was taken on board at that Island. It yielded to the usual remedies and since then only a few sporadic cases have presented themselves (*Vide* infra.)

"Ulcer, which to a large extent has prevailed lately, adds considerably to the number of sick for the 12 months. It only appeared lately during the time the ship was in the Victoria Lagoon. Unfortunately having got aground, where we remained fourteen days, we were subjected to great annoyance from mosquitoes. The bites from these insects being scratched took on the character of an ulcer.

"I am glad to say that during the year no deaths have happened on board. During this period 18 gallons of rum were used for the purpose of administering quinine."

The possibility of a ship harbouring at the same time the virus of two distinct diseases must not be overlooked. The case narrated below from the Journal of the "Bloodhound" is clearly one of cholera.

"A.D., æt 39, Captain's steward.—Placed on sick list on the forenoon 8th August complaining of vomiting, purging and prostration; pulse weak and slow. Tongued furred; evacuations watery. Treated with opium gr.i every 2 hours, at 12.30 p.m. became much worse, pulse scarcely perceptible, severe cramps in abdomen and calves of both legs and in a state of collapse. Treatment, sinapisms to calves, gr. 2 opii, &c. This treatment was continued for some hours, when the symptoms gradually yielded. This case is a type of many that presented themselves amongst the ship's company after leaving Madeira."

JOURNAL OF THE "BLOODHOUND."

1st July, 1861, *to 30th June*, 1862.

MR. W. J. EAMES, *Assistant-Surgeon in Charge.*

GENERAL REMARKS.

" During the past twelve months, from 1st July, 1861, to 30th June. 1862, the health of the ship's company has been satisfactory, the total days sickness for the year being 1,181, an average of 15½ for each man. No deaths have occurred from disease. The diseases attributable to climatic influences have borne the proportion of almost one-third to those which are incidental to other stations. With regard to fevers, the disease which calls for especial attention here, I have little to add to what was mentioned in my last report. As far as I can speak from personal experience there has not been any alteration in symptoms, but from all the accounts which have reached us, *the rivers seem to have suffered in more than an ordinary degree, the river Bonny in particular. The epidemic made its appearance in March*, 1862, *and raged with unabated violence for three months ; out of* 163 *white inhabitants* 130 *died in that time. It was equally fatal amongst the natives.* I have made all the enquiries in my power, and believe from the symptoms described, that the disease must have been the *true black vomit, from the first period of attack it generally ran to a fatal termination in* 48 *hours or less.* There was no medical man in the river, consequently the patients had not the benefit of any treatment, which may account for such a large mortality. The residents account for *this visitation, a thing so unprecedented*, from the fact of there being no regular rains last year and the irregularity of the breezes for some time previously. Scarcely any sea breeze prevailed. The land breeze before reaching the town must pass over an extensive swamp and arrives loaded with poisonous exhalations, the loss of the breeze blowing off the sea acting as an antidote to this, was most severely felt, and the present epidemic, or something of the sort, was predicted. After the experience I have gained in the last two years, I am inclined to think that the fevers incidental to this Coast have been divided in a manner too arbitrary for any practical use. We are called upon to believe that the disease engendered in the Niger is invariably followed by dysentery, a sequence that has not once come under my notice, although after leaving that river 68 cases were under treatment. The only instance I have met of dysentery as a sequence to Coast fever was in the case of a man now under treatment, who contracted the disease at Lagos.

" The difference between these fevers exists, in my opinion, in the degree of intensity, and being complicated with a disordered state of some viscera, particularly the liver. I have always noticed the most troublesome cases to exist with this complication, indicated by bilious vomiting, pain in right hypochondrium, and at a later period, by the conjunctivæ and sometimes the skin becoming tinged, and although unable to speak from personal experience, *I believe from all I can*

*learn Yellow Fever to be the same disease intensified to a great degree, in fact on more than one occasion I have noticed this bilious remittent fever to assume a character which would almost justify its being classed under that denomination.** As for drawing a defined line between the Remittent and Intermittent type, I think it is scarcely practicable, as on many occasions I have seen the one merge into the other, and for all practical purposes such a distinction is of little value, the same treatment being applicable to both. After having given Dr. Livingstone's pill a fair trial I do not think that it is * * * * * * superior in any way to any other purgative administered in combination with quinine. The treatment I usually adopt now is * * * * * * calomel 2 grains with 8 of quinine in two pills, at the expiration of 8 hours a draught composed of sulphate of magnesia, 2 dr. dilute sulphuric acid, ½ dr. 4 grains quinine and 2 oz. of water. This routine I occasionally vary according as other treatment may be indicated.

"Ulcers have not been so numerous as formerly. This can be accounted for by the small amount of river service which we have lately performed. Almost all these ulcers were caused by mosquito bites, which having been irritated quickly assumed that character."

JOURNAL OF H.M. SLOOP "BLOODHOUND."

MR. W. J. EAMES, *Assistant-Surgeon in Charge.*

Between the 1st July, 1862, and 30th June, 1863.

GENERAL REMARKS.

"In writing a statement of the different diseases which have prevailed on board during the past year * * * * * * by classifying the diseases into those affecting the different cavities, a pretty correct idea may be formed how much may be attributed to climatic influence and how much may be considered as incidental to this in common with other parts of the world. I find that during the 12 months, 163 cases have been under treatment, of these 153 have been discharged to duty well, 7 have died, 3 have been sent to hospital. Remittent fever forms a large proportion. 58 cases appear on the sick list * * * * * Yellow fever, although shewing a small number as having been attacked, furnishes the only cases of mortality which have occurred on board. I should premise by stating that at the time my report of this epidemic was written, I was only recovering from a very severe attack of fever, which rendered me unable for some days to attend to the duties which were demanded of me then more than ever, as it was during the time the greatest amount of sickness prevailed that I was attacked myself. However, with the exception of four days, during two of which I was delirious, I was able with assistance to get on deck and visit the patients. I only discharged myself from the list the day on which the ship arrived at Ascension in order that I might be able to attend to various duties which it was necessary should be performed. This disease, occupying

* The italics are not in the original.

as it does from the great mortality attending upon it the most prominent position, demands the first notice. Perhaps it will be as well to commence my report by giving a statement of the movements of the ship from the time the *first visit was made to Fernando Po* immediately *before leaving for the River Benin.* On our arrival at Fernando Po, on the 27th July, with H.M. Consul on board, a demand was made for our services through the Consul to proceed to the Benin, in order to obtain redress for some outrages that had been committed by the Natives. *We left for this river on 1st August*, consequently the duration of *our stay at Fernando Po on this occasion was five days.* I have made every enquiry both from English and Spanish residents, as well as the most intelligent natives of the place, and they all agree in their statement that, although great sickness and mortality existed at this time on board the convict hulks and shipping lying at anchor at Clarence Bay, it had not extended to the shore. With these ships and hulks we had no communication whatever. As the coaling depôt off which H.M. ships anchor is in another Bay (Maidstone) distant some mile or mile and half, at this time the ship was perfectly healthy. The disease prevailing at Fernando Po was *stated by the Medical Authorities to be Yellow Fever.* During this visit none of the the white ship's company with the exception of stewards and officers held any communication with the shore. Arriving *off the River Benin* on the night *of the 3rd August* we came to an anchor, and the following morning entered the river, where we *remained till 27th August, 23 days.* It is much to be regretted that no medical man was in the river whose opinion as to the nature of this disease, which had made such havoc amongst the residents, could be depended on, but from the statement made to me by a resident there, a Mr. Henry, who had studied medicine. I have no doubt the disease was *the same that had depopulated all the other rivers in the Bights—Yellow Fever.* His wife had died a month before, the symptoms he described were those of this disease, a few days after, a trading agent died with symptoms exactly similar. During our stay in this river the rains were prevalent, lasting sometimes for days without cessation. The river was swollen, and detached masses of floating vegetation separated from the banks were constantly coming down and fouling the ship, frequently causing her to drag. To clear these away necessitated a fresh exposure of the ship's company, and frequently their clothes were wet through once and twice in the twenty-four hours. Quinine was administered daily till the supply was exhausted, which happened a day or two before we left the river. All that could be procured in the river was purchased, but could not be given daily, as the stock at Fernando Po was finished, consequently I could not replenish there. *It will be seen that towards the latter part of August remittent fever became rather prevalent. Leaving the river on the 27th of August, we proceeded to Lagos*, where the Consul communicated with the Governor of that place. No unusual sickness was prevalent there at the time; leaving this, *we steamed to Fernando Po* in company with H.M.S. 'Brisk' and arrived *on 4th September.* At this time the sickness prevailing amongst the shipping had disappeared. There was none on the island. Only the usual communication with the shore took place, stewards and officers landing.

We remained *at Fernando Po* till 10th September, from whence we proceeded to *Batanga, a small village about* 50 *miles south of Cameroons;* it was while lying off this place on the 15th September that the first case of yellow fever appeared, 18 *days after leaving the river* (i.e. the river Benin), but it must be borne in mind that this man was complaining for two days before he applied for treatment, *notwithstanding this the time that elapsed between leaving and the appearance of the disease appears long.* Yet after having made all the enquiries in my power both from the stewards who landed with this man, and also from residents at Fernando Po as to disease being prevalent, I have not been able to trace the slightest evidence that would warrant an assumption that he contracted the disease by infection at that place.

"As I stated before, the 'Brisk' whose white men were employed daily on shore coaling, escaped without a case. To what then is the outbreak to be attributed? I confess I feel myself at loss to form anything but an opinion, which may possibly be an erroneous one, but I believe the germs of the disease to have been planted in the river. Why they should have remained so long dormant is the only unsatisfactory link in the evidence that has caused me to form this opinion. I regret that no clearer causes can be shown, as to its introduction into the ship, but it has not been owing to any want of exertion on my part to obtain every information, as every enquiry I could think of has been made. After the first case (which proved fatal) occurred we *stood out to sea and cruised for five days*, but finding this did not check the disease, we *started at once for Ascension*, calling at Fernando Po for coal, where we remained for 30 hours. On the passage across eight more cases appeared of whom five died. *Many cases of severe remittent fever were under treatment, but none were classed as yellow fever, except those in whom the symptoms were unmistakable.*"

The value of this record is greatly enhanced by the scientific caution shown in not at once concluding that all the cases were necessarily examples of one and the same disease. Probably there were many mild cases of Yellow Fever amongst them. If this excellent man had not been himself attacked he would doubtless have given equally good clinical records of some of these cases. The arrangements made for the accommodation of the sick consisted of a spar lashed fore and aft on one side of the forecastle, between which and the ship's side hammocks were slung, and attendants told off, who relieved each other twice a watch; the awning was kept spread, over which were placed tarpaulins, so that a constant supply of fresh air was always present; the treatment employed will be seen by reference to the cases which are given. The last case which appeared was in lat. 3′ S., long. 3′ 8″ W., and the disease had entirely disappeared before the arrival of the ship at Ascension.

REPORT OF CASES OF YELLOW FEVER ON H.M. SLOOP "BLOODHOUND."

"YELLOW FEVER. (1.)—J. P., æt 21, Lieutenant Commanding's Steward, presented himself on the evening of the 15th September, 1862, complaining of frontal headache, pain in loins and general lassitude, has been unwell for the last two days; constant irritability of stomach, pulse very small and quick, bowels confined, had cal. gr. v., rhubarb gr. x., quinine gr. v. On the following morning much worse, medicine had acted, tongue dry and covered with sordes, had quinine gr. iij every two hours with hydrocyanic acid and morphia in effervescence and essence of beef. At 4.0 p.m. he was still becoming worse, matter ejected from stomach thin and almost black, skin and conjunctivæ tinged, calomel gr. i was added to each dose of quinine and a small blister applied to epigastrium. On the 17th was seen at 4.0 a.m., he was suffering from cramp in legs and arms. Pulse scarcely perceptible. Tongue almost black. Ordered brandy and hot water every half hour. Castor oil ʒi and to continue as before. At 8.0 p.m. delirium set in. No urine had passed for 24 hours, bowels not opened, and evidently appears to be sinking; blister applied to nape of neck; ordered champagne, to have croton oil ℥ i. at once. At 2.0 a.m. on the 18th was called and found him in articulo mortis, applied hot water and friction to extremities and epigastrium, but without benefit. He expired at 2¼ a.m.

"YELLOW FEVER (2.)—J. B., 25, A.B., was placed on sick list on the 18th September, 1862, complaining of the usual symptoms of fever. He expressed himself "as having very little the matter." Pulse was not much accelerated, tongue looked clean; had quinine gr. iij, calomel gr. i three times and Dover's powder gr. x at night. The following day was worse, vomiting set in, tongue much furred, pulse quick; to continue the same. 20th, little change. Bowels confined, for which a mercurial purgative was given, and the same treatment continued with wine ʒiv. and at 8.0 p.m. castor oil ʒi. On the 21st the bowels were not opened. Tongue looked black, an enema of castor oil and turpentine was given which acted very slightly, and the same treatment as before. 22nd, much worse. Wanders, hiccough has set in and vomiting of a black ink-like fluid. Pulse small and slow; skin and conjunctivæ tinged. At 4.0 p.m. enema was repeated. A small quantity of black fœcal matter came away. Slight subsultus, perfectly insensible. 6.0 p.m. gradually sinking, tossing about and appears in great pain, low muttering delirium, vomiting almost constantly, ejected apparently without effort. Died at 8.50 p.m.

