

Malarial haemoglobinuric fever (so called), blackwater fever of the Gold Coast, chiefly from a clinico-pathological standpoint , with illustrative cases / by B. W. Quartey-Papafio.

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MALARIAL HÆMOGLOBINURIC FEVER

(SO-CALLED),

BLACKWATER FEVER OF THE GOLD COAST,

CHIEFLY FROM

A CLINICO-PATHOLOGICAL STANDPOINT,

With Illustrative Cases.

BY

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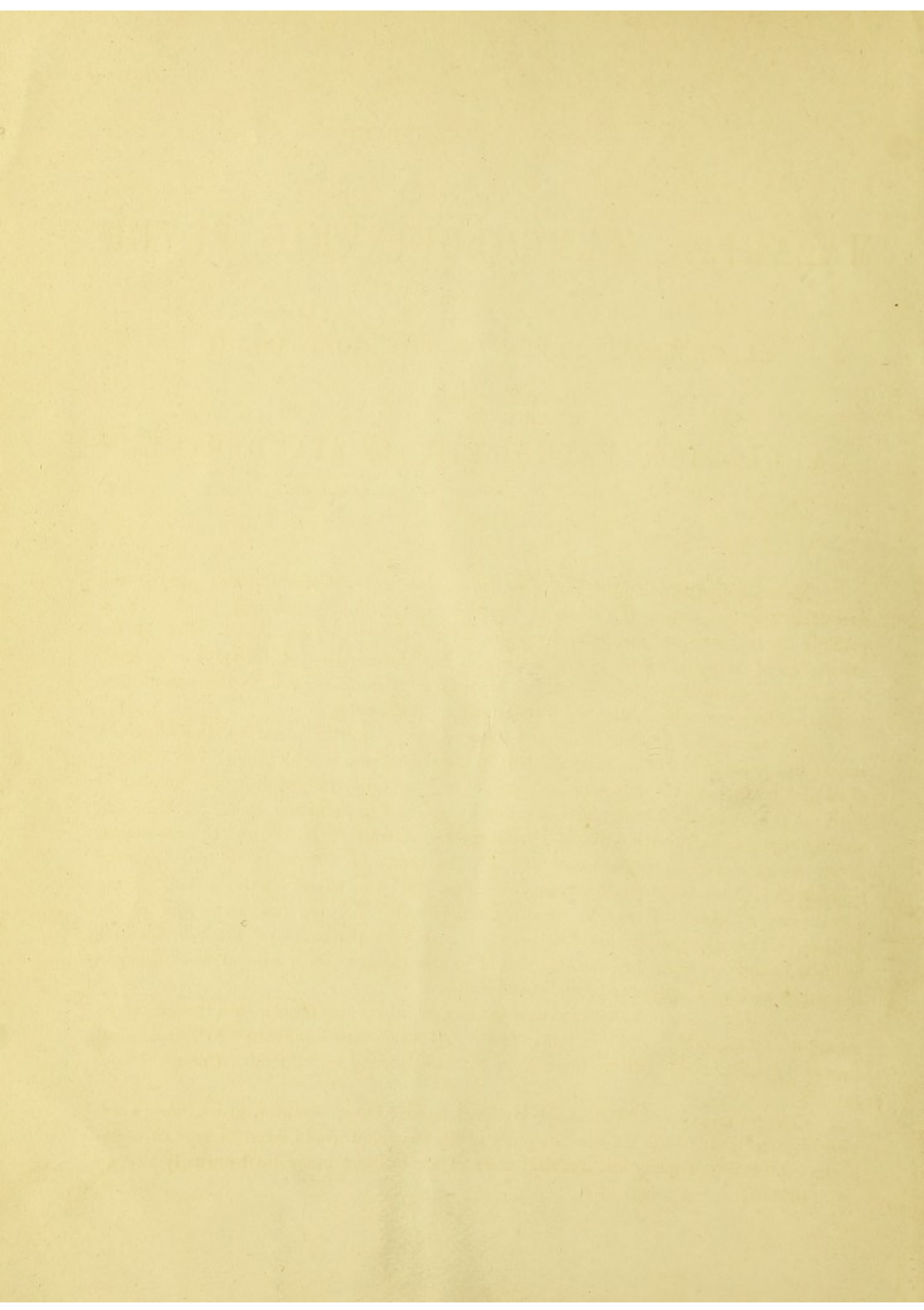
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MALARIAL HÆMOGLOBINURIC FEVER

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Malarial Hæmoglobinuric Fever is one of the more, if not the most, grave and necessarily dreaded types of Malarial infection met with on the Gold Coast. More perhaps than otherwise, on account of the panic which it causes in its victim at the knowledge of being attacked by the malady, it has, during the past thirty years at least, attracted the particular attention of the Medical Profession, as well as the non-medical portion of the community, under the popular name "Blackwater Fever."

It is undoubtedly a deadly form of Malarial Fever, and the mortality which it causes amongst Europeans and other races resident in the Gold Coast is deplorable. The intensity of its malignancy and the degree of its fatality may be fairly judged from the number of deaths that have resulted from the cases that have come under observation. Of the cases already reported, three out of five of Dr. Easmon's and one of Dr. Eyles's two cases died, giving a death-rate of 60 per cent. and 50 per cent., or 600 and 500 per thousand respectively. Four of eleven of my own cases died from the effects of the malady, giving a death-rate of nearly 37 per cent., or 370 per thousand. Taking, then, an average of the deaths of all the cases, we have a death-rate of nearly 49 per cent., or 490 per thousand, which is excessively high, and demonstrates in no small degree the profound malignancy of this subtle and least understood form of impaludism.

It is no wonder, then, that the natives amongst whom this fever occurs, though rarely, regard it as "incurable" and "certainly fatal," and which they designate "Attridi Assara" (*trans.* "snuff-coloured bilious fever"), in contradistinction to "Attridi" (*trans.* "bilious fever").

The ravages caused by Malarial Hæmoglobinuric Fever, however, give us only a side view of the potency of the maleficent agency of Malaria, and would seem to give us a clue to the explanation of many and doubtful cases of sudden and other deaths usually affirmed

by the natives—and not only the natives of the Gold Coast, but, in truth, by the Roman peoples of Ancient Classical times also—to be deaths from poisoning. We can from inference understand why these latter peoples, with their painful experience of the effects of the intensity of Malaria, have shown a common tendency to personify the great enemy of their new Colonies—"The Malaria."

In fact, the Latins, looking upon the effects and the cause which produced it as one, instituted the cult of the "Dea Febris" ("Goddess Fever"). To appease the fury of this divinity, Tommasi Crudeli tells us, they erected Temples in her honour, and instituted a worship which religious tradition carried on even after the notion of natural things became less vague and the struggle of men against the maleficent agency of Malaria assumed a more practical form. Besides, it is probable that these peoples, like the natives of the Gold Coast in that respect, did not always know how to trace back to their original cause the most dangerous attacks of Malaria, as, according to the accounts of Tommasi Crudeli, many of these do not in the least resemble attacks of common Intermittent Fever, and often even now, says he, are attributed to other causes by those who have not had a long experience in places where virulent Malaria is prevalent.

Considering the matter thus in the light of our present-day knowledge of Malarial Hæmoglobinuric Fever, it must be conceded that there is a fairly good ground for his assertion when Tommasi Crudeli,¹ continuing his remarks, says: "It is not at all unlikely that many secret assassinations and many instances of poisoning, recorded as such in the Chronicles of Ancient Rome, were purely and simply cases of death caused by deadly Malaria, because we have seen many errors of the sort interwoven in the Italian History of the last four centuries, and accepted as true. There are, in fact, many reasons for believing that the final catastrophe which befell the Borgias in 1503, instead of being due to a mistake in the administering of a poison prepared for some other person, was caused simply by an attack of a malignant fever which killed the Pope, already an old man, but which Cæsar Borgia, young and robust, was able to overcome." It is gratifying to note, however, that this much-dreaded malady no longer fills the breast of the medical profession on the Gold Coast with the same degree of alarm and anxiety as hitherto; and although I admit that amongst the community generally the medical practitioner "has to deal with a far more formidable complication than Hæmoglobinuria or jaundice, viz., panic" (Eyles), yet our knowledge and treatment of this disorder are, happily, advancing, though slowly, in a satisfactory manner towards the attainment of an exact knowledge founded on a scientific basis.

In endeavouring to arrange my notes for this subject I am strongly reminded of the fact that many others, both foreign and in this country, have published works on this subject; on the other hand, I am equally reminded of a certain degree of halo of doubt there is existing, yet to be cleared up in respect of the bearings of this subject, and whilst investigations into the subject have not yet enabled us to make a dogmatic statement regarding it, the facts already cited by these painstaking authors in their able contributions appear to me to require

¹ The Climate of Rome and the Roman Malaria, Chap. IV., p. 57.

to be more or less supplemented by others derived exclusively from the Clinico-Pathological study of the malady, in order to form, if possible, a basis of data more immediately useful in the interpretation of the phenomena of Malarial Hæmoglobinuric Fever.

Despite the many difficulties in the way and irrespective of the lets I am to meet with, I shall endeavour to treat, though in an imperfect manner, of this subject more especially from the Clinico-Pathological standpoint. In bringing this subject before the profession I make no apology on the ground of its dealing with a malady practically unknown in Europe. I am satisfied that the immense importance of it to the teeming millions of the population within the Gold Coast, and the ravages which it is causing amongst the European residents particularly, call for some such observations as I venture to submit in the following remarks, in the hope it may throw some further light on this grave form of paludal disease.

DEFINITION AND MEANING OF THE TERM.—This form of Malarial Fever has been described under the names, “Bilious Hæmoglobinuric Fever,” “Malignant Bilious Fever,” “Pernicious Remittent Fever,” “Hæmorrhagic Malarial Fever,” so frequently mentioned in Clinical reports of cases and patients in whom the condition occurs; while many interesting references are to be found in foreign literature, *e.g.*, “Fièvre Bilieuse Hématurique,” Fièvre Bilieuse Grave of the French, and the Bilious Remittent Fever of the North American Writers, and “Febris Remittens Hæmorrhagica, etc.”;² as the “very pernicious so-called bile fever (Gallen Fieber) of the Gold Coast described by Mahly.”³ On the Gold Coast Dr. J. Farrell Easmon,⁴ and Dr. C. H. Eyles⁵ have published works relating to this subject, and as far as I have been able to ascertain, I believe Dr. Easmon was the first to apply the term “Blackwater Fever” to this morbid condition in the records of his observations on the subject. After Dr. Easmon Dr. Eyles published his interesting brochure, in which it is clearly evident that he views Blackwater Fever” as a Malarial Remittent Fever to which is added another Malarial manifestation, *viz.*, Hæmoglobinuria, and that when this occurs there is more marked hepatic disturbance than in ordinary Remittents.⁶

Whether we describe this condition as “Blackwater Fever” or apply any other terms of reference to it, we are to understand by the term “Malarial Hæmoglobinuric Fever” an endemic, miasmatic fever, malarious in its kind, and characterised by a well-marked group or series of symptoms in which pyrexia, paroxysmal continued, or irregular, black, porter-like urine (or in some cases a colour not unlike that suggested by decomposed venous blood), with more or less yellowness of the skin and conjunctivæ are the essential features of this morbid condition. I have adopted the term Malarial Hæmoglobinuric Fever in preference to any other applied to this condition, for the simple reason that in the first place it conveys the general idea that the condition is of Malarial or Paludal origin, accompanied by Fever typical of Malarial infection; and in the second place it is, etymologically speaking

² Hirsch: Handbuch der Historisch-Geographischen Pathologie, Bd. I., s. 164.

³ Hertz: Tiemssen's Handbuch der Speciellen Pathologie und Therapie, 3rd Ed. II. i., p. 45.

⁴ Easmon: “The Nature and Treatment of ‘Blackwater Fever.’”

⁵ Eyles: “Malarial Fever as met with on the Gold Coast.”

⁶ *Opus Cit*: pp. 11 and 58.

logical, and pathologically it is more or less an attempt to be accurate in conveying the grave nature of the condition present. I admit that this term does not tell us anything precise regarding the true and exact nature of this malady, but I am persuaded that it will be found to be not unsuitable when all that can ever be known in respect of this malignant fever is brought within the domain of practical medicine.

DISTRIBUTION.—Malarial Hæmoglobinuric Fever is found everywhere in the Gold Coast Colony and its Hinterland, and not improbably it is a disease of Tropical Africa generally. I have met with it occurring on the Seaboard as well as in the Hinterland, *e.g.*, in elevated places like Begoro in Eastern Akim, Abetifi in Kwahu, and Bompata in Ashanti-Akim. These are towns situated at considerable heights above the level of the sea. Thus it is a disease that does not appear to be influenced, so far as the Gold Coast is concerned, by a high altitude (elevation).

Conditions in which "Black urine" and "Yellow discolouration of the skin and conjunctivæ" have been observed to arise are for the most part as follows: "Paroxysmal Hæmatinuria," "high temperature affecting the blood directly" (Ponfick, Klebs); in the same way certain chemically active substances act on the blood—such are Nitrobenzol (Filehue), Potassium Chlorate (Marchand), Pyrogallie Acid (Neisser), Sulphuric Acid (Leyden and Munk), Nitrite of Amyl (Hoppe-Seyler), certain mushrooms of the Morel kind (Ponfick), and the venom of certain serpents (Halford), cooling of the cutaneous surfaces (Lichtheim).⁸

CLINICAL PHENOMENA, SYMPTOMS, AND GENERAL COURSE.—Malarial Hæmoglobinuric Fever occurs at all seasons of the year, but more commonly during the warmer and dampish wet months. It is not contagious, and has never been known to occur in epidemic form. It attacks all races, but Europeans and those of European origin are very much more susceptible to its effects. Among the Negroes and Mulattos it occurs, though rarely. One attack does not confer immunity from subsequent attacks. Here lies the almost impossibility of European acclimatisation in malarious countries. The weak and debilitated are much more frequently attacked, and often cases of mild Remittent or even Intermittent Fever precede this disorder for some time, it may be for a few days or hours before the condition manifests itself; in other cases the onset of symptoms may be sudden. From the illustrative cases which I append herewith, it is well to bear in mind that there are several phases of this morbid condition, apparently differing slightly in their nature, but that in all there is a remarkably significant similarity standing out prominently in the grouping sequence and arrangement of the symptoms. It will be convenient therefore to classify the symptoms under the systems to which they naturally refer, as for instance:—(1) Those symptoms both primarily and directly referable to the blood and circulatory system; (2) Those referable to the digestive and excretory systems; and (3) Those referable to the nervous system.

⁷ T. Grainger Stewart: Hæmatinuria, Quain's Dictionary of Medicine.

⁸ Ziegler: Special Pathological Anatomy, Part II., Chap. iv., Art. 262.

1. The phenomena referable to the *blood and circulatory system* contribute the greater, if not the most serious, aspect of this malady, because all the secretions of the body are maintained in an active and regular condition by means of the activity of the circulation of the blood, which is constantly driving out the Malaria-germ when moderate quantities are absorbed, but should the circulation be enfeebled from any cause whatever, then the Malaria-germ has time to attack directly the red corpuscles of the blood (as Machiafava and Celli have demonstrated), and thus produces infection, which becomes either this form—the subject under review—or some other variety of Malarial Fever. The chief points observable with reference to the circulation and blood are that the pulse is quick, soft, small, regular, and easily compressible, or it may be slow, irregular, and intermittent. The heart's impulse is weakened, and sometimes the apex sounds have a tendency to overlap each other. But I have not observed in any of my cases any distinctive cardiac murmur. In the convalescents, however, after the abatement of general symptoms, or sometimes in bad cases before death, a distinctive hæmic bruit is audible in the large veins of the neck, indicating a profound anæmic state of the blood, frequently described as oligocythæmia and hæmoglobinæmia, a condition induced by the excessive breakdown of the red blood corpuscles. In this connection the use of the hæmocytometer and hæmometer at the bedside is simply invaluable, for if blood from a patient is examined by these means it will be observed that the number of red corpuscles is reduced, whilst the white appear to be relatively increased, with a marked deficiency of hæmoglobin. In connection with the clinical examination of the blood in this morbid condition the *Lancet* has drawn the attention of the profession to the usefulness of the hæmometer in malarious diseases generally, and it will not be out of place to quote here its remarks, as they coincide with my own view of the matter and cannot be too strongly insisted upon. The *Lancet*⁹ remarking on the “Pernicious Fevers of Eastern Africa” in connection with a most interesting paper on the subject of “Bilious Hæmaturic Fevers,” written by Staff-Surgeon-Major Stendel, of the German Army, says: “In twelve cases he (Staff-Surgeon-Major Stendel) made an examination of the blood by means of Fleischl's hæmometer, and found that the amount of hæmoglobin present oscillated between 50 and 21 per cent. of the normal standard. In two other cases the quantity was too small to be determined by the instrument, but it was estimated by the observer at not more than 5 and 8 per cent. respectively. He lays stress upon the prognostic value of hæmatological examinations, and furnishes details regarding two patients with a deficiency of hæmoglobin in their blood, in whom bilious fever subsequently showed itself on several occasions when their ordinary mode of life underwent a change for the worse.” The clinical facts here described agree in some important respects with the condition of the blood in Malarial Hæmoglobinuric Fever. Continuing its remarks, the *Lancet* adds: “It seems only reasonable to conclude that a systematic use of the hæmometer cannot but render great service in the detection of the incipient stage of a disease which is invariably attended by more or less destruction of the red corpuscles of the blood. Staff-Surgeon-Major Stendel looks on the diminution of hæmoglobin as a certain

⁹ *The Lancet*, July 27th, 1895, p. 225.

index of latent or incipient malaria, and is satisfied that this important sign manifests itself long before the more salient symptoms become apparent. As long as the impoverishment continues slight the sufferer can be restored by appropriate treatment on the spot, but as soon as it passes certain limits he should at once be invalided to Europe or at all events sent to a Sanatorium. The means thus furnished for unmasking the insidious enemy while it is still comparatively impotent, and before it has had time to acquire the firm hold on the patient's constitution which it subsequently manifests, should enable the medical officer to save many a valuable life that otherwise would be sacrificed to the curse of Africa. . . ."

2. *Turning to the Digestive and Excretory Systems:* The lips are enæmic and dry, or almost blackish in grave cases; the tongue is found to be dry, or moist and slimy, and encrusted with a thick dirty-yellow or dark-brownish fur, or sometimes leaden-coloured, with an abundance of sordes on the teeth and gums; insatiable thirst; anorexia, deglutition may be affected from weakness; griping pains in the abdomen; irritable stomach as evidenced by nausea, or vomiting of green or yellow bile or, in malignant cases, coffee-ground coloured matter mixed more or less with frothy fluid, and when there is much retching there may be actual hæmatemesis and epigastric uneasiness or actual oppression around the chest; hiccough is also present, frequently distressing; constipation is the rule in all my cases, except where purgatives had been taken before the case came under my observation; there may be, though rarely and not so much in this as in the simple Remittent variety, gastro-duodenal catarrh with bilious stools; tenderness in the right hypochondriac region, with or without enlargement of the liver; tenderness over the spleen and at times over the stomach. The alvine evacuations are, as a rule, feculent, with an admixture of mucus and a melanotic matter of very offensive odour, or they may be scanty, hard, and "shotty" black lumps (scybalæ), or assume a peculiar mixture of green and reddish-black colour like pounded spinach mixed with palm oil, or at times black and jelly-like; this latter is contemporaneous with diminished urine and excessive vomiting of "coffee-ground" fluid matter. The skin is in some cases dry and hot, in others bathed in cold clammy sweat; the surface temperature varies between 102° F. and 104° F., or higher, generally paroxysmal, or continuous or irregular, conforming to no regular type of fever. There is yellowness of the skin and conjunctivæ and nails, with at times injection of the conjunctivæ. In the more dependent parts of the body there may be ecchymosis giving a mottled appearance of the skin, especially over parts usually exposed to pressure, or the skin may be covered with lichen tropicus.