"YELLOW FEVER (3).—E. S., æt 25, A.B., was placed on the sick list on the 21st September, 1862, complaining of headache, pains in the back and other febrile symptoms. Treatment was commenced by the administration of quinine gr. v. calomel gr. iv. rhubarb powder ʒi. which was repeated in the afternoon. On the 22nd pulse quick, tongue looking black and covered with sordes. He appeared drowsy and difficult to rouse, although sensible when spoken to; a blister was applied to nape of neck and quinine gr. iv. calomel gr. ij. thrice a day. 23rd, motions quite black. Appears somewhat better. At 2 p.m. he became

suddenly worse, throwing his arms about and moaning, talks incoherently. Sol. of muriate of morphia ℥ 4 in wine was given, which had the effect of procuring four hours sleep, after which he awoke better. 24th, had castor oil ʒi. at 6 a.m. which acted at once, has had vomiting, skin and conjunctivæ yellow, but seems better; to continue as before. 25th, vomiting less urgent, bowels acting regularly, tongue cleaning, decidedly better. Same treatment continued from this date, he convalesced without any relapse, and on 20th October was discharged to duty well.

"YELLOW FEVER (4).—J. P., æt 24, stoker, was placed on the sick list on October 1st. He was seized on the previous evening with the premonitory symptoms of fever, headache, lassitude and pain in loins. Tongue slightly furred, pulse rapid. On the 1st he appeared better, the bowels had acted. Quinine gr. v. calomel gr. i. was ordered thrice a day.

"2nd. Tongue getting brown, pulse slow and labouring. When seen at 4 p.m. his bowels had been very loose, having had ten or twelve motions since the morning. Vomiting had set in. Matter ejected being a watery black-looking fluid. To continue quinine and wine during the night.

"3rd. Very much worse, delirious and was with great difficulty prevented from throwing himself out of his hammock. Eyes suffused. Tongue quite black and hanging out of his mouth, lips and teeth covered with sordes, skin tinged, vomiting almost incessant, head shaved and a blister applied to nape of neck. Some brandy and water was ordered, but could only with great difficulty be given. He died at 11.40 the same day.

"YELLOW FEVER (5).—W. C., æt 36, stoker, was placed under treatment on October 1st. Frontal headache which he complained of as being almost unbearable. Tongue not much furred, pulse slightly accelerated. Quinine gr. v. jalap and calomel was given. 2nd, tongue looking very black, has had vomiting (black), pulse slow and labouring. Appears stupid. 3rd, much worse, appears to be sinking; vomiting constant. Extremities cold. Hot water was applied to feet and abdomen, and a tablespoonful of brandy and water every quarter hour. He died at 10 a.m. on the same day."

ITINERARY OF H.M. SLOOP "BLOODHOUND."

From July, 1862, to September, 1862.

Arrived Fernando Po ...	...	27th July.
Left „ ...	...	1st August.
Arrived Benin River ...	...	3rd August.
Left „ ...	...	27th August.
Arrived Lagos	...	?
Left „	...	?

Arrived Fernando Po ...	...	4th September.
Left „ ...	...	10th September.
Arrived Batanga ...	...	? 13th September.
Lying off Batanga ...	...	15th September.
Left Batanga	...	? 18th September.
Cruising at sea ...	...	? 19th to 24th September.
Arrived Fernando Po ...	...	?
Left „ ...	...	"30 hours later."
Arrived Ascension ...	...	?

As the first case of Yellow Fever appeared on September 15th, "eighteen days after leaving the (Benin) River," the infection may have been acquired in the Benin River, if recently infected stegomyia were then taken on board, but it is specially to be noted that the first case occurred in a man who had in September landed with the stewards at Fernando Po, a place where Yellow Fever had been epidemic in July, but which was said to be free from the disease at the date of the second visit of the "Bloodhound" in September. Wherever the infection was acquired it was certainly not at Sierra Leone, as stated by Augustin (p. 323).

A good illustration of the inaccuracy of this author is afforded by his method of dealing with this incident. "In the Statistical Report of the Health of the Navy of 1862 it is stated that the squadron on the West Coast of Africa suffered from Yellow Fever. Although Sierra Leone is not directly incriminated, the infection was no doubt contracted there. Eleven cases occurred on board the 'Bloodhound,' seven of which died."

He does not state that all the cases in the squadron occurred on the "Bloodhound"; takes no trouble to ascertain, by a comparison of dates, where the infection probably occurred, and suggests that it must have been at a place at which the ship did not touch during the time that the disease prevailed on board. There is indeed no reference in the Journal to any visit to Sierra Leone in the year 1862.

CASES OF "REMITTENT FEVER" ON BOARD H.M.S. "ARROGANT" IN 1861.

ABSTRACTS FROM THE JOURNAL OF DR. HART GIMLETTE,

Surgeon, Royal Navy.

The disease was acquired in the Lagoon of Porto Novo between April 22nd and 28th, 1861, in the expedition against that place. The cases are those referred to by Assistant-Surgeon Eames in the Journal of the "Bloodhound."

Strength of the expedition from the "Arrogant."		Cases.	Deaths.
Officers and Seamen ...	104	41 ...	6
Marines	60		
	164		

CASE 1.—"*Remittent Fever.*"

P. H., æt 22 Onset May 6th.

May 6th. Giddiness, frontal headache, pains in loins.
May 7th. Rigors, thirst, frontal headache. P. 80.
May 8th. Languid expression, denies any feeling of weakness.
May 9th. Restless, constantly getting out of bed.
May 10th. Tongue brown dry. P. 84.
May 11th. Stomach irritable: refuses food, restless, delirious.
May 12th. Suddenly became insensible. Died at 10.15 a.m. "Apparently from pressure on brain."

Autopsy—Head opened; results nil.

CASE NO. 2.—"*Remittent Fever.*"

T. G., æt 24, exposed to malaria in launch in the Lagoon of Porto Novo from April 22nd to 28th, 1861. Has been taking sulphate of quinine gr.iv every morning since the 22nd. Onset May 7th. Lassitude, weakness, pain in head, vomiting, tongue foul. Pulse 82.

May 8th.—Face flushed, pulse 84, eyes suffused, thirst, but not much headache.

May 9th.—Restless. Inclined to vomit.

May 10th.—Sickness continues. Vomited a bilious coloured fluid. Delirium. Pain in head greatly increased, tongue dry and brown. Symptoms of coma appeared in the evening. Pulse 94, weak and compressible.

May 11th.—Very restless and delirious, perspired freely and passed a large quantity of urine during the night. Stomach irritable.

May 12th.—Delirium continues, tries to get out of bed. Vomited. 2.0 a m. very violent. Died 1.40 p.m.

CASE 3. "*Remittent Fever attended with suppression of Urine.*"

G. I., æt 21, one of crew of launch. Exposed thirteen days previously at Porto Novo. Onset 8th May. Rigors, vomiting, headache, thirst, lassitude, weakness. Pulse 98.

May 9th. Heavy, difficult to rouse, delirious, tongue brown, pulse 100. Not passed water all day, but bladder not distended.

May 10th. Delirious, fell out of hammock, breathing stertorous. One ounce of urine drawn off by catheter "ammoniacal." Died 1.15 p.m.

CASE 4. "*Remittent Fever.*"

J. Mc.A. æt 26. Exposed April 22–28 in Lagoon of Porto Novo. Onset May 7th. Headache, giddiness, lassitude. Has been suffering more or less since 30th April; has taken vini quinæ ʒi during the whole period. Pulse 65. Feels chilly.

May 9th. Slight rigor, pain in head, increased, worse about forehead.

May 10th. Pulse 74. Slept badly, vomited two or three times. Urine scanty.

May 11th. Headache worse, drowsy, wanders. Pulse 86.

May 12th. Stomach irritable.

May 14th. Better.

May 16th. Deaf, headache returned.

May 25th. Convalescing.

June 7th. "A paroxysm of ague."

June 12th. At Ascension: recovered slowly.

CASE 5.—"*Remittent Fever.*"

W. P., æt 24. Exposed 22–28 April, at Porto Novo. Onset 8th May. Frontal headache, debility, rigors. Pulse 68. Has taken gr. iv. quinine regularly each morning since the 22nd April.

May 9th. Headache increased, cold, shivering, thirst. Pulse 84. Vomiting.

May 11th. Headache less. Vomiting.

May 12th. Restless night. Passed water freely.

May 15th. Comfortable, cardiac failure after getting up to night chair. Death 12.40 p.m.

CASE 6.—"*Remittent Fever.*"

J. K., æt 30. Same history as previous cases. Has taken gr. iv. quinine daily for 14 days. Onset on 10th day from forcing of barrier at Porto Novo. Rigors, frontal headache, anorexia, thirst, eyes dull and suffused. Pulse 84, irregular.

May 9th.—Much worse, headache, vertigo, rigor. Drowsy, in evening. Vomiting. Urine fair proportion, high coloured.

May 10th.—Violently delirious. Now comatose.

May 11th.—Comatose. Pulse 94. Very violent in night.

May 12th.—Sordes on teeth. Restless. Died 3.40 p.m.

CASE 7.—"*Remittent Fever.*"

I. H., æt 24. Same previous history. Onset 10th day after return to ship. Rigors, general pains, lassitude. Pulse 80. Vertigo. Quinine gr. iv. daily since 22nd April.

May 10th. Restless, headache, urine scanty.
May 11th. Restless, rigor, pains in back, deaf.
May 12th. Vomiting.
May 13th. Better until 2 p.m. then vomiting.
May 14th. Improving.
May 17th. Stronger. Pulse 90.
May 30th. Discharged to duty.

NOTES BY DR. H. GIMLETTE.—"In this man's case the early symptoms appeared to follow nearly the same course as in Case 45" (Case 6) "but without any particular plan of treatment a favourable change took place in this one, with a manifest remission of the head symptoms, although the pulse was not reduced for some time, but in the other the disease increased in severity and terminated fatality on the 4th day unchecked by the means employed. Both men were equally exposed to malaria, got wet at the barrier, were in the same boat and both took quinine as prophylactic for 16 and 17 days."

The above cases are the first seven recorded, the others are almost precisely similar in character; all the men were attacked about the same date and all had taken quinine regularly since April 22nd.

CASE 8. A similar case to last, recovered.

CASE 9. Recovered.

CASE 10. Recovered after a long illness.

CASE 11. Recovered after a long illness.

CASE 12. Recovered after a long illness.

CASE 13. Recovered after a long illness—violent delirium.

CASE 14. Recovered after a long illness.

CASE 15. Died from syncope after a period of improvement.

CASE 16. Occurred on 7th July at St. Thomas. Death on 17th July.

In recording the cases more attention was paid to noting minute details of treatment than to giving an accurate clinical description of the symptoms.

For example, the character of the vomited matter is only once mentioned, and the same remark applies to the presence of jaundice.

The following paragraph in the general remarks is important:—

> "Two men who acted as nurses contracted this fever, who had not been absent from the ship, but at the same time another man was attacked who had no communication with the sick. The patients were isolated and kept on one side of main deck, and though Remittent Fever is not considered contagious, the idea of infection, etc., which most people entertain, is of great advantage to the patient on board ship in procuring him rest and quiet."

In the General Remarks of Dr. Gimlette in the Journal of the "Arrogant" for 1862 the following statements occur:—

Remittent Fever.—1862.

> "A lad aged 16 was attacked without exposure of any kind, shewed symptoms of coma on the fourth day, without much previous headache; became rapidly insensible and died off Lagos on the 8th day, his symptoms resembling in many points those of the men who suffered last year from fever after the attack on Port Novo."
>
> "Remittent was complicated with dysentery amongst the Portuguese residents at Benguela and Pernicious Fever (so called) prevailed at Mossamedes, the most southern division of the province of Angola, which town * * * * * * had been used as a Sanatorium by the Portuguese troops until the latter portion of '61 and beginning of '62, when the malignant form of fever visited the province and decimated its inhabitants. As the 'Arrogant' did not call at Little Fish Bay, I was not able to ascertain the particular symptoms which marked the attacks, but all agreed that the disease was rapid in its progress and it was not styled Yellow Fever by the Portuguese practitioners.
>
> "An intelligent officer, Captain of the Port at Benguela, who had been employed for fourteen years in the country, informed me that he had observed the same kind of sickness during his residence and that at one period it was termed Remittent, next Typhoid, and lastly Yellow Fever, without his observing much difference in its appearance."

Commentary on the Cases of Remittent Fever on the "Arrogant," 1861.

These cases are of great importance as illustrating the nature of the disease then termed "Remittent Fever." A review of the whole of the circumstances and of the clinical history of the cases, of which

abstracts are given, can, we think, lead to no other conclusion than that the disease was Yellow Fever. The suggestion of Dr. Eames that "some morbific influence may have remained" on the hired launch which carried some of the men of the "Arrogant" during the expedition is discussed by Dr. Gimlette, but rejected. The boat was, it is true, so foul that the men who cleaned out the hold were made sick by the horrible odour, but they were not attacked by the disease. The launch had come from Bonny, where in the following year there was a very severe epidemic, and might have harboured infected stegomyia elsewhere than in the hold, but from a consideration of the dates it appears to be more probable that the disease was acquired at Porto Novo. As cases appeared on the "Arrogant" in men who had not been out of the ship, infected mosquitoes must have been taken on board when the men returned from the expedition.

The conclusion at which the Captain of the Port at Benguela had obviously arrived as the result of fourteen years' experience in the country shews that, although not a medical man, he was possessed of much clinical acumen.

Ivory Coast.

Grand Bassam.

On the 16th November, 1862, the French despatch boat "l'Archer," which is said to have been *infected at St. Paul de Loanda* by communicating with the ship "Dialmath," arrived at Grand Bassam and landed one white and ten native sailors. The white sailor was taken ill on the 17th and died on the 20th, with unmistakable symptoms of Yellow Fever. None of the blacks, who were put on shore at the same time, contracted the disease.