The Urine.—There may be a certain amount of dysuria or retention present, or suppression at the very onset of symptoms, though in some cases urine and fæces are passed involuntarily. Usually the urine passed is scanty or of moderate quantity, the colour varies from at first, it may be, dark-reddish or sherry, afterwards it turns muddy port wine, or in some cases at the commencement it is thick and black, like molasses, Sp. g. varies between 1,020 and 1,030, acid in reaction and has sediment, contains a trace of albumen, but in bad cases it may be one-half, and constituents of hæmoglobin. Sediment consists of urates principally but no blood corpuscle, and as a rule no tube cast except when nephritis is a

complication, nor bile nor sugar. In one of Dr. Easmon's¹⁰ cases we read the following remarks on the examination of the urine: "Specimens of the urine were forwarded to Professor Ringer and Dr. Wickham Legg, of London, but neither of these physicians—and one of them, the latter, is a specialist on the subject—was able to detect bile; on the contrary, the microscope and spectroscope revealed the presence of reduced blood."

3. *With regard to Symptoms referable to the Nervous System*:—The most noticeable is the depression of the nervous force and vital energy: malaise, weariness, aching pains in the bones and joints and back, shifting muscular pains, headache, periodical attacks of rigors, with shiverings, restlessness, dizziness, impairment of the power of the mental faculties in the form of a dull and clouded intellect, a mind wandering strangely—light-headed; there may be hallucinations of sight and hearing, a low, muttering delirium gradually passing into a comatose stupor. Sometimes the delirium is acute, violent, and noisy; voice is tremulous and there are muscular tremors, subsultus tendinum, carphology, and occasionally, but very rarely, there may be convulsions. From day to day the fever progresses and all the symptoms increase in their severity; there are more severe pains in head and loins; yellowness of the skin and conjunctivæ deepened; urine more scanty or absolute suppression, when examined now may show increased albumen about one-half; fæces are scanty, black, hard, and "shotty" lumps; rigors severe; temperature is now 105° F. or 106° F., pulse very weak and running; head symptoms increase and severe; and the scene is quickly closed, if the case is to terminate fatally—in comatose hyperpyrexia or uræmic suppression. In a typical case the whole scene occupies the space of seven days, or a bad case may go on to a much later date, and the patient then dies from exhaustion. Death at times takes place speedily in three or four days.

The hæmoglobinuria usually appears on the third or fourth day after the onset of prodromal symptoms, or it may be sudden, and then ceases on the third or fourth day after its onset—though there have been cases in which hæmoglobinuria has gone on till the seventh day, and sometimes never ceases before death supervenes. With the cessation of hæmoglobinuria there is often defervescence in the temperature and an abatement of general symptoms; the patient is thus relieved and passes into convalescence.

Oftener than not, however, there is a deceitful remission before the manifestation of fatal symptoms.

When this unfortunate phenomenon occurs every care and watchfulness have to be exercised in the attempt to save the patient's life.

PATHOLOGY.—As to the organism which produces the morbid changes in this as well as in the other variety of Malarial Fever, a controversy still continues. But I believe it is generally admitted that in all cases of Malarial Fever, of which Malarial Hæmoglobinuric Fever is only a type, a germ—*Bacillus Malariae*—is found in the blood of patients both during life and after death. I am aware of the opposition to this view led by Surgeon-

¹⁰ Easmon: *Op. Cit.*, case of S., p. 22.

Lieutenant-Colonel Laurie, who "maintains as the result of his investigations that there is no parasite in the blood in Malaria—a conclusion, it need scarcely be added, at variance with the researches of Leveran, Marchiafava, and quite a number of independent observers in Europe, America, and elsewhere."¹¹

In what manner the Malarial germs—spores, flagellate, or crescent—produce disease is by no means a settled question. As to whether the disease is due to their presence or to some product generated by them is a view which is still awaiting elucidation and respecting which our knowledge is advancing, though slowly. But whatever may be said on this subject, I think we may claim a right to be certain of this, that the pathology of Malarial Hæmoglobinuric Fever is essentially the pathology of the blood; it is, *ab initio*, the medium of the attack of the micro-organism—in fact, the arena of combat between the vital forces of the blood constituents and paludism—whence the tissues of the body generally suffer. The blood, as Ziegler¹² says, is a definite living tissue, and in disease, too, it comports itself as a living tissue. As a tissue may not the blood be regarded as subject to all the inflammatory changes, with their attendant phenomena, to which an ordinary solid tissue is subject? If this be so, then any grave changes in its composition or serious variations from the normal must be looked upon as a pathological phenomenon. Clinically we find in Malarial Hæmoglobinuric Fever morbid processes affecting the blood in the direction of changes in the form and quantity of its morphological elements, and manifesting themselves by simultaneous grave changes in the functions of the organs generally. Of the Malaria germ in the blood we have the authority of Leveran¹³ who found "filaments mobiles" in the blood of ague patients. Marchiafava¹⁴ found the bacillus in the blood, marrow, and spleen of patients who had died of Malarious Fever. Ziegler¹⁵ tells us that in the condition so-called "Melanæmia, a result of malarial infection, the blood change is due to the destruction of the corpuscles and the retention of the disintegrated products in the blood"; and quite recently we have been placed in possession of what Dr. Patrick Manson¹⁶ says of the Malaria parasite within the human body: "These spores," says he, "on becoming free, attach themselves to red blood corpuscles, enter the red blood corpuscles, and begin to grow at the expense of the hæmoglobin, which they convert into their proper tissue and into the black pigment, which must be regarded as a sort of excrementitious product of the parasites' digestion. In about forty-eight hours they have attained their maximum growth, and prepare for sporulation, the nucleus and nucleolus becoming diffused through the protoplasm." "Although there may be differences of opinion on some minor points, pathologists and biologists in the main agree that this is substantially the history of the benign tertian parasite in human blood, and that the same account practically applies to all the malarial parasites." The effects of these morbid processes on the

¹¹ *The Lancet*, October 5th, 1895.

¹² *Pathological Anatomy and Pathogenesis*, Sec. 251, p. 8.

¹³ *Nature Parasitaire des Accidents d'Impaludisme*, Paris, 1881.

¹⁴ Marchiafava and Cuboni: *Nuovi Studj sulla Natura della Malaria*, Acad. dei Lincei, Jan. 2nd, 1881.

¹⁵ *Special Pathological Anatomy*, Part 1., Art. 262.

¹⁶ *Gulstonian Lectures*, I., March 14th, 1896.

blood are that the blood is poor in red corpuscles and in hæmoglobin, conditions described as oligocythæmia and hæmoglobinæmia. When these conditions exist combined we have a deficiency of blood supply in the organs of the body—called oligæmia or anæmia. This condition is indicated during life by the pallor of the skin and mucous membranes, and after death it appears in the small proportion of blood contained in the several organs. As bearing upon the effects of the malaria micro-organism on the blood, and in support of the view that the blood is, *prima facie*, the first line of attack in this malady before any manifestation of impaludism appears in any of the organs of the body, we find that Staff-Surgeon-Major Stendel¹⁷ looks upon the diminution of hæmoglobin as a certain index of latent or incipient malaria, and is satisfied that this important sign manifests itself long before the more salient symptoms become apparent, and furnishes details regarding two patients with a deficiency of hæmoglobin in their blood, in whom bilious fever subsequently showed itself on several occasions when their ordinary mode of life underwent a change for the worse. If, now, we accept the usual account given of the occurrence of hæmoglobinuria, that when the destruction of blood cells becomes so excessive that hæmoglobin appears in solution in the plasma, and in excess of the amount that can be dealt with by the spleen, liver, and bone marrow, the kidneys take part in the eliminating process, and hæmoglobinuria is induced¹⁸; that the icteric discoloration of the skin and conjunctivæ is due to the solution and effusion of the colouring matter of the blood,¹⁹ the crystals of which appear to be identical in form with those of bilirubin, the chief colouring matter of the human bile²⁰; that when the disintegrated red corpuscles accumulate in the blood they exercise an injurious effect, in the way of shades of degrees of congestion, upon the various organs with which they are brought in contact; and, further, if we accept the hypothesis that the Malarial micro-organisms when settled in the tissues, or in the course of their elimination from the system, exercise their destructive effects upon the tissues²¹ we should have very little difficulty in accounting for the occurrence of the phenomena exhibited by the several organs and tissues of the body taking part in the morbid processes of Malarial Hæmoglobinuric Fever.

Thus we see that the significance of this factor, hæmoglobinuria, when associated with Malaria, is greater than it may have appeared at first sight. It is a phenomenon that should be regarded, if not more, in the same degree as the elevation of temperature itself, inasmuch as both depend, as I maintain, upon the destructive effects of the malarial micro-organisms upon the blood primarily, and subsequently upon the several organs.

As regards the morbid changes in this fever, there is on record one post mortem performed on one fatal case, with microscopic examination of the tissues in another case,

¹⁷ *The Lancet*, July 7th, 1895.

¹⁸ Ziegler: *Special Pathological Anatomy*, Part II., Art. 263.

¹⁹ Reynolds' *System of Medicine*, Vol. I., p. 483.

²⁰ Gamgee: *A Text-Book of the Physiological Chemistry of the Animal Body*, Vol. I., p. 120.