"The fever did not spread immediately to the mainland, but soon broke out on the vessel. On November 26th the second steersman was stricken. The fever spread rapidly, five deaths occurring between November 28th and December 5th." Dr. Sarouille,* from whose

* Sarouille. Thèses de Paris, 1869, No. 150, p. 41, quoted by Augustin.

report the facts were obtained, was himself attacked. "On December 7th the Commandant, thinking that 'l'Archer' had been infected at Grand Bassam, took on board all the white inhabitants of the port who could be spared and sailed for Dabou. But the disease continued to appear on board, and by the time the vessel reached Dabou, December 12th, three more sailors had succumbed. The men who were taken on board at Grand Bassam were landed at Dabou, and strange as it may seem not a single case developed among them, the disease being confined to the sailors. This immunity can only be explained on the ground that the landsmen slept on deck, where the infected mosquitoes had no access, while the sailors were compelled in the performance of their duties to remain below decks most of the time, where they were unprotected from the bites of mosquitoes." (7, p. 233). It is surely more likely that only the seamen's quarters were harbouring the infected mosquitoes. On December 12th only three of the original crew remained alive. Subsequently the captain died, so that out of ten attacked only one recovered.

Cases began to appear at Grand Bassam shortly after the death on November 20th of the sailor landed from "l'Archer." Out of a white population of eighteen there were twelve cases and six deaths.

Assinie is situated on the coast about 30 miles east of Grand Bassam. "The European population at Assinie in 1862 consisted of the governor, the resident surgeon and three soldiers. *About the 10th December* two of the soldiers were taken ill and both died a few days later. The governor and the surgeon were then successively attacked, the latter dying on the 27th. The former recovered. The natives of the villages contiguous to Assinie suffered severely, but in the town proper there were only four deaths among the blacks, making a total mortality of eight." (7, p. 234.)

"Sporadic cases of Yellow Fever occurred at Grand Bassam and Assinie in 1863, but almost entirely among the natives. We find the record of only one death among the Europeans at Grand Bassam, an agent sent by a French commercial house to establish a factory at this post. He arrived at the 'unhealthy season' and remained three months on board a vessel in the harbour. During the month of

February, thinking all danger was past, he went on shore. Fifteen days later he was stricken with Yellow Fever and died eight days after the onset of the malady." *

Lagos.

It is interesting to note that although at Lagos in 1862 "no unusual disease was prevailing," yet in 1864 "bilious remittent fever" was raging and many were dying after a short illness with black vomit (*vide* p. 27). Was this an aftermath of the epidemic of 1862?

Angola.

1860, 1861, 1862.

St. Paul de Loanda.

St. Paul de Loanda is the capital of Angola on the Congo Coast. Angola is said to have been for a long period the radiating point of the slave trade. It is stated by Béranger-Féraud, but he does not cite his authority, that a severe outbreak of Yellow Fever occurred there in 1860, and that it was again visited by the disease in 1862, but the period of the year is not given.

Benguela and Mossamedes.

We know from the journal of the "Arrogant" that there was a disease at Benguela and Mossamedes in 1861 and 1862 of such a malignant type that it "decimated the inhabitants" of the province of Angola. There cannot be any doubt that this disease was Yellow Fever.

* Sarouille. Thèses de Paris, 1869, No. 150, p. 41, quoted by Augustin.

"THE ALBERT NYANZA AND THE SOURCES OF THE NILE."

By (Sir) Samuel W. Baker.

Sir Samuel Baker, on his arrival at Khartoum in 1865, when he had long been given up for lost, writes as follows (Vol. II., p. 340) :—

"The plague or a malignant typhus had run riot in Khartoum, out of 4,000 black troops only a remnant below 400 remained alive. This frightful malady that had visited our boat had revelled in the filth and crowded alleys of the Soudan capital.

"For some two days two or three of our men had been complaining of severe headache, giddiness and violent pains in the spine and between the shoulders. I had been anxious when at Gondokoro concerning the vessel, as many persons had died on board of the plague during the voyage from Khartoum. The men assured me that the most fatal symptom was violent bleeding from the nose, in such cases no one had been known to recover. One of the boatmen, who had been ailing for some days, suddenly went to the side of the vessel and hung his head over the river: his nose was bleeding! Another of my men, Yaseen, was ill; his uncle, my vakeel, came to me with a report that his nose was bleeding violently. Several other men fell ill; they lay helplessly about the deck in low muttering delirium, their eyes as yellow as orange peel. In two or three days the vessel was so horribly offensive as to be unbearable *the plague had broken out*! * * * * * * Yaseen died; he was one who had bled at the nose * * * * * * Mahommed died; he had bled at the nose * * * * * * Several men were ill, but the dreaded symptom had not appeared * * * * * * All night we could hear the sick muttering and raving in delirium, but from years of association with the disagreeables we had no fear of the infection. One morning the boy Saat came to me with his head bound up and complained of severe pain in the back and limbs, with all the usual symptoms of plague; in the afternoon I saw him leaning over the ship's side, his nose was bleeding violently! At night he was delirious. On the following morning he was raving and on the vessel stopping to collect firewood he threw himself into the river to cool the burning fever that consumed him. His eyes were suffused with blood, which, blended with a yellow as deep as the yolk of egg, gave a horrible appearance to his face, which was already so drawn and changed as to be hardly recognised * * * * * * Saat grew worse * * * * * * He never slept, but night and day he muttered in delirium, breaking the monotony of his malady by occasionally howling like a wild animal * * * * * * as morning dawned a change had taken place, the burning fever had left him and although raised blotches had broken out upon his chest and various parts of his body he appeared much better * * * * * * His pulse was very weak and his skin cold * * * * * * He is dead!

This disease was certainly not plague. It is to be remembered that Sir Samuel Baker was not a medical man, but the description which he gives of the cases coming under his own immediate observation is strongly suggestive of Yellow Fever and that the boat was carrying Stegomyia previously infected at Khartoum.

EAST AFRICA PROTECTORATE.

The following extract from a communication sent to the Governor of the East Africa Protectorate describes a fatal case of fever in a young European, which presents many of the characters of Yellow Fever.

It will be observed that it occurred in the course of an epidemic in which the disease proved fatal to many natives (*vide* p. 135.)

22nd December, 1913.

"With reference to your request for particulars regarding the death of our son, I beg to intimate that he was a perfectly sound and healthy young man, I am sorry that I am unable to give his exact temperature during the course of the disease as I had no clinical thermometer with me at the time, but from past experience I believe that during the first severe attack the temperature was about 107. In all my life in Africa I never was conscious of feeling with the hand so high a temperature in a human body. The heat of the body was not so high in the second exacerbation and lessened considerably as the time of departure approached. There was considerable suffusion of biliary secretion and jaundice was present in a marked degree, but I was not aware of any albuminuria being present.

"Bleeding from the nose continued at intervals during the course of the disease, and frontal headache was exceedingly severe and acute as long as consciousness remained. There were a great many cases of severe bilious remittent fever among the natives and numerous deaths from same in the district in which my son was stricken with the disease.

"The initial symptoms, which came on with alarming suddenness, were pains in the stomach and in the lower limbs, and immediately a feeling of coldness and shivering, while the face turned yellow. These symptoms were followed by an alarming hot stage with severe bleeding from the nose, frequent vomiting of yellowish and green matter and terrific frontal headache, and the patient soon passed into delirium. The hot stage prevailed without any diminution for a period of 8 hours, during which the temperature was probably 107°, after which the temperature gradually lowered for a period of 4 hours until it reached about 102°, during which a little sleep was obtained. After this the

patient was conscious, but in a very weak state for the space of 6 hours, during which time his speech was perfectly coherent, but he was not inclined to speak much. He refused to be carried home from the camp where he was, and insisted upon riding his pony a distance of 12 miles. After the sixth hour of lowered temperature the second exacerbation came on while he was at home, and although his temperature rose high yet it did not on this occasion reach above 105°, as far as I could judge. Delirium soon set in, and shortly afterwards the power of speech was lost and never regained.

"Twenty minutes before death, however, evident consciousness returned. His illness lasted 36 hours. After death the body was of a distinctly yellowish hue and blood oozed from the nostrils and also very slightly from the mouth.

"This disease has been known throughout Ukamba for a long period of time, and few years pass by without a few cases, and these generally come in the 'nunduni' or cloudy season of June and July. Never before in the memory of the oldest men have there been so many cases and so many deaths as this year. Their name for the disease is 'Kiathi' or 'Ndetema wa Nyonggo' (bilious fever) and they assert that during the course of the disease there is hæmorrhage from the internal organs, a greatly enlarged gall bladder (which sometimes bursts) and that after death, blood oftentimes oozes from the mouth, nose, ears and anus. Few patients recover, and their recovery is very slow, sometimes covering two years, while others never get strong again."

In the opinion of the Commission there can be little doubt that this is the same disease as that from which (Sir) Samuel Baker's men died in 1865.

Health of the Ships of the Navy on the West African Station in 1862.

	Admissions.	Deaths.
Continued Fever and Remittent Fever	675 ...	11
Intermittent Fever	140 ...	0
	815	11
Yellow Fever	cases 11 ; deaths 7	

The cases of Yellow Fever all occurred on the "Bloodhound."

Health of the Black Troops serving in Western Africa in 1862.

	Average Strength.	Admissions to Hosp.	Deaths.
Sierra Leone	317	252	9
The Gambia	209	254	4
Lagos ...	105	198	3
The Gold Coast	313	144	9

Sierra Leone.

"The admissions into hospital at Sierra Leone though somewhat above the average, have been greatly below the numbers in 1861. At the Gambia there has been a great increase in the admissions, but a decrease, to the extent of one half, in the deaths; and on the Gold Coast the admissions have been much under the average, while the deaths have been above it and greatly in excess of those in 1861."

Lagos.

"At Lagos the admissions were extremely high, amounting to twice the average proportion at the Gambia, but the deaths corresponded closely with the ratio at Sierra Leone and on the Gold Coast."

The Gambia.

One death occurred at the Gambia and one at the Gold Coast from remittent fever: none at either Sierra Leone or Lagos.

No death occurred among the European non-commissioned officers at any of the stations.

Commentary on the Epidemic of 1862.

It is evident that about the year 1862 Yellow Fever was a widely spread disease in Africa. It by no means follows, however, that because it was present in a great many centres fifty years ago it is to be found in those places to-day; nevertheless it ceases to be surprising that from time to time it should re-appear in one or more of them or

in new centres. Like other transmissible diseases it requires for its continued presence certain conditions, some of which may fail and so lead to its disappearance, and this in a given centre may be either temporary or permanent.

So far as these records go there is no evidence to show that it was imported into any African settlement from the West Indies or elsewhere in the year 1862, and we have the statement of the Medical Board whose report (1884) is given on page 34, that whenever it appeared in Sierra Leone (except in 1872) it was "the undoubted product of Freetown itself."

Like some other diseases it certainly spreads along the lines of human travel, but these records do not shew that in 1862 it was carried from one Colony to another. Also, like other insect-borne diseases, it requires for its continued extension the presence of its intermediary host, and so far as our present knowledge goes it is only by the destruction of the carrier that we can hope to wipe out the disease.

(v) ANALYSIS OF THE WEST AFRICAN EPIDEMICS OF 1910, 1911 AND 1912.

A report on the epidemics of Yellow Fever in 1910 and 1911, the work of Dr. A. E. Horn and Dr. T. F. G. Mayer, of the West African Medical Staff, successively attached to the Colonial Office, has already been published. The Commission have gone carefully through the records of the cases, and also of those which occurred in 1912, and have classified them on the basis which they have adopted throughout, viz. :—

Yellow Fever.
Probable Yellow Fever.
Possible Yellow Fever.
Negative.

In the last class are included cases in which the evidence did not attain to the arbitrary standard which, as already explained, the

Commission have fixed in order to secure the utmost possible degree of certainty, and also those, comparatively few in number, in which the diagnosis was thought to be wrong. In this analysis these two classes are differentiated. The inverted commas in the following analyses, e.g., "Yellow Fever," indicate the diagnosis of the cases arrived at by the Commission from a study of the records.

A general survey of the position as regards Yellow Fever in West Africa immediately preceding and at the time of the first outbreak in May, 1910, at Freetown, may be useful as an introduction to an analysis of these epidemics.

It is unlikely that a knowledge of the past history of the West Coast in relation to this disease, such as now appears in the Retrospect forming part of this report, was then present to the minds of many of those concerned.

The memory of the long history of epidemics at Sierra Leone, and elsewhere, had been buried in a happy oblivion, and much of the information on the subject now available has been obtained since that date.

On this as on other occasions no evidence was obtained, although careful search was made, that the disease had been introduced by an infected ship from the West Indies or some non-African Port, and this remains true of all the outbreaks which have occurred since 1910 in the British Colonies on the coast.

Sir Rubert Boyce states that "in 1908 a Syrian died at Freetown with symptoms which the Medical Officer who was in attendance regarded at the time as due to gastric ulcer. He now thinks that it might very well have been a case of Yellow Fever."

Also that "in 1909 a fatal case occurred, which in the light of recent experience the Medical Officers who were in attendance now conclude was Yellow Fever." This was diagnosed as phosphorus poisoning.

We have not verified these statements as regards the opinions of the individuals concerned, but the frequency with which the Syrians, who live in the native quarters of the towns, are the first to be obviously attacked in an epidemic renders any doubtful case occurring among them doubly suspicious. Whether a patient had or had not taken phosphorus should not have been a matter of doubt.

As this enquiry has proceeded it has become evident that in the year 1910 the disease was present at various places, distributed over a very wide area in West Africa.

Distribution of Yellow Fever in West Africa in 1910.

In January there was Yellow Fever at Anecho on the coast of Togoland.

In a report by Dr. Coghill, one of the Investigators appointed by the Commission, it is stated that a disease, which from the description given was undoubtedly Yellow Fever, " was brought south from Senegal " in March, 1910, Wagadugu being the chief centre of infection. From thence it was carried " west through the Wangara country—many dying on the way." In April it appeared at Leo, near the northern boundary of the Northern territories. In May it was at Gwong, south of Tumu, at Duluboi in July and at the end of that month at Kankillanbassie.

The period of suspicious cases in the Freetown epidemic extends from April 7th to May 16th. The case which occurred on April 7th has been classified by the Commission as " Yellow Fever." The last case occurred on September 22nd, 1910.