²¹ Ziegler: *General Pathological Anatomy*, Part I., Art. 198.

which throws some light on the morbid anatomy of Malarial Hæmoglobinuric Fever; but I must admit beforehand that the available observations on this head have not the extent or exactness that could be desired to enable us to formulate a definite theory of the morbid changes applicable to all cases. It would therefore be highly desirable and advantageous if in every case of death from this malady one could have the opportunity of performing an autopsy with a microscopic examination of the tissues, including the blood and other fluids; for, as Dr. Moore²² cogently urged upon all students of medical pathology, "it is of no less importance that they should see and understand as many post mortem examinations as possible, for thus only can they attain clear notions of disease, sound principles of diagnosis, and accurate views of the right direction of treatment." On the Gold Coast, though fatal cases are common enough, our opportunities in this respect are unfortunately very much limited by circumstances over which the medical practitioners have no control.

I have not myself performed any post mortem examination on a fatal case, and therefore quote with some slight abbreviation the report of a fatal case examined by my colleague Dr. Connolly: "The colour, which had slightly faded, had again deepened and assumed a mustard hue. The body was emaciated, particularly in the face and upper and lower limbs. On section jaundice was found to penetrate the entire skin, but did not seem to extend to the deeper tissues, as the muscles, connective tissue, and nerves. There was no diminution, apparently, of adipose tissue underneath the skin of the thorax and abdomen. The lungs were extremely pale and light ash in colour, very little congestion being visible even in their posterior bases. On section scarcely any blood flowed, only a light mucus or serous frothy liquid. The heart's colour was pale gray, and the muscular fibres were thin, worn, and easily separated, an evidence of molecular degeneration, and the walls of the ventricles were exceedingly fine and thin. There was a loose collection of frothy, light red blood, not deserving the name of a coagulum, in the right auricle and ventricle. The left side of the heart was empty, and not so much in a state of constriction as collapse. The liver withdrawn under the ribs seemed somewhat shrunken, and looked like an immense lemon. The capsule was loosely adherent and formed numerous bright saffron-yellow tumours, varying in size from that of the head of a pin to that of a buck-shot. They were cysts formed of obstructed and expanded ducts, and contained a thick liquid cheesy matter. The lemon-like colour pervaded the entire substance of the liver. The gall-bladder was full and distended, its contents being dark green. The scanty blood in the portal vein and in the inferior vena cava was light red and frothy, and no clots were to be seen. The kidneys were uniformly enlarged, the right weighing eight ounces, and the left eight ounces and a half. They resembled in appearance the result found in a case of acute desquamative nephritis; they were deeply congested, the cortical portion particularly, which was enlarged, looking red and inflamed, whilst the pyramids, though congested, seemed to have undergone a change towards enlargement rather than towards inflammation. The substance of the kidneys was readily friable and the capsule loose. The pelvis and infundibula seemed to partake of the general increase in size, and contained

²² Norman Moore: Medical Pathology.

a dark slimy fluid. The spleen was enlarged, weighing fourteen and a half ounces, was in a condition of extreme friability and congestion, the capsule peeling off like the fingers of a glove. A red frothy blood-like liquid exuded from it. The stomach was distended, contained a few lumps like black currant jelly, and was markedly inflamed along the entire surface of the greater curvature, from which point no doubt hæmatemesis arose. The small intestines showed scattered patches of red congestion appearing on their outer surface, except at the entrance of the common bile duct, where there was intense yellow staining. Internally they were covered with muco-gelatinous matter varying in colour from light green to deep black; the valvulæ conniventes and even the mucous membrane seemed worn away; and Peyer's patches, although the intestines were well washed, could not be made visible. The large intestines displayed an augmented vascularity beyond the ileo-cæcal valve, and through the entire rectum circular and irregular ulcers, and a ragged destruction of the mucous membrane, were prominent. The bladder was normal, and contained a few drops of yellow urine. A fact most striking to the observer was the deficiency of blood in the organs of circulation and in the tissues, and its non-coagulability."

From the remarks made by Dr. Wheaton²³ at a meeting of the Pathological Society of London relative to some preparations from the organs of a case of what he calls "West African 'Blackwater' Fever," exhibited by him, we gather the following: "After a preliminary stage of shivering and numbness of the extremities, with pain in the loins, slight jaundice developed, as also fever, followed by the passage of porter-coloured urine. In severe cases bilious vomiting occurred, succeeded by death with symptoms of uræmia. The attacks recurred again and again, some patients having as many as ten attacks. The urine contained hæmoglobin or methæmoglobin, and red corpuscles were absent from it The preparations showed in the cortical portion of the kidneys cloudy swelling of the epithelium and the accumulation of granules of hæmoglobin in the tubules. In the pyramids the tubules were filled up by large masses of hæmoglobin. The spleen showed small red points, due to collection of hæmoglobin, as could be shown by examination with the microspectroscope, as also the presence of large circular cells with large nuclei also containing pigment. The liver showed cloudy swelling of the cells and the presence of collections of large granules of pigment in them. There was no blood pigment in the vessels or capillaries of the organs, nor were there extravasations of blood. . . . The nephritis which occurred, and which was most marked in the specimens shown, was probably due to the irritating effect of the passage of blood pigment through the secreting cells of the kidney tubules." Dr. Samuel West,²⁴ criticising the above observations, maintained that the disease belonged to a malarial group of a severe kind, and gave as his reason for adopting this view a case from the West Coast of Africa which had come under his observation. That was the patient's third attack. His temperature rose on the third day to 104·5° F., and he began to pass blood in his water.

²³ *The Lancet*, February 4th, 1893.

²⁴ *The Lancet*, *loc. cit.*

Next day he was jaundiced, the urine containing hæmoglobin with albumen, but no blood corpuscles or bile. Two days later blood oozed from different parts of his body on the slightest scratch, the temperature fell to sub-normal, vomiting was constant, and he died of exhaustion. And he added that his patient told him that the disease was more fatal amongst the black than among the white people.

Further, Dr. Patrick Manson,²⁵ in his paper on what he terms "African Hæmoglobinuric Fever," read before the Epidemiological Society, observes: "The essential phenomenon was the destruction of the blood cells; in the vessels the blood corpuscles were seen to be of all sizes and forms, broken, discoloured, and partly dissolved. The colour of the urine, to which the disease owed its popular name of 'Blackwater Fever,' was caused by the presence of broken-down blood cells, epithelium casts, and a quantity of granular *débris* and reddish-brown pigment—which slowly subsided or was carried down on boiling by the coagulum of albumen, leaving the supernatant fluid clear. The 'jaundice' was not due to bile, but to staining with altered blood pigment." Thus far has reached our present knowledge of the pathological features of Malarial Hæmoglobinuric Fever, and as our knowledge further advances so much clearer would become many of the unsolved problems which at present render this malady one of the most subtle and insidious forms of impaludism yet known to West African Pathology.

DIFFERENTIAL DIAGNOSIS BETWEEN MALARIAL HÆMOGLOBINURIC FEVER AND YELLOW FEVER.—The clinical observations of Malarial Hæmoglobinuric Fever bring before one's mind a pathological state of the blood which closely approaches that of Yellow Jack. A true distinction can, however, be always drawn between Malarial Hæmoglobinuric Fever and Yellow Fever—the following being, if not all, some of the essential points of difference between the two:—

MALARIAL HÆMOGLOBINURIC FEVER.

Non-Contagious.

Source—Malaria.

Attacks—Recur.

Fever—Paroxysmal, remission of paroxysms.

Hæmorrhage—As a rule, none.

Spleen—Often enlarged.

Facies—Ordinary.

Quinine—Efficacious.

YELLOW FEVER.

Contagious.

Source—Contagion, which may be carried beyond malarious districts.

One attack.

Fever—No paroxysms.

Hæmorrhage—From all the mucous surfaces.

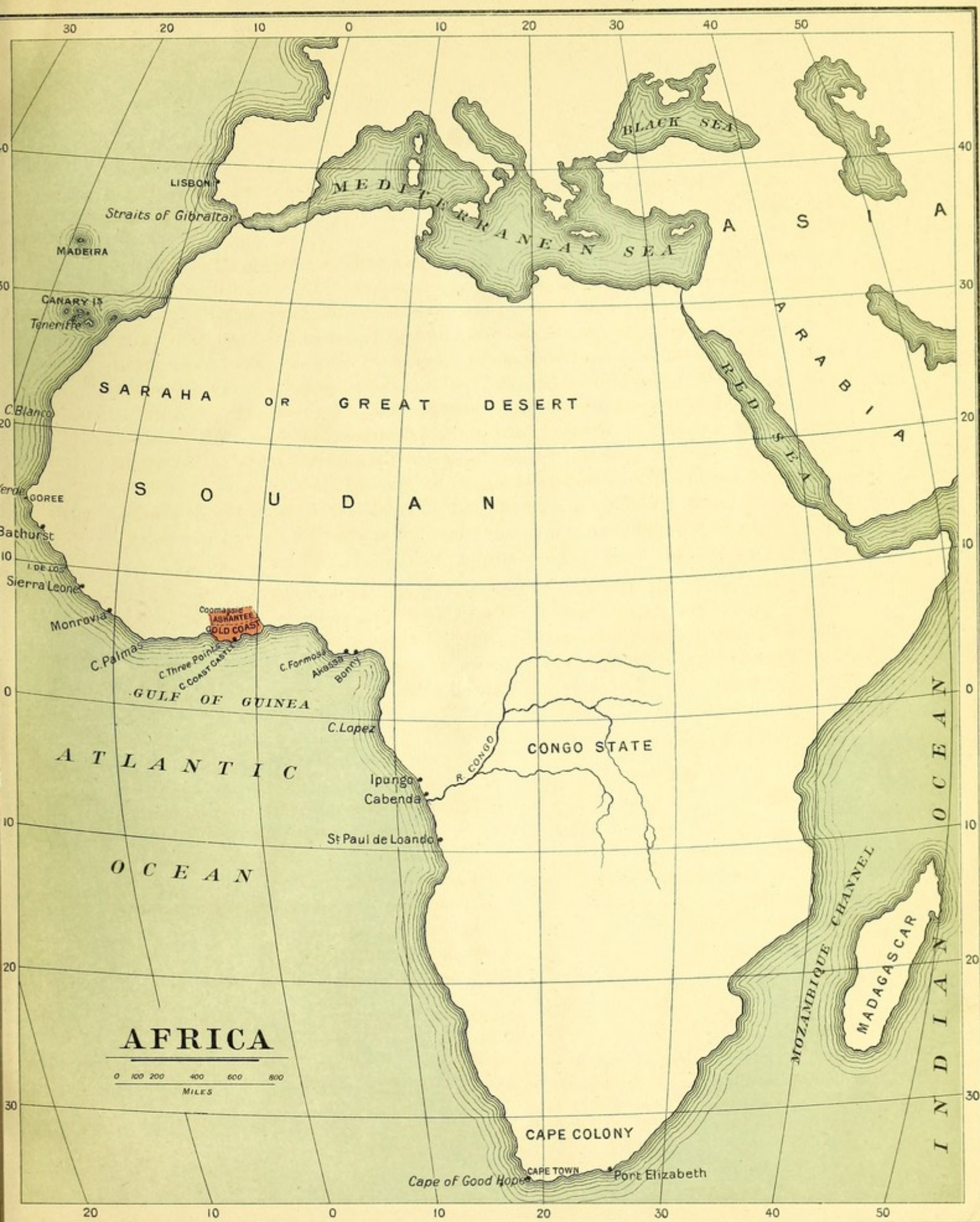
Spleen—Not enlarged.

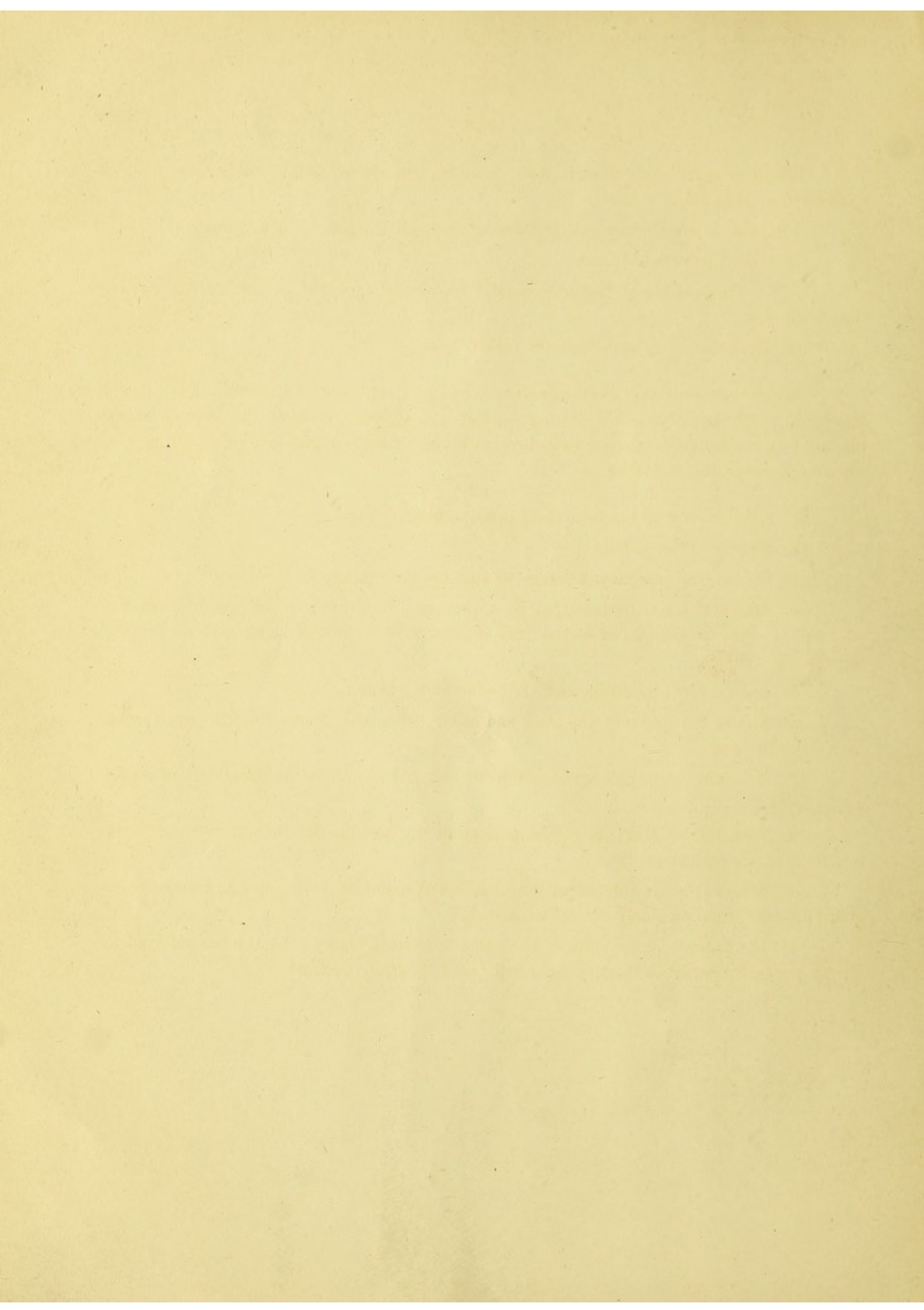
Facies—Peculiar.

Quinine—Intractable to the use of.

As regards prognosis, the morbid appearances demonstrate that the cases in which death cannot be averted are those in which: (a) Old renal disease is present; (b) Valvular disease or some other form of cardiac weakness is present; (c) There is present ulceration of the large intestines, and in consequence there is great initial pyrexia.

²⁵ *The Lancet*, April 1st, 1893.





Whilst cases in which the prognosis may be considered unfavourable, but in which recovery may take place, are :—

- (1) Cases in which there is slight derangement of the liver of long standing.
- (2) Gastro-Intestinal Catarrh.
- (3) Cloudy swelling of the kidneys and impaction of *débris* of hæmoglobin in the tubuli uriniferi.
- (4) The presence in some form of lung disease.

PRINCIPLES OF TREATMENT INDICATED BY THE MORBID ANATOMY.—The general effects of active hæmolysis and its consequent anhydræmic state of the several organs produced by the malarial micro-organism point to the extreme importance of adopting some such measures as the following :—

- (1) Absolute rest in the recumbent position under suitable cover.
- (2) Strictly enforced fluid diet.
- (3) Deplete the surcharged organs by suitable mild purgation.
- (4) Attack the site of infection by appropriate remedies such as quinine, calomel, etc., and by every precaution of cleanliness, etc., exclude the further introduction of micro-organisms.
- (5) Reduce fever by antiperiodic remedies and cold sponging.
- (6) Arouse the action of the liver and other abdominal organs by hot fomentations over the abdomen.
- (7) Maintain the physiological action of the kidneys by mild diuretics and copious saline drinks.
- (8) Support the heart as much as possible by stimulants, though only when the condition of the patient requires it.
- (9) Where there is antecedent lung mischief present, it is of especial importance to guard against pneumonia and severe bronchitis.
- (10) As evinced by the state of the gastro-intestinal tract at the autopsy after death, strong purgative remedies must be guardedly used if at all necessary.

ILLUSTRATIVE CASES.

CASE I.

Rev. K., German Missionary, aged 32. Result—Recovery.

The patient is a German Missionary brought down from the interior with a bad fever. He had been in fever for three days, and complains now of pains around the waist and back, weakness, thirst, loss of appetite, nausea, sleeplessness, and being light-headed, and diarrhœa after taking some purgative. He is restless. Skin hot and slightly moist. Conjunctivæ and skin are jaundiced—almost lemon-yellow discoloration; incessant vomiting of "green" bile mixed with frothy fluid; bowels loose; temperature 104° F. Pulse 120, rather rapid, regular, and compressible; urine scanty, tinted black like muddy port wine, contains a trace of albumen, the constituents of hæmoglobin, a heavy deposit of urates, acid in reaction, but no blood, bile, sugar, or tube casts; spleen enlarged and tender to touch, so is the liver; tongue covered with a dirty-yellowish fur. Quinin. Sulph. gr. x. and Calomel gr. v. were administered, to be followed in one hour by a draught containing Warburg's tincture. These were not retained, and at 3.30 p.m. a large mustard poultice was applied to the whole of the abdomen, after which a draught containing bismuth and soda given and retained.

7 p.m.—Patient slept in the afternoon, and feeling slightly better; temperature 102° F., pulse febrile. Quinine and Calomel repeated. Egg-flip, champagne, and milk retained. 10 p.m.—Vomiting less frequent.

5th February, 8 a.m.—Patient had a bad night. Complains of feeling the head swimming, headache, and pain in the hepatic region. Tongue cleaning. Bowels have not opened since last note. Temperature 101° F., pulse 99, regular and fairly strong; urine is of moderate quantity, clear and dark coloured; skin and conjunctivæ discoloration improving.

To take Calomel gr. v. with a draught containing Ol. Ricini. Egg-flip, milk, and champagne retained.

6.30 p.m.—Had a good sleep in the afternoon. Temp. 101° F., pulse febrile and weak. Had champagne, milk, and egg-flip, but all ejected immediately after they had been swallowed; so was the sleeping draught administered at 9 p.m. Bowels have acted twice; stools are scanty and darkish-red coloured.

6th February, 7 a.m.—Patient had a good night, and doing fairly well this morning Temp. 100.4° F.; pulse fairly good; urine is now clear and light-coloured; tongue cleaning; bowels have acted twice, stools have the same characters as last note; pains in the region of liver and spleen better. 6 p.m.—Patient has had several motions of the bowels; temp. 101° F.; pulse febrile; urine normal colour. Quinin. sulph. gr. xv. given at once.