The first case in the Seccondee epidemic classified as Yellow Fever occurred on April 12th, although a fatal case of " possible Yellow Fever " occurred on March 24th.

A case of " probable Yellow Fever " occurred at Axim on July 6th, and another at Sawmills on July 18th.

At Lagos a case similarly classified occurred on July 27th, and another on August 5th.

In August there were cases at Anima in Togoland, 257 miles from the coast.

On October 18th seven deaths took place near Kayes, Dinguira and Setadougou, in Upper Senegal. In October three doubtful cases are recorded at Grand Bassam. In December there was an outbreak of Yellow Fever at Boulama, in Portuguese Guinea.

It is obvious therefore that in the year 1910 Yellow Fever was a disease widely distributed in West Africa, and that its appearance in the British Colonies in that year is by no means astonishing.

The Course of Yellow Fever Epidemics.

The following extract from a paper by Dr. Kohnke* on "The Sanitary Prevention of Yellow Fever," may be commended to the notice of those who are disposed to criticise medical action in relation to epidemics of Yellow Fever :

> "It is my experience that early cases, not imported, are not recognised in time to prevent infection, and it is my belief that they never will be Diagnosticians who can at all times differentiate between the very mild cases of Yellow Fever and diseases resembling it, exist mainly in the imagination of the laity."

Dr. H. D. Geddings, a distinguished member of the Marine Hospital Service, United States of America, in a paper read at the International Medical Congress at Moscow, in 1897, on "Yellow Fever from a clinical and epidemiological point of view and its relation to the Quarantine system of the United States," observes† :—

> "The first cases occurring in a locality are usually of a mild type, and generally end in recovery, and it is only later, when the foci of infection have become greater in number, the cases more virulent, and the victims begin to die with symptoms not readily to be accounted for by the common diseases prevailing in the given locality, that suspicion begins to be aroused, and by this time it is usually all too late to undo the damage that has already been done and there follows an epidemic of Yellow Fever * * * *"
>
> "There is always a melancholy sameness about epidemics of Yellow Fever, and a brief description of one will suffice with certain modifications for all. There is always a period of an unexplained malady, at first usually mild, gradually becoming more severe and finally causing deaths. The cases begin to occur in widely separated localities, but on later investigation they may usually be traced to the one original source.
>
> "Then * * * the cases become more frequent and more severe, the deaths correspondingly more numerous * * * * a panic ensues, and there is a flight from the stricken city * * * *"

SIERRA LEONE.

Analysis of the Freetown Epidemic of 1910.

(*a.*) *Period of "Suspicious Cases."*

On April 7th, 1910, a Syrian (case 1) was admitted to hospital, and died on April 17th. Case classified as "Yellow Fever." On the

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*(7.1137). †Annual Report M.H.S., 1897, p. 236.

17th, a Syrian (case 2) died suddenly at home. "Negative," as no details were obtainable.

On May 5th a Syrian, living in Kissy Street (case 3), died in hospital. "Probable Yellow Fever." This would have been certainly classed as "Yellow Fever," but no post-mortem examination was made.

On May 5th a Syrian (case 4), living in Little East Street, died at home. "Negative." No details obtainable.

On May 7th a Syrian (case 5) died in hospital. "Probably Yellow Fever." This case was only not classed as Yellow Fever because of the absence of a post-mortem examination.

On May 13th a Syrian trader (case 7) died suddenly at his home without being medically attended. "Negative"—no details.

It could not be ascertained with certainty whether all these Syrians resided in the same locality, but it was found that more than one death had taken place in the same house.

(b.) Presence of Yellow Fever Recognised.

The second period as a rule coincides with the death of one or more Europeans, and it was so in this epidemic.

On May 9th an Englishman, aet. 42 (case 6) long resident in Freetown, was taken ill and died in the nursing home on May 14th from "Yellow Fever." Post-mortem examination.

On May 16th a meeting of the Sanitary Committee was summoned to consider the action necessary in view of the fact that Yellow Fever had appeared at Freetown.

(c.) Course of the Epidemic.

On May 25th another Syrian (case 8) died in the Colonial Hospital from "Yellow Fever." He was reported to have arrived from Dakar three weeks prior to May 23rd, 1910.

Case 9 was that of a European missionary who was taken ill on May 26th and died in the Nursing Home on May 31st from "Yellow Fever." The next case occurred in a European (case 10) who died from "Yellow Fever" on June 8th, after an illness lasting five days.

Case 11 was that of a Government official who was ill from June 25th to July 15th with some fever and jaundice—"negative"; wrong diagnosis; albuminuria absent; ? Insolation.

(d) Temporary Disappearance and Recrudescence of the Disease.

It often happens that after a more or less prolonged period of activity the disease seems to have disappeared. If the town is a port, quarantine is raised after 18 days from the date of the last death or the screening of the last case, and there is a general feeling of relief. Infected stegomyia are, however, still present, and in time find their victims.

Quarantine was raised from Freetown at the end of June, all necessary anti-mosquito measures being continued.

On July 18th another death of a soldier (case 12) occurred from "Yellow Fever," and Freetown was again declared infected.

On the same date a Syrian woman (case 13) was taken ill and died on July 22nd from "Yellow Fever." Case 14 was that of a Syrian, who died suddenly, in a house a few doors from that occupied by case 13, without medical attendance. A post-mortem examination was made, and was said to have confirmed the diagnosis; but as no details either of the illness or the autopsy are given the case was classified as "negative." Case 15 was a negro, æt. 23, a clerk on the railway, who had never been out of West Africa. He was taken ill on July 27th and died from "Yellow Fever" on August 2nd.

Case 16—also that of a negro, æt. 24, who was taken ill on July 30th, admitted to Hospital on August 1st with pyrexia, Faget's sign, jaundice, epigastric tenderness and albuminuria, and was discharged well on August 5th. "Probable Yellow Fever." Case 17 was that of a European trader, æt. 24, whose illness, which commenced on August 1st, was characterised by pyrexia, pains, vomiting, albuminuria and an erythematous blush on the skin of the back and chest, a condition which was also subsequently noticed in case 31 (*vide* p. 110). On August 11th he was sufficiently recovered to be removed to a Nursing Home. "Possible Yellow Fever." Dengue could not be absolutely excluded. Case 18 occurred in a Government official, æt. 27, taken ill on August 11th with pyrexia, Faget's sign and

vomiting, a trace of albumen. "Negative." Evidence not given in sufficient detail. Case 19, a negro cook, taken ill on August 18th and discharged from hospital on August 27th, was classified "negative," as the symptoms did not in the opinion of the Commission point to Yellow Fever.

(*d.*) *Second Disappearance and Recrudescence.*

On August 20th, 18 days after the last death from Yellow Fever and the screening of the last suspected case, quarantine was again raised and the port declared free from Yellow Fever; but on August 30th the occurrence of case 20 necessitated a third declaration that the port was infected.

This patient, a negro labourer, æt. 26, was taken ill on August 25th, admitted to hospital on August 28th and died from "Yellow Fever" on August 29th.

(*e.*) *Third Disappearance and Recrudescence.*

"On September 19th it was decided that, 18 days having elapsed since the last death from Yellow Fever, ships calling at Freetown should be given a clean bill of health, but that the regulations previously instituted for the protection of shipping should continue to be enforced for a time."

It is remarked that "the wisdom of the latter decision was proved by the occurrence of another fatal case."

On September 15th a European clerk (case 21) æt. 26, who had not been out of Freetown for some time, began to ail, but continued at work; on September 19th he was seen by a medical man and was admitted to hospital, and died from "Yellow Fever" on September 22nd. This was the last case known to occur.

COMMENTARY.

1. A knowledge of the movements of the Syrian (case 1) for (say) six weeks prior to April 17th would be of interest, but there is no reason to believe that he landed from an infected ship. There is no evidence that the disease was imported.

2. Seven deaths (cases 1, 2, 3, 4, 5, 7, 8) occurred amongst the Syrians between April 17th and May 25th.

3. Case 4, classified as "negative," because of insufficient details, died at home in the same street as a fatal case, No. 7, also "negative," and for the same reason, and in close proximity to case 3, "probable," and case 8, "Yellow Fever."

4. As just stated, case 7, "negative," died at home in close proximity to cases 3, 4 and 8.

5. On reference to the map of Freetown (appended) it will be seen that cases 1, 3, 4, 7, 8 occurred in a part of the town where the Syrian quarter overlaps the European quarter.

6. The streets and places mentioned in connection with these cases are Kissy Street (3, 7, 8), Little East Street (4 and 7), Garrison Street (6), Tower Hill Barracks (12), Fourah Bay Road (13 and 14), Henry Street (15).

The neighbourhood of Kissy Street appears to have been the "Primary Epidemic Focus."

7. The interval of 18 days which must elapse from the death of the last patient, or the screening of the last case, is made up, of course, of two periods: The first of 12 days, allowed for the incubation within the body of the mosquito, the second of six days, for the incubation within the body of the patient.

It will be observed that in this epidemic :—

	Quarantine was raised	The next case occurred	Duration of	Interval.
(1)	"At the end of June"	July 18th ...	(18+18) ...	36
(2)	August 20th	Aug. 30th ...	(18+10) ...	28
(3)	September 19th ...	Sept. 22nd ...	(18+ 4) ...	22

From the above it is clear that if the period had been double that required by the quarantine regulations (i.e., 36 days), it would have coincided with or have been immediately followed by another case on July 18th.

From a scientific point of view it is manifest that the period of 18 days is insufficient ; but having consideration for the necessities of trade some arbitrary limit must be fixed by regulation, and Science can only say that a stegomyia *may* live 310 days, and that if

infected it *may* remain so during all that time, and that the observation of Marchoux and Simond that the virus can be transmitted from the infected mosquito to the next generation *may* ultimately be confirmed.

GOLD COAST.

Analysis of the Seccondee Epidemic of 1910.

(*a.*) *Period of Suspicious Cases.*

A European, æt. 29 (case 22), arrived at Seccondee from Accra on March 10th, 1910. At Accra he had "an illness of a similar nature," marked by vomiting and diarrhœa. Yellow Fever was not recorded there until 1911. He slept in the Town Council Offices, adjoining Cosby's bungalow, from which, later, several fatal cases came. Death occurred on March 24th, with marked jaundice of a lemon colour, which increased post mortem—"Possible Yellow Fever"—albumen not noted as present. This case was diagnosed as typhoid fever.

On April 12th the wife of the manager of a mercantile firm (case 23) was taken ill and after an illness lasting 16 days, marked by headache, pyrexia, saddle-back temperature and vomiting, she recovered and sailed for England on April 28th. There is no record of albuminuria. "Yellow Fever" on epidemiological grounds.

On April 27th the husband of the above (case 24) was taken ill and died on April 30th from "Yellow Fever." On May 8th a Government Official (case 25) was taken suddenly ill and died on May 10th from "Yellow Fever." On May 9th a missionary, æt. 25 (case 26), was taken ill and died on May 14th from "Yellow Fever." On May 10th a European, æt. 45 (case 27), died from "Yellow Fever." On May 12th and 13th a letter and a telegram were received from the Medical Officer at Seccondee reporting the occurrence of these cases "which exhibited the clinical symptoms of Yellow Fever."

(*b.*) *Recognition of the presence of Yellow Fever.*

On May 13th the Port of Seccondee was declared to be infected with Yellow Fever.

On the morning of May 15th a public meeting was held in the District Commissioner's Court and the situation was explained to those present.

Commercial Town—the portion of the town bounded on the west by the Hospital Road, on the south by the sea, and on the north by the Railway Timber Siding—was declared an infected area.

(*c.*) *Course of the Epidemic.*

On May 14th a post-mortem examination was made on a Hausa (case 28), who was said to have died suddenly during the night "Yellow Fever."

On May 16th an autopsy was held on a negro (Kroo), (case 29) who had been brought to the mortuary dead. "Yellow Fever."

On May 21st a European (case 30) died in Hospital after three days' illness from "Yellow Fever."

During the night of May 19th a European (case 31), æt. about 33 years, was taken suddenly ill, and died on May 27th from "Yellow Fever." This patient had "a rash like measles on the face, the upper part of the trunk and the backs of the hands" (*Vide* case 17, p. 107.)

On May 12th a missionary arrived in Seccondee, from Accra, and visited case 26 ("Yellow Fever") in Hospital. On May 20th he was brought to the hospital (case 32) in a semi-conscious condition, and died on May 23rd from "Yellow Fever."

Case 33 occurred in a government official, who was taken ill on May 22nd and died on May 25th from "Yellow Fever."

On May 24th a negress, the wife of a native clerk (case 34) died at her home in Essikado, near Seccondee, of "Yellow Fever." This was the last case which was known to occur.

(*d.*) *Disappearance of the Disease.*

The quarantine of Seccondee was raised on June 15th, 25 days after the isolation of the last case and 19 days after the last death from Yellow Fever. No recrudescence of the disease occurred.

Commentary.

1. It is stated in the report that "In view of the subsequent events it appears to be possible that the first case that occurred was case 22" ("Possible Yellow Fever"). There was an interval of nine days between the arrival of this patient in Seccondee, from Accra, and the onset of his illness; the inference being that if it was one of Yellow Fever it was either a relapse or infection took place in Seccondee.

2. It is suggestive that 19 days after the death of this patient cases should have appeared in Cosby's Bungalow, close to where he had lodged. Cases 23, 24, 25 and 31 can be traced to Cosby's Bungalow. Two cases (26 and 32) lived in the Wesleyan Mission Bungalow. Two cases (30 and 33) were probably infected in Bissue's Hotel, and one case (27) in Rust's Bungalow.

3. All the patients had been in Seccondee for periods longer than the usual incubation period of Yellow Fever.

4. There is no evidence of the introduction of the disease from without.

5. The sketch map of Seccondee (appended) shows the position of the houses where these cases occurred.

Axim.