7th February, 8 a.m.—Had a much better night. Temp. 99° F. Pulse good; vomiting has entirely ceased; conjunctivæ and skin discoloration improved; urine normal; tongue quite clean; one good stool; appetite good. Patient has so rapidly regained strength that he is permitted to sit in an arm-chair. 6 p.m.—Patient is convalescent. Temp. 99° F. Pulse good; one good stool. To take quinin. sulph. gr. xv. Poultice stopped.

8th February.—Convalescence is complete. Temp. 98.8° F. Pulse good; urine normal; appetite good. Placed on a generous diet and a bitter tonic. Sent shortly afterwards to Germany for a change of air.

CASE II.

Rev. Father S., aged 28 years. Result—Recovery.

Patient is a Roman Catholic Missionary, and has been out two years on this Coast, during which he had suffered once from an attack of Malarial Hæmoglobinuric Fever in June last, so that this is his second attack of the same fever. On seeing him in the afternoon of 1st August, 1890, he complained of a feeling of uneasiness in the lumbar region, headache, thirst, periodical chilliness over the whole body, with shiverings, sleeplessness, loss of appetite, constipation, and nausea, and said that this illness began three days ago with lassitude and want of energy. I find the skin and conjunctivæ intensely jaundiced; skin hot and slightly moist; eyes dazed and suffused; tongue covered with a dirty-yellowish fur; head tossed on the pillow from one side to the other; incessant vomiting of white fluid mixed with frothy mucus; no tenderness elicited on pressure over the abdominal organs. Temp. 105° F. Pulse 120, rather rapid, regular, and fairly strong. Had not passed urine since last night, when he had much difficulty in doing so, and what came was very scanty and black-coloured.

To take quinin. sulph. gr. x. and Calomel gr. x. at once; cold sponging of the head and upper part of the body, and hot water bottles applied to the feet; sterilised milk and soda *ad lib.*, and beef tea ordered. 6 p.m.—Temp. 104° F. Pulse extremely febrile; patient complains of dysuria. About 2 oz. of black urine drawn off, looking very much like molasses, and contains a very small quantity of albumen, constituents of Hæmoglobin, and heavy deposit of urates, etc., but no blood, bile, sugar, or tube casts; thirst insatiable, but fluids are ejected as soon as they are swallowed: Antipyrin gr. xx. to be taken at once, followed in half-an-hour by quinin. sulph. gr. xv.; a large mustard poultice applied to the whole of abdomen.

2nd August, 8.30 a.m.—Sent for hurriedly to see the patient, who is reported getting worse. On attending, patient complains of having had a bad night, thirst, pains in the lumbar regions and also in the hepatic region. He is restless and very hot all over the body; the icteric tinge of the skin and conjunctivæ is very pronounced; had been sick—vomited matters consist of undigested food and frothy fluid, but contain no bile, nor blood; perspiration defective; temp. 105.2° F.; pulse very rapid, irregular, and weak; no urine passed since last note, and the bowels have not acted. To take antipyrin gr. xv. every hour till 30 grains have been taken, to be followed half-an-hour after by quinin. sulph. gr. xx. 1 p.m.—Temp. 103.2° F. Pulse rapid, regular, and compressible; no urine has been passed; skin sweating profusely, one stool, darkish-red coloured; milk and soda retained. Antipyrin gr. xv., to be followed by quinin. sulph. gr. x., ordered. 6 p.m.—Temp. 103.8° F. Pulse febrile and weak; perspiration continues; patient kept down egg-flip, beef tea, and milk. 9 p.m.—Temp. 101.4° F. Pulse febrile and weak; about three ounces of urine passed with difficulty; colour of urine is like that of molasses. Calomel gr. v. administered at once, and a sleeping draught ordered to be taken at 10 p.m.

3rd August, 6.30 a.m.—I found the patient quiet and calm. He said he had a bad night and vomited once during the night, and then slept for one hour, after which he awoke and sweated throughout the night. Temp. 102° F. Pulse rapid and rather weak; urine has the same character as last note, but increasing in quantity; dysuria much lessened; skin discoloration is improving; bowels not open; headache persists. To take a draught containing ol. Ricini ʒss, Tinct. Chlorof. Co. ʒ xv., and Ess. Menth. Pip. ʒ ss. 12 noon.—Temp 101° F. Pulse febrile and weak; one stool, greenish-red coloured; sweating profusely. Quinin. sulph. gr. xv. administered. Egg-flip, beef tea, and some white wine were retained. 6 p.m.—Temp. 102° F. Pulse febrile; urine is still black, but increasing in quantity; four greenish-red stools. Icteric tinge of skin and conjunctivæ improving. Nausea and vomiting have ceased; patient taking nourishment and wine freely. Quinin. sulph. gr. xx. administered, and a sleeping draught ordered to be taken at bedtime.

4th August, 8.30 a.m.—Patient had a bad night. He awoke in the night feeling very chilly and shivery; perspiration defective; patient reported to me that he took some raw eggs this morning. Bowels have not opened; icteric tinge of skin and conjunctivæ has increased. Dysuria has ceased, and urine is passed freely and increasing in quantity; colour is still black. Temp. 102.4° F. Pulse febrile, regular, full, and compressible. To take quinin. sulph. gr. x., to be repeated at noon. Mist. pot. acet. co., chicken broth, beef tea, cold tea, and arrowroot ordered. 12 a.m.—Felt

sick, and brought up the undigested raw eggs taken in the morning. Temp. 101° F. Pulse febrile; about ten ounces of reddish-yellow coloured urine passed. 6 p.m.—Temp. 101.6° F. Pulse slightly febrile. Patient had a sleep in the afternoon, from which he awoke in a fright. One stool. Quinin. sulph. gr. xv. administered, and a sleeping draught ordered to be taken at 9 p.m.

5th August.—Patient had a bad night. He did not have any sleep after taking the sleeping draught. He is, however, improving. Temp. 101° F. Pulse slightly febrile and fairly strong; urine increasing in quantity, colour changed to darkish red; bowels have acted thrice—stools are dark red-coloured; skin discoloration improving. Quinin. sulph. gr. xv. administered; afterwards he took some arrowroot and retained it. 6 p.m.—Patient is calm and perspiring freely. Temp. 100.2° F. Pulse 98, regular, full and fairly strong; frequent micturition—urine is plentiful and of the same colour as last note; general condition has much improved; appetite improving, and no return of headache nor nausea. Pil. Podoph. Co. i. ordered to be taken at once, and followed in the morning by a saline aperient; and a sleeping draught ordered to be taken at bedtime.

6th August, 6 a.m.—Patient is doing fairly well. Temp. 101° F. Pulse 90, fairly good; colour of urine changed to reddish brown; two reddish-black coloured stools; Prickly Heat appears on the forehead and back; taking nourishment freely. To take quinin. sulph. gr. xv. 6 p.m.—Temp. 100.4° F. Pulse 80, good. A lotion containing Plumbi Acet. $\bar{5}$ ss. to two pints of water ordered to be used in sponging parts of the skin affected with Prickly Heat. To take quinin. sulph. gr. x., and a sleeping draught at bedtime.

7th August, 8 a.m.—Had a good night after taking the draught, and feeling better this morning. He complains of bad mouth, especially at the back part of the tongue, and the mouth being sore; temp. 100° F. Pulse fairly good; micturition less frequent, urine is clear and has changed to "light-coloured;" stools are clayey coloured; discoloration of skin and conjunctivæ continues improving. Calomel stopped, and mouth wash containing Pot. Chlorat and Acid Hydrochlor Dil. ordered to be used frequently. 6 p.m.—Condition the same as last note.

8th August, 8.30 a.m.—Patient had a very good night. Slept well. He is steadily improving. Appetite keen; tongue cleaning; bowels not open; temp. 100° F. Pulse 75, good; urine light-coloured and clear. To take Quinin. Sulph. gr. x. 6 p.m.—Temp. 101° F. Pulse 80, febrile; bowels not open. To take Pil. Podoph. Co. ij. at bedtime, to be followed in the morning by a saline aperient.

9th August.—Patient had a fairly good night. He is improving. Two stools passed last night and four this morning. Temp. 101° F. Pulse 80, febrile; urine normal colour. To take quinin. sulph. gr. xv. Chicken soup and toasted bread, with some champagne, allowed. 6 p.m.—Slight bleeding from the nose when he sneezed. Temp. 100.4° F. Pulse good. Two more stools are clayey and sticky. To take quinin. sulph. gr. xv.

10th August.—Patient complains of being restless. Temperature ranged between 101.2° F. in the morning and 100.6° F. in the evening. Pulse good. Tongue quite clean. Quinin. sulph. gr. xv. administered.

11th August.—Patient had a very good night, and has made much progress towards convalescence. Morning and evening temperatures are 101° F. and 100.8° F. respectively. Pulse fairly good. Mouth sore better; urine still normal, and bowels open. Quinin. sulph. repeated. From the 12th to 14th August patient's progress has been uninterrupted. Temperature ranged between 98.4° F. and 100.2° F. Pulse good; urine normal; discoloration of skin better, but the conjunctivæ remained jaundiced; bowels open; appetite keen, and sleeps better. Quinin. sulph. gr. x. every four hours. Patient permitted to sit up, and to have fried bacon, toasted bread, and blanc mange pudding, with some white wine.

15th August.—Patient is convalescent: recommended to be sent to Europe for a change of air. A bitter tonic prescribed.

16th August.—Patient sent to France to-day for a change of air. He has since returned in good health to resume his work on this coast, and is quite well.

CASE III.

J. E., European, aged 28. Invalided and died. Death.

A mercantile agent, brought down from the Volta River District to Addah for treatment on account of strong headache, incessant vomiting, pains all over the body, especially at the joints, weakness, thirst, constipation, difficulty of passing urine, loss of appetite, and utter aversion to food; bad mouth, and a feeling of chilliness, with shiverings. On seeing him this morning, 11th October, 1888, patient is restless, skin and conjunctivæ extremely jaundiced; eyes injected and suffused; lips fairly coloured; tongue large, dry, and covered with a dirty-yellow fur; frequent vomiting, vomited matters at first greenish frothy fluid, afterwards black-coloured matter; about two ounces of black urine, looking like molasses, drawn off, is acid in reaction, sp. gr. 1,030, and contains a small quantity of albumen, constituents of hæmoglobin, and a considerable deposit of urates, etc., but no blood, bile, sugar, or tube casts; tenderness to pressure elicited over the abdomen generally, but more in the hepatic and left lumbar regions; temp. 101° F. Pulse febrile, but regular and small. Calomelas gr. v. and Haustus Sennæ Co., ʒij. administered and retained. 8 p.m.—Bowels have acted several times, but patient is not better; he is very restless. Inject. Morphine Hypoderm. administered. Milk and soda *ad lib.*, Calomel gr. v. and quinine gr. x. every four hours ordered.

12th October, 6.30 a.m.—Patient had only two hours' quietness during the night, but had no sleep. Temp. 99° F. Pulse regular, slow, and weak; stomach is so irritable that patient is unable to retain any food; one copious slimy bilious stool; about two ounces of black urine drawn off; vomited matters greenish-yellow coloured. An effervescing draught containing Acid Hydrocyanic Dil. administered, to be repeated every three hours till vomiting has ceased; mustard poultice to abdomen; sterilised milk and soda and rectal feeding ordered to be carried out till gastric irritation has subsided. 6 p.m.—Vomiting and abdominal pains much relieved; patient is quieter. Temp. 100° F.; Pulse slightly febrile and weak; skin warm and moist.

13th October, 8 a.m.—Patient had a fairly good night. He is improving. Temp. 99·8° F. Pulse 80, regular, small, and weak; dysuria persists; about three ounces of thick black urine drawn off; vomiting ceased; eyes brighter; bowels not open; discoloration of skin and conjunctivæ improving; the draught containing Acid Hydrocyan. dil. and rectal feeding stopped. Quinin. sulph. gr. xv. and calomelas gr. ij. to be administered every four hours; to take champagne, Brand's essence of beef, and egg-flip. 6 p.m.—Slight perspiration. Temp. 99·8° F. Pulse regular and weak; Inject. Morphine Hypoderm. ordered at 9 p.m.

14th October.—Patient had a good night, and is improving. Temperature ranged between 99·8° F. and 100° F. throughout the day. Pulse fairly good; was able to pass about an ounce of black urine; bowels not open.

15th October.—Patient slept well, and is improving. Temp. 99° F. Pulse good. Tongue cleaning; bowels have acted twice—stools darkish-red coloured; urine increasing in quantity, clear and light-coloured; discoloration of skin and conjunctivæ improving; taking nourishment freely. 6 p.m.—Temp. 100° F. Pulse fairly good. Calomel stopped. Quinine reduced to 10 gr. doses twice daily. To take iced champagne.

16th October.—Had a bad night. Felt sick and vomited thrice during the night. Temp. 99° F. Pulse good; urine is now plentiful, clear, and light-coloured. 6 p.m.—Condition same as this morning. A sleeping draught containing Pot. Bromid. and Chloral Hydrate ordered to be taken at bedtime.

17th October.—Had no sleep last night after taking the draught. He has, however, much improved. Temp. 99° F. Pulse good; bowels open; urine good quantity, clear and light-coloured. Vomited once this afternoon. Inject. Morphine Hypoderm. ordered to be taken at 8 p.m.

18th October.—Patient had so much improved that he was to-day recommended to be sent to the Sanatorium at Aburi for a change of air. From this date up to the 20th patient's progress has been uninterrupted.

21st October.—Patient is not quite so well to-day. Temp. 102° F. Pulse febrile; urine normal; sickness and vomiting have returned. An effervescing draught containing Tinct. Euonymin and Brandy stopped sickness and vomiting, and towards the evening temperature was lower—99° F.

22nd October.—Patient going on fairly well. Had a good night. Temp 99° F. Pulse good.

23rd October.—Patient sent by steamer to Accra *en route* for Aburi for a change of air. It has since been reported that he had had a relapse at Accra and died at that place.

CASE IV.

F. D., European, aged 25. Recovery.

A Frenchman belonging to the Roman Catholic Mission. This is his first tour of missionary work on this Coast, and has only been six months away from France. With the exception of slight attacks of fevers and other ailments, referable to malarial origin, he has been healthy and able to maintain his strength and vigour fairly well, until the morning of the 10th June, 1892, when he felt out of sorts—pains all over his body, lassitude, headache, loss of appetite, and restlessness at night, and feeling no better day after day he thought he must send for me, as he has had a strong attack of shivering with chilliness this evening, 12th June, and on passing urine he noticed it black-coloured, which frightened him considerably.

He complains now of splitting headache, thirst, nausea, loss of appetite, and a feeling of oppression in the epigastrium. He is restless; vomiting green bile, mixed with frothy fluid; skin hot and dry; tongue coated with a dirty-yellowish fur; stools blackened; temp. 103·4° F.; pulse febrile, regular, and fairly strong; urine is scanty and blackened like muddy port wine, it is acid in reaction, sp.g. 1,030, and contains a trace of albumen, constituents of hæmoglobin, and a considerable deposit of urates, etc., but no blood, bile, sugar, or tube casts: Antipyrin gr. xv. every hour till 30 grains taken, and then followed in half-an-hour after by quinin. sulph. gr. xv. The following nourishment ordered: Sterilised milk and Sauerbrühen *ad lib.*, beef tea, Brand's essence, and arrowroot.

13th June, 6 a.m.—Patient had a fairly quiet night, but only one hour's sleep. He complains of oppressive feeling in the epigastrium; bowels not free; urine scanty and black; temp. 99·4° F.; pulse fairly good: quinin. sulph. gr. xv. administered. 6 p.m.—Temp. 102° F.; pulse febrile: quinine and antipyrin repeated, but an hour after they had been swallowed they were ejected; mustard poultice applied to the epigastric region.

14th June, 6 a.m.—Patient had a bad night. Rather restless and weak this morning. Temp. 104° F.; pulse rapid, regular, small, and weak; bowels have not opened; urine is scanty, still black; thirst persists. Calomel gr. x. and quinin. sulph. gr. xv. administered, to be followed in one hour by a saline aperient draught. 6 p.m.—He complains of weakness. Temp. 102° F.; pulse febrile and weak; urine black-coloured; two black-coloured stools; colour of skin turning yellow; conjunctivæ not affected; thirst persists. Patient sponged down with tepid water. Calomel gr. v. and quinin. Sulph. gr. xv. administered, and Mist. Pot. Acet. Co. every three hours ordered; iced champagne permitted.

15th June, 6 a.m.—Patient had a quiet night, but sleep was very much disturbed. Temp. 100° F.; pulse slightly febrile, but fairly strong; urine is now plentiful, clear, and turning darkish red colour like claret; one stool, still black; vomiting and pain have ceased; thirst less: calomel gr. v. and quinin. sulph. gr. xv. given at once, and ordered to be repeated at 6 p.m. 6.30 p.m.—He still complains of a feeling of tightness in the epigastrium, and thirst. Vomiting has entirely ceased; about 15 ounces of light-coloured urine passed; temp. 100° F.; pulse slightly febrile, but fairly strong; tongue cleaning. Taking nourishment freely; champagne stopped. A sleeping draught containing Pot. Bromid. and Chloral Hydrat. ordered to be taken at bedtime.

16th June, 6 a.m.—Slept up to this morning after taking the draught. He is improving and gaining strength; complains of sore mouth. Temp. 99·6° F.; pulse good; tongue cleaning; bowels not open; urine increased and still light coloured; no pain nor headache. Quinin. sulph. gr. x., to be followed by a saline aperient draught at 12 noon. 7.30 p.m.—Temp. 100·4° F.; pulse fairly good; bowels have not acted; urine normal. Calomel gr. v. and quinin. sulph. gr. xv. administered.

17th June, 8 a.m.—Patient had a good night, and expressed himself as feeling better this morning, but still complains of sore mouth. Temp. 98·6° F.; pulse good; urine normal; bowels still confined; Calomel stopped. Saline aperient draught administered. Quinin. sulph. gr. x. ordered at 12 noon. 6 p.m.—Temp. 100·2° F.; pulse fairly good; urine normal; bowels have acted several times, stools are watery and darkish-red colour; poultice stopped; patient continues to take nourishment freely. Sponged down with tepid water and permitted to sit up in bed for an hour. Quinin. sulph. gr. xv. and egg-flip ordered.

18th June, 6 a.m.—Patient had a good night, and is doing fairly well. Temp. 99° F.; pulse good; urine normal. Quinin. sulph. gr. xv. administered. Permitted to have some fried ham and toasted bread. 6 p.m.—Patient has developed dysenteric symptoms (*Diarrhœa Mercurialis*); temp. 100° F.; pulse regular and fairly strong; skin perspiring; urine normal; tongue quite clean; slight shivering. Mustard poultice applied to the whole of the abdomen. To take quinin. sulph. gr. xv. and a sedative draught containing Chlorodyne ℥ xv., tinct. opii ℥ v., spt. Ammon. Aromat. ℥ xv. Tinct. Chloroform Co. ℥ xx. at once, and the draught to be repeated at 8 p.m. Mouth wash ordered to be used frequently. A teaspoonful of brandy to be taken every two hours.