On July 15th the death of an unofficial European (case 36) occurred at Axim. It was regarded as a case of Yellow Fever, and active measures were at once adopted. This patient had visited Secondee about June 20–22. He returned to Axim on July 6th. This case is classified as "Probably Yellow Fever." The signs were sudden onset, marked pyrexia, saddle-back temperature chart, Faget's sign, deafness, suppression of urine, vomiting, jaundice. Total duration of illness 4 days. Post mortem: The liver was enlarged and fatty. It is not expressly stated that albuminuria was present, and there was "a growth at the pyloric end of the stomach, otherwise it was normal." No further case occurred and Axim was not placed in quarantine.

Sawmills.

A European (case 35), aged 38, was brought from Sawmills Camp, 12½ miles by rail, to Secondee, on July 18th, and died from "Yellow Fever" at the latter place on July 19th.

No other case occurred.

SOUTHERN NIGERIA, 1910.

Lagos.

(*a.*) *Period of Suspicious Cases.*

A native, aged about 30, of the Yoruba tribe (case 37), came from Ilesha to Lagos. Two days later he was taken ill and after a similar period he was brought into the hospital. Apparently the day following admission was July 27th. There was then suppression of urine, jaundice, absence of malaria parasites, and black blood-stained fluid issued from the mouth. He died after a period of unconciousness on July 27th. The post-mortem findings suggested death from an acute disease, the liver was deeply bile stained and the stomach contained dark grumous looking fluid, but there was an "area of pneumonic consolidation in the right lower lobe." "Probably Yellow Fever."

Case 38 occurred in a negro of the Kroo tribe, employed in Lagos as a labourer. The illness is stated to have begun on August 5th, on the following day he was brought to the hospital in a dying condition, He was said to have vomited blood. There was suppression of urine, blood in the stools—coffee ground material was vomited after admission. On autopsy all the viscera were deeply bile stained; sub-mucous hæmorrhage was present in the stomach and intestines. Cloudy swelling of the kidneys. There were, however, areas of pneumonic consolidation. "Probably Yellow Fever."

No further cases were reported.

GOLD COAST.

Analysis of the Accra Epidemic of 1911.

(*a.*) *Period of Suspicious Cases.*

On February 24th, a European (case 39), died after an illness of uncertain duration (possibly 32 days), chiefly marked latterly by pyrexia, intense jaundice and bilious vomiting. Fever was absent until February 19th, 5 days before death; from its appearance until then it was continuous. The liver, on autopsy, was found to be greatly contracted, of an almost uniform yellow colour and harder than normal. The diagnosis, which was "acute yellow atrophy," is confirmed by the Commission.

(*b.*) *The Presence of Yellow Fever Recognised.*

On February 19th a European merchant (case 40), who had been engaged at Swanzy's factory, Accra, died in the hospital there, two days after admission. The symptoms were anuria, urine loaded with albumen, temperature ranging between 105° and 101° F.; no malarial parasites found on two examinations. This case is classified "Negative," owing to the very few details of the illness and the absence of a post-mortem examination; but it is to be noted that the reason given for the latter omission is "the diagnosis of yellow fever being considered sufficiently certain."

Swanzy's factory was sealed and fumigated and all the usual measures were at once put into force. No further cases occurred, "and the Gold Coast appeared to be free."

(*c.*) *Recrudescence of the Disease.*

On May 23rd, the same day on which Yellow Fever was reported from the Gambia, a European merchant (case 41), æt. about 24 years, attached to the Basel Mission factory, was admitted to hospital and died the same day of "Yellow Fever."

On May 23rd another European (case 42), contact of the former case, was admitted to hospital and died on May 28th of "Yellow Fever."

The natives living in the Mission premises were removed and isolated, and on May 24th one (case 43) was found to be ill with pyrexia, albuminuria, Faget's sign, absence of malarial parasites. He had recovered by May 21st. "Probable Yellow Fever."

On May 24th another native (case 44) was similarly attacked and recovered after an illness of the same duration (7 days). "Probable Yellow Fever."

On May 25th a native clerk (case 45), living in the native town of Christiansborg, was admitted to hospital with a similar attack and recovered after 7 days' illness. "Probable Yellow Fever."

On May 25th Accra was declared to be an infected port and was declared free from infection on June 14th.

(*c.*[i]) *Second Recrudescence of the Disease.*

On June 22nd an electrical engineer, æt. 35 (case 46), who had been working in an annexe to the Post Office, "underneath which was a damp store swarming with mosquitoes," was taken ill and died on June 26th of "Yellow Fever."

(*c.*[ii]) *Third Recrudescence of the Disease.*

(*a.*) *Period of Suspicious Cases.*

On August 26th a merchant, æt. 35 years (case 47), died after an illness of eleven days' duration marked by pyrexia, Faget's sign, restlessness, delirium, and terminating in coma. The urine did not contain albumen. The stomach was injected; the skin of the face was icteric —"Negative."

No further case was reported until December 20th, when a railway clerk (case 48) died after an illness of four days' duration, marked by hyperpyrexia and albuminuria. There was a history of alcoholism. "Possible Yellow Fever."

Commentary.

1. The "Primary Epidemic Focus" was apparently the Basel Mission factory.

2. First appearance of disease, February 19th.
Second „ „ „ May 23rd.
Quarantine declared, May 25th.
Port declared free, June 14th.
Third appearance of disease, June 22nd.

Period between last case and third appearance of the disease (18 + 8) = 26 days.

3. The source of the infection was not discovered.

4. The sketch map of Accra (appended) shews the position of the houses in which the cases occurred.

Avreboo.

Avreboo is a town 9 miles inland from Axim.

The manager of a rubber estate (case 49) "situated in a very hilly but sparsely populated country," was taken ill on June 22nd, 1911, and died on June 27th from "Yellow Fever."

No other case was reported.

THE GAMBIA.

Analysis of the Bathurst Epidemic of 1911.

(*a.*) *Period of Suspicious Cases.*

On May 8th a frontier soldier came to the Hospital, Bathurst, and stated that he was suffering from Yellow Fever. His reason for this opinion was that he believed he was passing blood in his urine. He was detained in a screened ward. The urine was slightly darker in colour than normal, but no blood was found at any time, nor was there albumen at any time. After detention for 5 days he was discharged for duty.

On May 18th a European (case 50), Royal Engineers, was taken ill and died in Hospital on May 23rd from "Yellow Fever." On the same day another European, Royal Engineers, æt. 32 (case 51),

was taken ill and admitted to Hospital on May 19th. On the 20th May the case was regarded as suspicious of Yellow Fever, a view which was confirmed after the autopsy on the following day. "Yellow Fever." Case 52, a European, was admitted on May 21st. He recovered. "Probable Yellow Fever."

(*b.*) *Recognition of the Presence of the Disease.*

On May 21st the presence of the disease was notified to the neighbouring ports.

(*c.*) *Course of the Epidemic.*

On May 26th a European private servant (case 53), one of five men, who were friends, of whom two died from Yellow Fever, died in a wing of Government House. Case classified as "Negative," owing to the absence of records of the illness and no autopsy made. On May 26th an Engineer, æt. 24 (case 54), died after an illness of three days' duration, of which the only record is the temperature chart (Temp. 101°–104°F). "Probable Yellow Fever."

(*c.*[i]) *Disappearance and Recrudescence of the Disease.*

No further cases appeared for six weeks, i.e., until July 6th.

On this date the Assistant Engineer (case 55) of the Government vessels in the Harbour was infected, and died on July 13th from "Yellow Fever."

This patient was treated in a house next to houses occupied by Syrians and natives.

On July 8th or 9th, a Syrian (case 56) was taken ill and died on July 12th of "Yellow Fever."

On July 16th a European clerk, aet. 27 (case 57), living 100 yards from the house occupied by case 55, many small houses of natives, Syrians and Moroccans intervening, died on the 4th day "with most marked symptoms." "Probable Yellow Fever"; evidence insufficient.

On July 15th a Syrian (case 58), living in Russell Street, about 500 yards from the house in which case 55 lived, developed a slight attack, from which he recovered in 7 days: "Probable Yellow Fever"; evidence insufficient.

Case 59 occurred in a Roman Catholic brother, who died on July 23rd "undoubtedly of Yellow Fever." This patient had left Bathurst through fear of the epidemic and died without medical attendance at Abuko. "Possible Yellow Fever"; evidence insufficient.

A European clerk, æt. 29 (case 60), who had nursed case 57, ("Probable Yellow Fever": owing to insufficient evidence) with whom he lived, was taken ill on July 22nd.

He was found concealed (the only case so found) but screened; the intention being to take him on board a steamer which left Bathurst on the following day; he died in hospital. "Probable Yellow Fever": details insufficient.

A Syrian (case 61) was taken ill on July 24th, a few days after his arrival in the Colony, and died on July 28th of "Yellow Fever." Post-mortem examination. This patient lived in the same house as case 58, also a Syrian, who recovered and is classified as "Probable Yellow Fever" owing to insufficient evidence.

The last case in this series occurred on August 2nd. The patient (case 62) was a Bank Cashier. "Although the symptoms were mild it was undoubtedly a case of Yellow Fever and the patient recovered." "Possible Yellow Fever." No sufficient evidence given.

(*c.*[ii]) *Second Disappearance and Recrudescence of the Disease.*

No further cases occurred for a period of more than three months.

On November 11th a French clerk (case 63) who had arrived from France via Dakar, one month before his illness, was seen by a medical man and found to have fever, Temp. 103° F. and continuous vomiting. He died on November 15th from "Yellow Fever."

On November 15th a member of the same firm (case 64) was taken ill with Malarial Fever. On November 18th he was profoundly affected by the news of the death of his friend (case 63) his temperature rose to 105°. He became extremely nervous, was removed to Hospital, and on the morning of the 21st his temperature suddenly rose to 107·2° and he collapsed and died. "Possible Yellow Fever."

Analysis of the Epidemic.

1. "All five patients (cases 50, 51, 52, 53, 54) were friends and often together in the Engineer's quarters."

2. The mosquitoes in these quarters were probably infected from a mild case in a native soldier.

3. A large number of Syrians (55) in the town escaped infection.

4. No evidence was obtained in support of the suggestion that the infection was brought by the S.S. "Akassa."

5. Quaratine declared ... ... May 21st.
"Last case" died. .. .. May 26th.
Disease reappeared ... . July 6th.
Disease disappeared ... ... August 2nd.
Disease reappeared ... ... November 11th.
Disease disappeared ... ... November 21st.

6. No evidence of the source of infection was obtained.

7. The sketch map of Bathurst (appended) shews the position of the houses in which the cases occurred.

GOLD COAST.

Analysis of the Epidemics of 1912.

Accra.

(*a.*) *Period of Suspicious Cases.*

A man, æt. 39, who had stayed at Accra from April 5th to April 8th, was taken ill at Weshiang on April 10th, and died on April 13th. "Probable Yellow Fever."

Reappearance of the disease.

Christiansborg.

Case 67 was a European, æt. 35, taken ill on May 30th, and died June 4th of "Yellow Fever."

(*b.*) *Course of the Outbreak.*

A European, æt. 35, living at Accra (case 68) suffered from a mild attack lasting from June 12th to June 21st. "Probable Yellow Fever."

A young German, æt. 27 (case 69), living at the Basel Mission workshops, Christiansborg, was taken ill on June 22nd and died on June 27th from "Yellow Fever."

LABADI.

The case of a clerk (case 70) taken ill on July 19th with pyrexia headache, brightness and yellowness of the eyes, Faget's sign and albuminuria was classified as "probable Yellow Fever."

He recovered after an illness of about 4 days.

"Enquiries were instituted at Labadi into the health of the occupants of the house from which this patient came." The result being that eleven patients (cases 71–81) were discovered, some of whom were suffering from slight febrile attacks. "A control examination of 15 people was made amongst the inmates of a house about 200 yards away, only one of whom shewed a slight rise of temperature." All these cases were classified as "probable Yellow Fever." Seven of these persons shewed a rise of temperature on July 28th.

SECCONDEE.

(*a.*) *Period of Suspicious Cases.*

On May 17th Mr. E—— (case 66) was taken ill with vomiting. On the 18th he was better, but had slight conjunctival jaundice. No headache, fever or albuminuria. On the 19th jaundice rather more marked; no headache, vomiting, epigastric tenderness or pyrexia. During the 20th and 21st there was nothing special to note. He made urine in normal quantity, but with a large amount of bile in it; no albuminuria; jaundice disappearing from the eyes and face, but more marked over abdomen and legs. Temperature, taken every four hours, always 98° or 98·4° F. Patient was quiet and made no complaint of any kind. The diagnosis up to that time was Catarrhal Jaundice.

(*b.*) *Recognition of the Presence of the Disease.*

There was, so far, no feature in the above case except the jaundice to suggest that it was one of Yellow Fever, but at 4 p.m. on May 22nd the temperature suddenly rose to 101° F., then to 106° F.; he became comatose; albumen appeared in the urine; dark fluid came from the mouth, and death followed at 5.30 a.m. on May 23rd. Post-mortem appearances typical of "Yellow Fever."

A remarkable case, illustrating the impossibility for more than five days of arriving at an accurate diagnosis.

AXIM.

On December 5th a native (case 82), æt. about 35, was taken ill with pyrexia and epigastric tenderness. Later Faget's sign and albuminuria developed with prostration and jaundice. He had recovered by December 15th.

The case was classified by a majority of the Commission as "Probable Yellow Fever."

(*B*)—RACIAL IMMUNITY—CLINICAL TYPES.

The literature of Yellow Fever, which is probably more extensive than that of any other disease, contains many references to the so-called immunity of the native races. This is believed to be either partial or complete, the latter view having always been held more firmly by the laity than by medical men. It is worth while to consider, briefly, the nature of the evidence upon which these beliefs are based, as the question is one of considerable practical importance. As we have already pointed out, the records of epidemics in West Africa are confined almost entirely to the incidence of the disease amongst Europeans, and it is not until well marked, and as a rule not until fatal cases occur in non-natives, that its presence is recognised. Upon such cases the attention of the affected community is centred, and neither then, nor at any other time, have they much knowledge of the state of health of the native population. Such of the latter as are in

contact with the sick may be observed to escape, and from this it is concluded that all natives are immune Medical men, with more extended opportunities of observation, have seen that during epidemics cases undoubtedly occur amongst the natives, but that they are usually of a mild type; hence arises the view that the natives enjoy a partial immunity.

In the despatch from the Governor of Sierra Leone quoted on p. 30 it will be remembered that the following passage occurs:—

"A remarkable feature in the course of the progress of this disease is that, as it assumed a more virulent form, its presence became more and more restricted to persons of European birth, till at the point at which it reached its worst stage, and was admitted to be Yellow Fever, the natives seemed to have complete immunity from its attacks. With the exception of the case of a soldier of the regiment in the garrison here, a West Indian negro, the cause of whose death is, as I have already mentioned, stated to have been Yellow Fever, there has not been a single authenticated case of that disease among the negro population." This may be cited as an example of the lay view, but in the medical report forwarded with the same despatch we find the following: "The prevalence of this severe form of typho-malarial fever or Yellow Fever now so fatal among Europeans and native residents * * * * ."

"The extreme sick rate and mortality from fever amongst the native population occurring during the month of May and June (1884) in Freetown."

"The Registrar-General's return shows for May and June alone no less than 19 deaths amongst the resident natives." It is, however, not stated that these deaths were due to Yellow Fever, and from the analysis of the cases amongst the Europeans of which details are given, it is clear that there was also an epidemic of typhoid fever at the same time.

These extracts illustrate the difference between the observations of a layman and of medical men upon the same epidemic. In the extract from the description of the epidemic of 1778 in Senegal, by Schotte, the following passage occurs:—

"A most dreadful disease broke out which * * * * carried off the greatest part of the Europeans and a great number of the native

mulattoes and blacks, the Europeans suffered much more by it in proportion than the mulattoes, and those much more than the blacks."

This evidence is to some extent supported by figures, which must be taken for what they are worth, quoted by Augustin (p. 265) shewing the incidence of and mortality from the disease amongst the various races, observed in an epidemic of Yellow Fever at Goree (Senegal) in 1866.

	Cases.	Deaths.	Population.
Whites	242	107	268
Mulattoes ...	4	2	766
Blacks	3	1	2,500

The comment of the author, who is not a medical man, upon these figures, is as follows :—

"This remarkable immunity has always prevailed among the blacks, not only in Africa, but throughout the world."

It would be interesting to know how many cases of a mild type amongst the mulattoes and blacks were overlooked, as if the figures are accurate the case mortality amongst the former was 50 per cent. and amongst the latter 33 per cent.!

The same writer observes in reference to an epidemic of Yellow Fever in Senegal in 1878: "The course of the disease among the blacks, who in nearly every instance proved immune to Yellow Fever during epidemics in Senegal, is lightly touched upon by the numerous authors we have consulted, and the natural inference is that the natives must either have totally escaped or suffered so little that it was not thought worth while to go into details."

The evidence above adduced may be usefully contrasted with the following experience in America and West Africa. For the former we are indebted to an article by Dr. Charles Chassaignac, of New Orleans in Augustin's History of Yellow Fever (p. 1,054) on "Some Lessons Taught by the Epidemic of 1905" (Louisiana and Mississippi).

"It was shewn conclusively during 1905 that negroes are about as liable to contract the disease as the whites, but that they have it usually in a remarkably mild form."

He gives the following figures for the three places named :—

		Cases.		Deaths.		Per Cent.
TALLULAH ...	Whites	90	...	18	...	20
	Negroes	950	...	5	...	·5
LAKE PROVIDENCE	Whites	80	...	15	...	20
	Negroes	247	...	8	...	·3
PATTERSON ...	Whites	500	...	51	...	10
	Negroes	200	...	1	...	·5

"Several negroes were observed by me in Tallulah who had symptoms just about sufficient to make a diagnosis possible, yet who were scarcely sick, some not even interrupting their work."

"At first very few of the darkies reported their sick, and it was only when it became bruited about that the sick were supplied with delicacies, especially chicken during convalescence, that we obtained any idea of the large number who were having the disease" (p. 1055).

The following opinion is the result of the experience in Togoland, West Africa, of Dr. Sunder, of the German staff. It is contained in an article entitled "Yellow Fever among Negroes" (*Gazette*, 8th January, 1907). "It is to be hoped that the assertion that negroes are immune to Yellow Fever, which has for a long time been in contradiction with the known facts, may be regarded as finally disposed of. The black race is as little immune to Yellow Fever as it is to malaria."

It is unnecessary to labour this point further, as no one now contends that the native population of West Africa is immune to yellow fever; indeed, the evidence of their susceptibility obtained by the Commission is steadily increasing.

CLINICAL TYPES OF YELLOW FEVER.

If the form of the disease generally observed in Europeans and "Newcomers" is regarded as its only true manifestion it is not difficult to understand why it has been believed that the natives in the coast towns enjoy an immunity to its attacks.

The difference in the clinical picture presented by cases such as those met with in Tallulah by Dr. Chassaignac and by severe cases of

the hæmorrhagic type is so great that, at first sight, it appears almost impossible that they can be examples of the same disease. On consideration, however, it will be seen that the difference is not greater than that between a case of hæmorrhagic small-pox and one of a mild type occurring in an individual who, although vaccinated, was not completely protected, or than obtains between a mild case of enteric fever and one of the hæmorrhagic variety.

Few physicians in this country have seen cases of Yellow Fever, and a considerable experience of enteric fever may not include one of which the following is an example. The case was under the care of a member of the Commission in a London hospital.

H.H. æt. 20. Silversmith. Admitted, January 6th, 1901.

No history of hæmophilia in family or patient.

Measles and whooping cough in childhood: no illness since: no history of syphilis.

Onset. December 27th, headache and rigors. December 30th, had a "sore throat." December 31st, diarrhœa.

Temperature observed by medical attendant has been as follows:—

January 2nd.	103°F
January 3rd.	101·1,
January 4th.	101·2.
January 5th.	M. 100.
	E. 101·4.
January, 6th.	M. 100·4.

On several occasions during the week preceding admission he has noticed that when he blew his nose blood appeared on the handkerchief, on one occasion in considerable quantity.

On admission. Well nourished. Complains of fever, diarrhœa and abdominal pain. Lies low in the bed: knees are flexed and abducted. Lips dry and cracked; small aphthous ulcers on the anterior pillars of the fauces; tongue coated with white fur on dorsum, red at tip and edges; a few spots on the abdomen, which fade on pressure; gurgling in right iliac fossa; motions liquid and green in colour; heart and lungs normal; abdomen not tumid: spleen cannot be felt: urine normal does not give Ehrlich's reaction.

January 8th. Blood does not give Widal's reaction. Tâche cérébrale well marked on abdomen and face.

January 6th to 20th. Temperature of remittent type ranging between 100°–103° E. and 99°–100° M. Pulse 88–100; diarrhœa ceased on December 12th.

January 15th. Slow agglutinative reaction with culture of bacillus typhosus.

January 22nd. Slight epistaxis.

January 23rd. Very severe epistaxis; hæmatemesis; hæmaturia; urine resembled blood; ecchymosis in lobule of left ear, at site of puncture for examination of blood; purpuric spots above and below knees; no hæmorrhages in retina; bleeding from gums.

January 24th. Large quantity of blood in urine; epistaxis continues; gums still bleeding; purpuric spots on left upper eyelid and ecchymoses in left supra-spinous fossa.

January 25th. Less blood in urine; stools tarry from blood.

January 26th. Epistaxis ceased; blood disappeared from urine; 10.30 p.m. sudden pallor and abdominal pain; delirium; pulse imperceptible: death.

Post-mortem appearances.—

Numerous hæmorrhagic spots in the skin.

Stomach. Small hæmorrhages all over the mucous membrane.

Small Intestine. The mucous membrane of the lowest part of the ileum was grey and shreddy and there were several sharply cut ulcers; none of them were very deep, and all appeared to be in the early healing stage. Above this area some of the Peyer's patches had a "shreddy" loose network appearance, without definite ulceration: some small ulcers of the solitary follicles.

Large Intestine. Contained a large quantity of recent blood. The mucous membrane was stained of a reddish colour; there were a few small shallow ulcers near its upper end. The hæmorrhage did not appear to have come from some definite ulcer, but to be part of a general condition.

Mesenteric glands. Moderately enlarged and soft.

Spleen. Enlarged, dark and unusually firm.

Kidneys. Extensive hæmorrhage into the renal pelvis on both sides and into the peri-renal tissue on the right side; renal substance pale.

Liver. Some small hæmorrhages on the surface.

Bladder. A few small hæmorrhages in the mucous membrane.

Heart. Numerous hæmorrhages into the muscular tissue, valves and visceral layer of the pericardium.

Lungs. Œdematous; a few small pleural hæmorrhages."

No one, of course, would think of basing the clinical description of typhoid fever, as met with in this country, upon the record of such an exceptional case; but if it is true that the common type of Yellow Fever amongst the natives of regions in which that fever is constantly present (*maladie habituelle*) is a comparatively mild disease, it follows that an analogous error is committed when the hæmorrhagic type of Yellow Fever, as met with in a "new-comer" into a Tropical region, is regarded as the only form of that disease.

The necessity of insisting upon the existence of these two types, differing so widely in their gravity, appeared to be new, but a little

research into the literature of the subject shewed that it had not escaped the notice of a learned writer (Dr. Lind) from whose works we have already quoted.

AN ESSAY ON DISEASES INCIDENTAL TO EUROPEANS IN HOT CLIMATES (1777).

By JAMES LIND, M.D., F.R.C.P.E.,

Physician to Haslar Hospital.

"In the West Indies, as in other unhealthy climates, fevers and fluxes are fatal to Europeans, but the disease which is commonly called the Yellow Fever is more particularly destructive to them.

"Having considered this disease with attention, I am now of opinion: That the remarkable dissolution of the blood, the violent hæmorrhages, the black vomit, and the other symptoms which characterise the Yellow Fever, are only accidental appearances in the common fever of the West Indies.

"They are to be esteemed merely as adventitious, in the same manner as purple spots and bloody urine are in the smallpox, or as an hiccup in the dysentery; like these, they only appear when the disease is accompanied with a high degree of malignity, and therefore always indicate great danger."

EPIDEMICS OF YELLOW FEVER OF A MILD TYPE.

There is abundant evidence available to prove the occurrence of cases of Yellow Fever of a mild type, firstly the direct inoculation experiments, of the American Commission consisting of Drs. Reed, Carroll and Agramonte, and secondly the records of numerous epidemics. Of these latter probably that at Ocean Springs is the most complete and the most instructive. The population of the States concerned is predominantly Negroid.

Ocean Springs is a health resort of Mississippi, a place at which in the summer there is a constant coming and going of visitors, and one therefore peculiarly adapted as a centre for distributing a transmissible disease. The epidemic is recorded in the Annual Report of the Surgeon-General of the Marine Hospital Service of the United States for 1897.

"The epidemic of yellow fever which occurred shortly after the close of the last fiscal year has its official beginning from the 4th September,

when an officer of this service proved by post-mortem examination the existence of the disease in Ocean Springs, Mississippi. This, however, is not the actual beginning of the epidemic, for it had been in existence, though undiscovered, for many weeks before its formal announcement.* * Subsequent information has shewn satisfactorily that the first victim of the disease was a person who came from a Central American port, through a local quarantine, in April, prior to the beginning of the quarantine closed season. The mildness of the epidemic prevented it becoming a matter of public concern, and this, coupled with the hesitation which men naturally exhibit in admitting the existence of yellow fever, kept accurate knowledge from the hands of the authorities. The experience at Ocean Springs is evidence of the benignity of the disease, where there were 400 *cases of this unrecognised mild type of yellow fever* with extremely slight mortality.

"This mild type led to general denial of the first cases appearing in communities, and occasioned widespread discussion as to the correctness of the expressed opinions of acknowledged experts. Controversies proceeded with more or less acrimony in several localities, but the correctness of the opinion of the officers employed by the government as to the existence of yellow fever was promptly confirmed by local physicians and health authorities."

The first report of a Committee on August 23rd, 1897, stated positively that the disease was "Dengue."

The Marine Hospital Service (a Federal institution), however, persisted in their inquiry, and in September despatched another of their own officers, who, after much difficulty with the local authorities (State Officials), established by post-mortem examination the diagnosis of Yellow Fever. There were then records of over 500 cases of the disease.

"We then visited four cases of the so-called 'Dengue Fever.' The characteristic disproportion in pulse rate, icteroid skin, conjunctivæ and prostration appealed to us strongly."

The record of the final interview between the Federal and the State Officials, when the diagnosis of Yellow Fever was still being resisted and the tension extreme, is almost dramatic. Just as relations were about to be broken off and the Marine Hospital Service officers had decided to leave, "the resident physician hastily announced the imminent death from convulsions of Miss Shutze, the patient seen by Dr. Saunders and diagnosed as Yellow Fever. This information was a thunderclap to those who had announced it Dengue."

It is interesting to note that the case on which the diagnosis of Yellow Fever was finally accepted by all was one in which that disease proved fatal in an individual previously infected with malaria and in whose blood the malarial parasites were found shortly before death. They were present in four out of five cases of the fever then again specially examined, but it is not stated that the other cases were fatal.

The following extracts from the report (9, p. 622) of Surgeon H. R. Carter, a recognised authority on the disease, are of interest. Dr. Carter determined, before the discovery of mosquito transference, by accurate observation of cases, the existence and duration of the "extrinsic incubation period," a very remarkable achievement. It is now, of course, known that this corresponds to the period during which the virus is believed to be undergoing changes whilst it is in the body of the mosquito.

> "To understand the matter we must premise that Ocean Springs was not a business place, simply a health resort, or watering place. Its communications, then, with other places was almost entirely by persons (pleasure seekers) and the effects of such persons, and while of course these people came and went between it and the other towns, especially health resorts on the coasts near by, yet it had much communication also with somewhat distant places: New Orleans, Mobile and a number of places in Mississippi and some in Alabama and Louisiana. If yellow fever existed here to any extent and for a somewhat long time, many of these places must have already been infected and a somewhat widespread epidemic was impending."
>
> "Subsequent developments lead me to believe that all the fever reported generally as prevailing fever on the Mississippi coast, was yellow fever and that it was introduced early.
>
> "(1) Certainly there was much yellow fever at Ocean Springs, Scranton, Biloxi, Bay St. Louis, McHenry and Barkley, and at Edwards and other places in North Mississippi.
>
> "(2) At Ocean Springs, the local practitioners claim that none of the symptoms differentiating dengue from yellow fever: eruptions, double paroxysms, painful convalescence, arthralgia, etc., were observed by them in about 700 cases. They recognised only one kind of fever.
>
> "(3) At the places infected from Ocean Springs yellow fever was invariably observed, and at most of them no claim was made of the existence of any other disease save yellow fever.*
>
> "(4) I have made a careful enquiry of a number of physicians on this coast, and the places infected from this coast, for which unusual opportunities were given in the post-epidemic work, and they say,

* There was an epidemic of Dengue in Texas, as in the three cases seen by Dr. Carter the symptoms were typical.

without exception, that no one had the 'prevailing fever' a second time. This to me is very strong evidence, almost proof (unless an attack of some other disease gives a temporary immunity to yellow fever) that the prevailing fever was one disease, and that disease yellow fever.

"As to the time it had existed at Ocean Springs, a number of cases generally estimated at 600, had occurred in Ocean Springs before it was announced and guarded against. This would imply that it had been in this place a long time. Independently of this, a large number of physicians, and such laymen as I have had an opportunity to speak with, say this disease existed in Ocean Springs in the early summer. Dr. Bailey, of Ocean Springs, from a record, fixes one case in a resident of that place on May 19th, which would bring its introduction (if introduced by a person sick with the fever) not later than the first part of May; how much earlier this does not determine. There was little hope that this disease was confined to Ocean Springs."

From Ocean Springs as a centre Yellow Fever was carried to nine States and forty-two cities. The total number of cases officially recorded from September 4th, 1897, to December 25th, 1897, was 4,426 and the deaths numbered 494. In these figures the cases, variously given as 500, 600 and 700, which occurred before the disease was officially recognised are not included.

It would be difficult to find a more complete illustration than is afforded by the record of this epidemic of the occurrence in a Negroid population of Yellow Fever as a mild disease, and of the dire events which may follow failure to recognise its earliest appearance, even though it should present itself in that seemingly innocent garb.

This mild form occurs in West Africa, where hitherto only the appearance in Europeans of the type accompanied by hæmorrhage has been considered sufficient to justify a diagnosis of "Yellow Fever."

Epidemics of Yellow Fever of a Severe Type amongst Natives.

At the same time, other, and at first sight contradictory evidence is increasing, tending to show that amongst the natives living in regions either distant from the Coast or from the European Settlements on the Coast, epidemics of a disease, which cannot be

distinguished from Yellow Fever, are of occasional occurrence and that such epidemics are attended with a very high mortality.

The following are examples of such outbreaks :—*

1. The epidemic at Khartoum in 1865, referred to on page 103, which is said by (Sir) Samuel Baker to have been of such a fatal character that "out of 4,000 black troops only a remnant of 400 remained alive."

To this disease, which can only from the description have been Yellow Fever, although called plague, the death of (Sir) Samuel Baker's native attendants on the voyage to Khartoum was due.

2. The epidemic described on page 91 amongst the natives in the delta of the Niger in 1862 which was attended by a great mortality.

3. The epidemic in East Africa in which the son of the Missionary at the Ukemba Mission, Maindoindoni, Donyo Sapuk, died in November, 1913. (p. 104)

4. The epidemics described in the report of Dr. H. S. Coghill, one of the Investigators of the Commission, as having occurred, according to the statements of the native chiefs, in Senegal and the Northern Territories of the Gold Coast in 1910, and (?) 30 years previously (?1880) and at a still earlier date, again (?) 30 years previously (?1850) (*vide* p. 109) †

We have, therefore, to recognise the occurrence amongst the natives of the West Coast of Africa of two types of Yellow Fever, the one a mild type accompanied by such slight symptoms that its diagnosis is often very difficult, and another the hæmorrhagic type, presenting all the grave and fatal characters of the disease as it commonly affects Europeans and newcomers into any area in which it is more or less constantly present (*maladie habituelle*).

---

* It is also questionable whether the fatal epidemic jaundice, observed from time to time in Egypt and especially in Alexandria, may not have some relation to Yellow Fever.

† It is to be noted that all these epidemics were reported by non-medical men.

(*C*)—YELLOW FEVER IN CHILDHOOD.

There have been differences of opinion with regard to most points in connection with Yellow Fever, and the incidence of the disease in childhood is not an exception.

European children are not, we imagine, very numerous in the West African Colonies, and it is not, therefore, probable that much evidence will be forthcoming as to the incidence of Yellow Fever amongst them.

As regards native children, it is apparent that much difficulty will be experienced in ascertaining the facts as to their illnesses, unless of a severe type. We learn from all witnesses that the natives are very suspicious of investigations into the nature of the diseases from which they suffer, and also that they have a far higher opinion of their own medicine men than of the white man's medicine. This, however, does not extend to his surgery, for which they now express great admiration ; if, therefore, the medical ailments of native children are to be investigated with success, it can only be done by first gaining the confidence of their parents through the treatment of their surgical affections.

On the general question of the incidence of and mortality from Yellow Fever at various ages, there is agreement that the disease occurs with greater frequency and greater severity amongst adults than at any other period of life.

In the Lisbon epidemic of 1857, out of 3,465 deaths 2,577 were in adults, 572 amongst the aged, 288 in children and in 28 the age was not known.†

In other terms, in every 1,000 deaths from Yellow Fever :—

750 were adults (16—60 yrs.) ;
166 were aged (61—100 yrs.) ;
84 were children (1—15 yrs.).

The percentage mortality at various ages is not stated.

† Bérenger-Féraud, p. 483.

In the 1905 epidemic in New Orleans,* up to November 8th, there were 430 deaths, thus distributed according to age :—

1—2	8
3—5	11
6—10	16
11—15	38
16—20	56
21—25	56
26—30	65
31—35	36
36—40	47
41—45	36
46—50	23
51—60	27
61—70	10
71—75	1
	430

Pothier † in an article on the pathology of Yellow Fever states :—

"We must not forget that the majority of fatal cases of Yellow Fever occur in adults" * * * * * * "It is remarkable how rarely children or young children die of Yellow Fever. In fact in them the disease is so mild as to pass unnoticed by the best experts on Yellow Fever : a fact noted by all who have seen Yellow Fever and all who have written on the subject. It is possible, however, that children are less susceptible to the poison."

If the above statements are accurate, and also are applicable to the native children of West Africa, it is not likely that it will prove an easy task to determine what proportion of such of the natives as now possess immunity to Yellow Fever acquired it in childhood.

It may be, as Dr. Pothier suggests, that children are less susceptible to the virus of Yellow Fever than adults ; but this would not be proved by showing that fewer children or still fewer infants contracted the disease.

---

* Statistical review by Lezard. Augustin (p. 107.)

† Augustin (p. 1147.)

(*D*)—TABLE SHEWING THE INCIDENCE OF YELLOW FEVER

IN THE WEST AFRICAN COLONIES AND SETTLEMENTS FROM 1900 TO FEBRUARY, 1914.

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
Sudan		++	++					++	++						
Senegal	++	+		++	++	++	++				++	++	++		
Gambia	++	−	−	−	−	−	−	−	−	−	−	++	−	−	
Portuguese Guinea											++	++	++	++	
French Guinea ...		+													
Sierra Leone ...	−	−	−	−	−	−	−	−	−	−	++	−	−	−	+
Liberia															
Ivory Coast ...			++	++	+	+					++				
Gold Coast ...	−	⊕⊕	+	+	+	+	+	−	−	−	++	++	++	+	+
Togoland... ...						++	++	++			++			+	
Dahomey ...						++	++	+						+	
Nigeria, Southern	−	−	−	−	−	−	−	−	−	−	⊕		⊕	++	++
,, Northern	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Cameroons ...	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−

Epidemic of Yellow Fever ... . = ++
Yellow Fever reported ... ... = +
Suspicious cases . ... = ⊕

Reported absent or not mentioned in report ... = −
No Reports received ... ... Blank.

GENERAL CONCLUSIONS.

A consideration of the facts brought out in the several sections of this report and in the evidence which has come before them during the course of the enquiry, so far as it has hitherto been carried, has led the Commission to the following general conclusions :—

1. That Yellow Fever has occurred from time to time since 1778 in various parts of the British West African Colonies.

2. That there is no evidence to shew that the infection in each outbreak has been introduced from outside Africa.

3. The mild nature of the attack in certain cases of Yellow Fever makes the identification of such cases a matter of great difficulty. It is therefore essential that in the future all cases of fever should be carefully observed and classified in order that, so far as possible, such mild cases of Yellow Fever may not pass unrecognised.

4. The attention of all workers at this subject should be specially directed to the discovery of a clinical test for Yellow Fever. The Commission do not in the least degree underestimate the importance of the researches which they are prosecuting in connection with the nature of the virus, and also of research as to the appearances by which its presence could be recognised in the body of the mosquito ; indeed, it is quite possible that by such researches the desired clinical test may be found, but the extreme practical importance of being able to determine whether a mild case of fever is or is not Yellow Fever renders it essential that all possible methods should continue to be employed in the clinical study of the disease.

5. The Commission are of opinion that the day has gone by for endeavouring by the use of euphemistic terms to conceal the presence of Yellow Fever, and that the only hope of eradicating that disease lies in boldly facing the facts ; also that failure to take all possible steps to destroy a focus of Yellow Fever is an offence against the comity of nations.

The Commission desire to thank the Liberian Minister for kindly making enquiries as to the occurrence of Yellow Fever in the Territory of the Republic.

The Commission also desire to thank the Director-General of the Medical Department of the Navy for kindly allowing extracts to be made from Journals of Surgeons on H. M. Ships on the West African Station, and also for obtaining leave for research to be undertaken in the Admiralty Library.

JAMES KINGSTON FOWLER.
W. J. SIMPSON.
RONALD ROSS.
W. B. LEISHMAN.

1st July, 1914.

APPENDICES.

APPENDIX I.

Bibliography.

A list of some of the works and papers consulted in the preparation of this report.

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APPENDIX II.

Further List of Investigators and members of the West African Medical Staff engaged upon the work of the Commission.

AT FREETOWN, SIERRA LEONE :—

J. M. Dalziel, M.D., C.M. (Edin.); B.Sc. Public Health (Edin.); D.T.M. (L'pool); W.A.M.S. (Medical Officer, Nigeria (N. Provinces)).

W. B. Johnson, M.B., B.S. (Lond.); F.R.C.S. (Eng.), L.R.C.P. (Lond.); W.A.M.S. (Medical Officer, Nigeria (N. Provinces)).

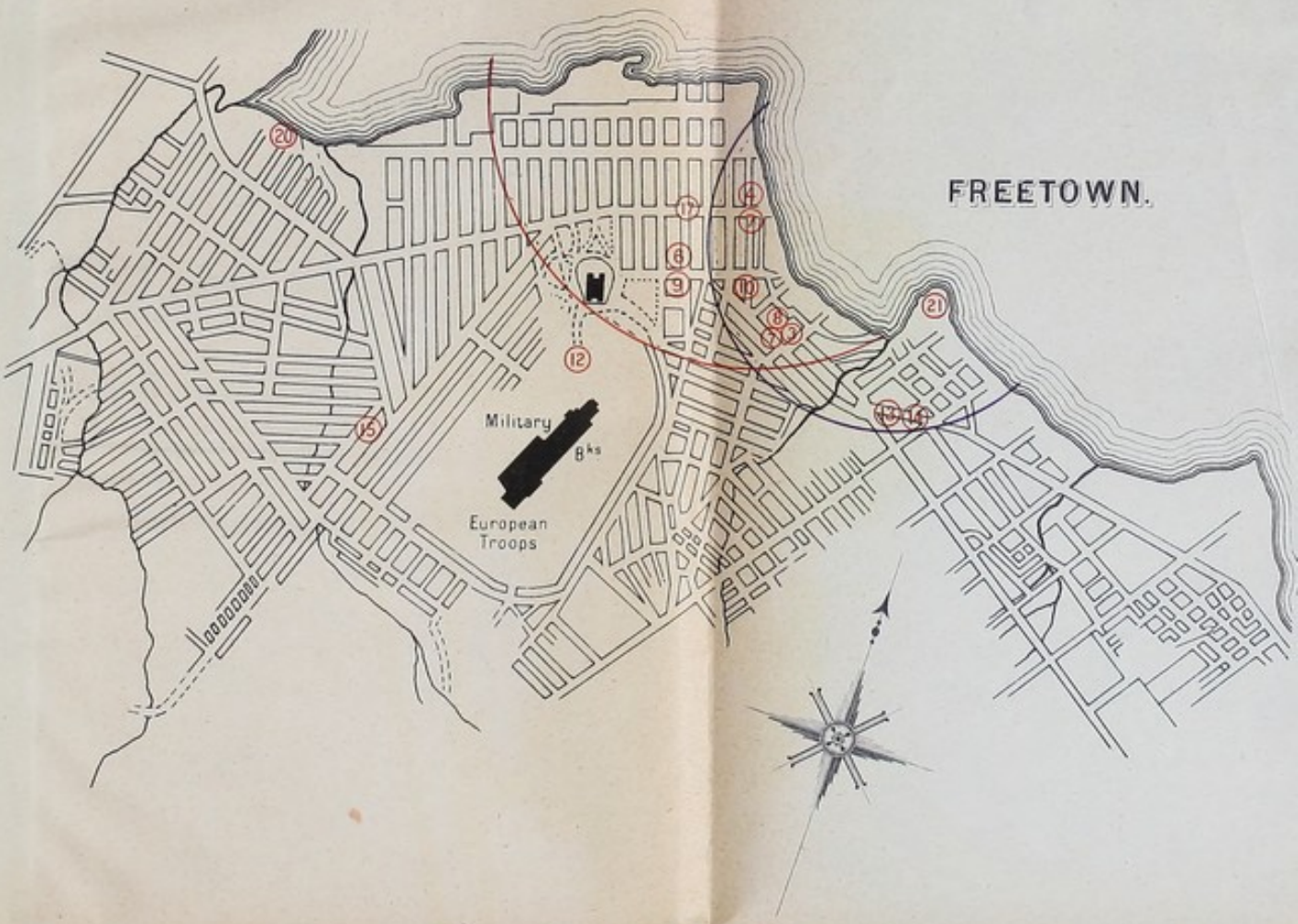
AT LAGOS, NIGERIA (Southern Provinces) :—

A. Connal, M.D., Ch.B. (Glas.); D.P.H., D.T.M. and H. (Cantab.); W.A.M.S. (Nigeria (S. Provinces)); Director of the Medical Research Institute, Lagos.

MAP I.

FREETOWN

SHEWING WHERE CASES OF YELLOW FEVER OCCURRED IN 1910.



0 500 1000 FEET

0 1 2 3 4 FURLONGS

Qtr where Europeans live

Qtr " Syrians "

Y. F. cases numbered red to correspond with numbers in text.

For reduplication of the number 7 see page 7 of the Report.

WATERLOW & SONS LIMITED, LONDON WALL, LONDON.

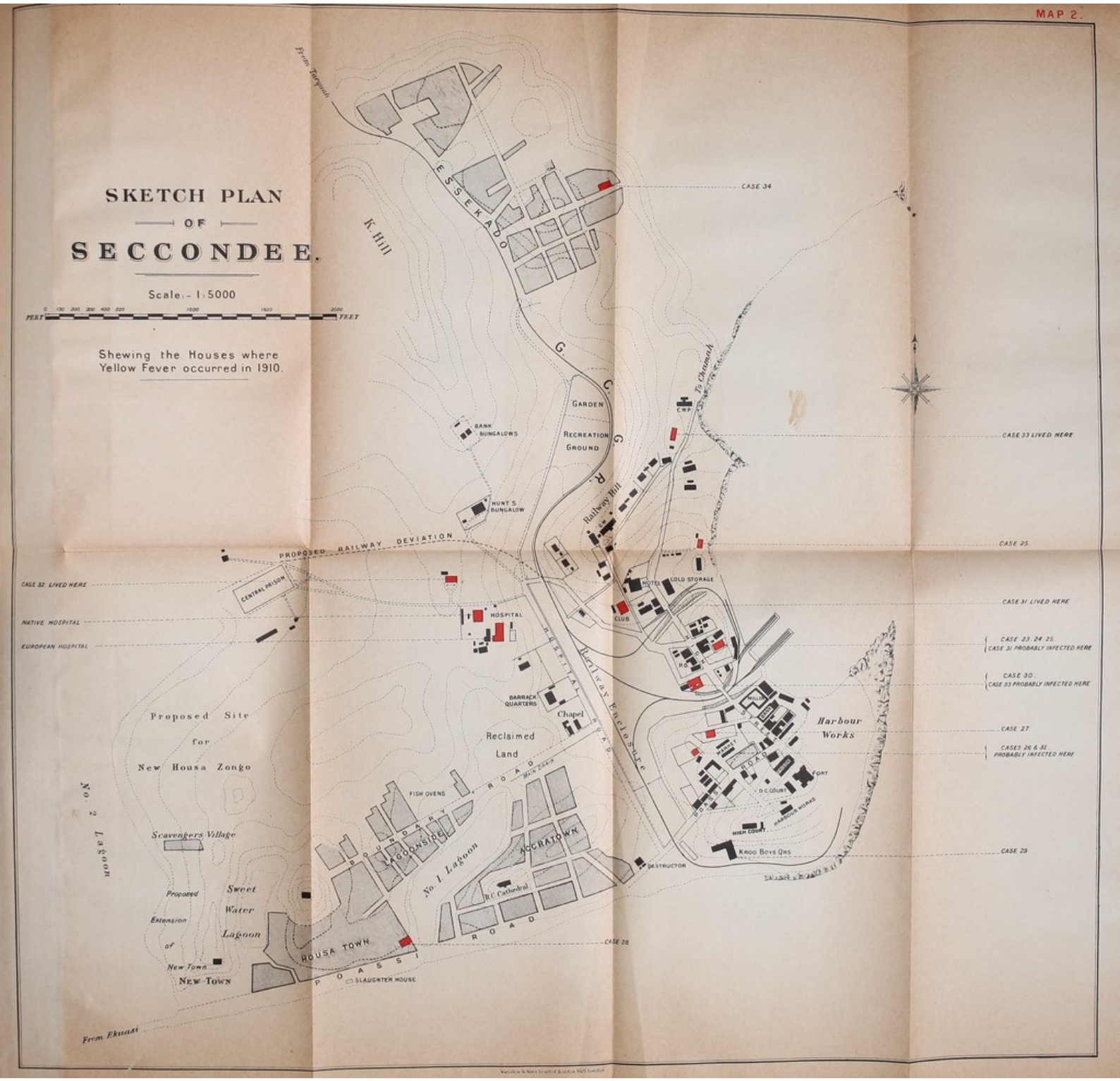
MAP 2.

SKETCH PLAN
OF
SECCONDEE.

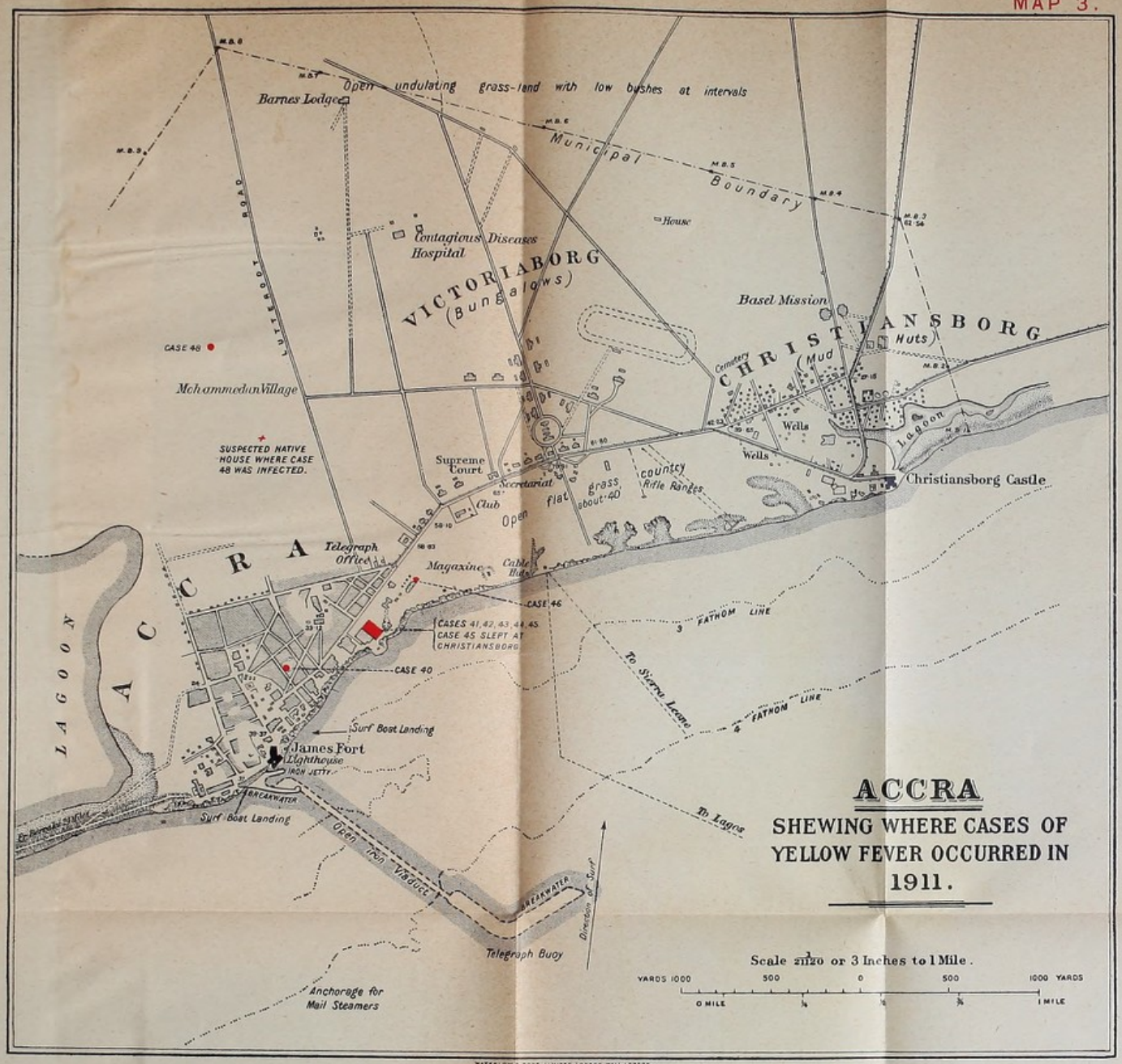
Scale:- 1:5000

0 100 200 300 400 500 1000 1500 2000
FEET FEET

Shewing the Houses where
Yellow Fever occurred in 1910.



MAP 3.



ACCRA

SHEWING WHERE CASES OF YELLOW FEVER OCCURRED IN 1911.

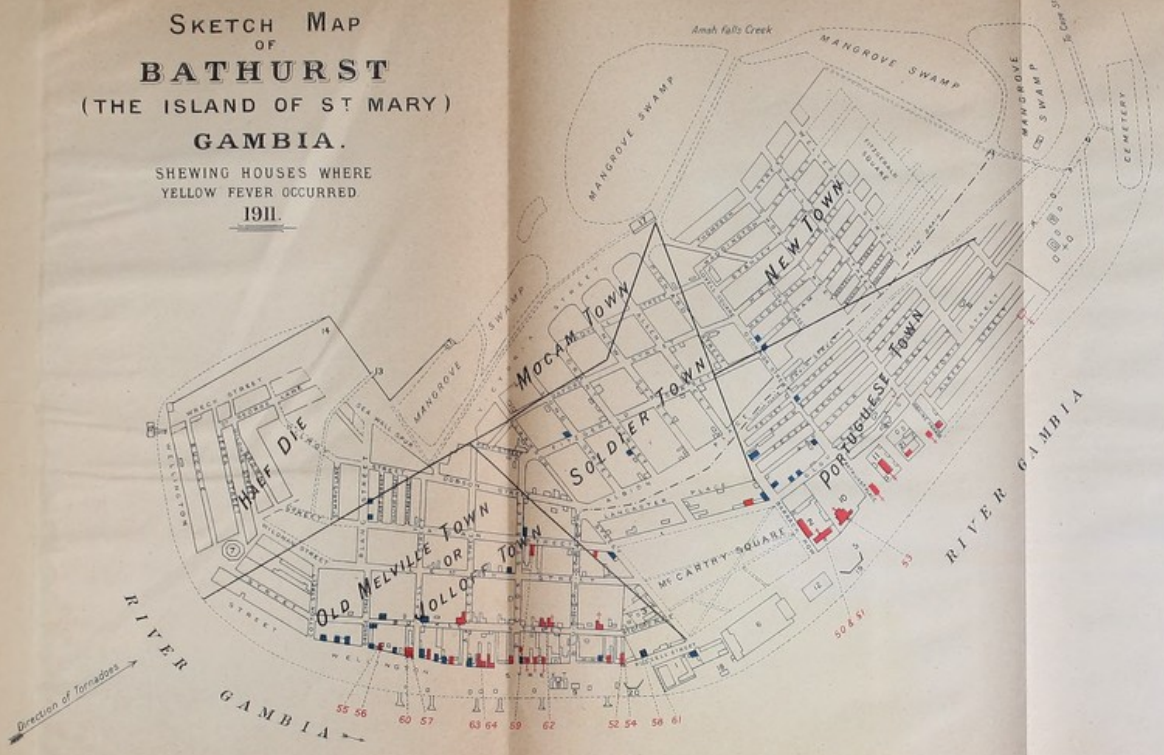
WATERLOW & SONS LIMITED, LONDON WALL, LONDON

MAP 4.

SKETCH MAP OF BATHURST (THE ISLAND OF ST MARY) GAMBIA.

SHEWING HOUSES WHERE YELLOW FEVER OCCURRED

1911.



REFERENCES

1 Albert Market
2 Barracks
3 Bathurst Gaol
4 Bungalow
5 Colonial Flag Staff
6 Colonial Church
7 Coal Depôt
8 Customs Warehouse
9 Customs Boathouse
10 Government House
11 Military Hospital
12 Merchants Gunpowder Magazine
13 Sluice Gate Half Die
14 One Gun Battery
15 Sluice Gate (Box Bar)
16 Public Offices and Court House
17 Public Necessaries
18 Slaughter House
19 Six Gun Battery
20 Three Gun Battery
21 Victoria Hospital

Blue marks the houses occupied by Syrians.

Red marks the houses occupied by Europeans.

Government European officers quarters

New Bungalow

Colonial Engineers Office
Bathurst, Gambia