19th June, 8 a.m.—Patient had a good sleep, and did not pass a stool throughout the night. Dysenteric symptoms have subsided. Temp. 98° F.; pulse good; urine still normal. Quinin. sulph. gr. xv. administered. 6 p.m.—Patient had a sound sleep in the afternoon; bowels confined; appetite fairly good; urine is a shade darker, but no return of Hæmoglobinuria. Temp. 101·4° F.; pulse febrile but fairly strong: to take quinin. sulph. gr. xv.

20th June, 6 a.m.—Patient had a much better night. Temp. 100° F.; pulse slightly febrile; urine turned bright yellow colour; bowels still confined. A draught containing castor oil and opium administered, and mustard poultice applied to the abdomen. 6.30 p.m.—Bowels have acted six times, stools are watery and dark-reddish coloured. Temp. 101° F.; pulse febrile. Patient complains of headache and giddiness on the slightest exertion. Quinin. sulph. gr. xv. administered, and cold sponging of the head ordered.

21st June, 6 a.m.—Had a bad night. He is rather restless and weak this morning. Headache is better and giddiness much less. Temp. 99° F.; pulse fairly good; urine still plentiful and clear, but now darkish coloured. Quinine gr. xv. given. To take egg-flip and brandy increased to half an ounce in water thrice daily. 6.30 p.m.—Found patient in a cold shivering state. He said he had had two severe attacks of it in the afternoon. He is restless and light-headed. Bowels not free; passed a high-coloured urine; temp. 104° F.; pulse rapid, regular, full, and fairly strong. A draught containing Antipyrin gr. xxx. administered, to be followed in half-an-hour by quinin. sulph. gr. xx.; hot water bottles to the feet and cold applications to the head produced a fall in the temperature with profuse perspiration.

22nd June, 6 a.m.—Had a quiet night, and feeling much better this morning. Temp. lower, 99° F.; pulse regular, small, and weak; bowels have still not acted; urine is plentiful and light-coloured. To take calomelas gr. v. and quinin. sulph. gr. xv., to be followed in a couple of hours by a saline aperient draught. 6 p.m.—Patient had been sick in the afternoon, and brought up a lot of bile mixed with frothy fluid substance. Bowels have acted twice—stools are dark-reddish coloured; skin discoloration better; Temp. 101° F.; pulse febrile and weak. Patient sponged down with tepid water. Quinin. sulph. gr. xv. administered.

23rd June, 8 a.m.—Patient doing well. Had a good night. Temp. 100° F.; pulse fairly good; urine normal; sore mouth is better. Taking nourishment freely; appetite good; mouth wash and Mist. Pot. Acet. co. stopped. 6 p.m.—Patient is brighter and more cheerful. Temp. 99° F.; pulse fairly good: to take quinin. sulph. gr. xv.

24th June, 8 a.m.—Patient had a very good night, and feeling much stronger this morning. Temp. 98·8° F. Pulse good. He is allowed up for two hours. 6 p.m.—Patient is convalescent. Temp. 98·4° F.; pulse regular, full but weak. Bitter tonic prescribed. Patient's further progress was good, and on the morning of the 25th of June he embarked for France for a change of air.

He has since returned to the Colony to resume his missionary work.

CASE V.

D. G. D., European, aged 21. Death.

Has been only six months in the Colony, and acted as French Consular Agent during a portion of the time. He had not enjoyed good health since his arrival in the Colony, having suffered from remittent and other malarial fevers, which had completely weakened his constitution.

On the 24th September, 1890, I was sent for hurriedly to see the patient. On visiting him he complained of headache, thirst, constipation, giddiness, loss of appetite, and sleeplessness, with pains at the knees and nausea. He is restless, skin hot and dry, mouth parched; tongue dry, and covered with a dirty-yellowish fur; pressure in the hepatic region elicited pain; temp. 102° F., pulse 100, rather rapid, regular but weak; bowels not open; urine is dark coloured like sherry; vomiting bile mixed with a frothy fluid; icteric tinge of the conjunctivæ. Patient is the subject of inflamed hæmorrhoides; quinin. sulph. gr. x. every four hours. Hot water bottles to the feet and cold sponging of the head. Ung. gallæ copio to be applied on lint to piles. Milk and soda *ad lib.*; beef tea and arrowroot.

25th September, 8 a.m.—Patient had a fairly good night. Temp. 103·4° F.; pulse febrile and weak. To take a saline aperient draught at once, and quinin. sulph. gr. xv. with a diaphoretic mixture ordered to be taken at 10 a.m. 6 p.m.—Temp. higher, 105° F. Pulse very rapid, small, regular, and compressible; felt sick, and brought up a lot of green-coloured fluid; bowels have not opened; urine high-coloured; tongue still loaded. Enema of castor oil and soap brought away very offensive blackened “shotty” hard fæces; mustard poultice applied to the abdomen.

26th September, 7.30 a.m.—Patient had a bad night. He sweated all night, but feeling no better. Temp. still higher, 104·8° F.; pulse very febrile and poorly. Patient is rather restless; skin hot and dry; no urine nor stool passed since last note; eyes dazed and conjunctivæ injected. Hot water bottles applied to feet and cold sponging of the head. Milk and arrowroot were retained. 6 p.m.—Was sick several times, and brought up a lot of green-coloured fluid. Temp. 105° F.; pulse extremely rapid, irregular, and feeble. Heart is depressed; skin burningly hot and dry. Diaphoretic mixture ordered every two hours till perspiration is produced.

27th September, 6 a.m.—Patient had comparatively a quiet night. Temp. lower, 103·8° F.; pulse febrile and weak. Patient felt sick after taking nourishment, and brought all up; urine is scanty and dark-reddish coloured; there has been one very dark and “shotty” hard stool. An enema containing castor oil and soap brought away very offensive black fæces. Calomel gr. v. administered. 6.30 p.m.—Temp. 103·4° F.; pulse still rapid, irregular, and compressible; urine very scanty and dark coloured; complains of thirst and nausea. Calomel gr. v. administered. To take egg-flip and a tablespoonful of brandy every three hours, and a sleeping draught ordered to be taken at bedtime.

28th September, 10 a.m.—Had a quiet night, but no sleep after taking the draught. Temp. lower, 101·4° F.; pulse febrile, regular, and weak. Two stools during the night, same characters as last note; skin perspiring; was able to retain nourishment. Calomel gr. v. administered. 7.30 p.m.—Temp. 102° F.; pulse febrile and weak. Patient complains of weakness. He is unable to raise himself up in bed without assistance. Urine still dark. To take champagne frequently.

29th September, 6 a.m.—Patient is rather worse this morning. Temperature is higher throughout the day, 103° F. both morning and evening; pulse 75, regular, small, and fairly strong; bowels acted after enema of soap and castor oil; stool is scanty and blackened; passed about four ounces of black urine, like molasses, acid in reaction, sp. g. 1,030, and contains a fair quantity of albumen, constituents of hæmoglobin, and a heavy deposit of urates, etc., but no blood, bile, sugar, nor tube casts. To take Mist. pot. acet. co. every three hours, in addition to other medicines.

30th September.—Patient had indifferent night. He is calm; temperature ranged between 103° F. and 103·2° F. all day; skin fairly moist; bowels confined; urine contains about $\frac{1}{4}$ of albumen, but contains no tube casts, and in other respects is of the same character as last note.

1st October, 8 a.m.—Patient slept off and on during the night. He looks considerably worn out, and thin in the face, which is pinched. Lips covered with herpes; weakness is considerable. Temp. 103° F.; pulse 80, regular and weak; about six ounces of dark-coloured urine passed; bowels not open for two days. Taking nourishment, which is fairly well retained.

Patient sponged down with tepid water. Lime drinks ordered; quinin. sulph. increased to xx. grs., and Calomelos gr. v administered. 6 p.m.—Temp. lower, 102·8° F.; pulse febrile, regular but weak; tongue cleaning; bowels still not open; skin slightly perspiring; no urine passed since this morning. Calomelos gr. x. and Quinin. Sulph. gr. xv. administered. A saline aperient draught ordered to be taken in the morning.

2nd October, 8 a.m.—Patient became delirious during the night, and bled a good deal from the nose, after which he became quiet. This morning he is again delirious, noisy, and very restless. Temp. 104·8 F.; pulse 90, slow, irregular, and compressible; four ounces of black urine passed contains about $\frac{1}{2}$ of albumen, but no tube casts nor blood, and does not deposit on standing; bowels acted twice; stools are black and “shotty.” To take champagne in small quantities with strong beef tea, and cold sponging over the body generally. 12 noon.—Delirium persists; patient now refuses nourishment of any kind; ten ounces of black urine passed freely, same characters as last note; icteric tinge of conjunctivæ more pronounced, but no discoloration of the skin generally; piles have bled a good deal; temp. 103·5° F.; pulse febrile and weak. Enema of castor oil and soap brought away black “shotty” fæces. 7 p.m.—Delirium continues; skin perspiring on the head, neck, and arms only, but not over the body generally. Urine has the same characters as last note; no stool; temp. 104·4° F.; pulse rapid, irregular, bounding, and full. Patient does not now refuse beef tea and egg-flip, which he retains. To take Calomel gr. x. and Quinin. Sulph. gr. xv.

3rd October, 8.30 a.m.—Delirium has passed off. Patient complains of pain in the right iliac region, which is tender on pressure; bowels acted twice last night and once this morning; skin hot and dry; temp. 104° F.; pulse very febrile and weak; urine passed is clearer but still dark, and contains less albumen: poultice over the whole of the abdomen. A tablespoonful of brandy every two hours ordered; hot water bottles constantly applied to the feet. 6 p.m.—Temp. lower, 103·8° F., but patient is no better, and appears quite overpowered by the effects of the fever. He is slightly delirious and exhausted. Blisters to the nape of the neck produced no satisfactory results, and at 10 p.m. I sent for my friend, Dr. D——, of the Army Medical Department, then Acting District Medical Officer of Cape Coast, to join me in consultation. Having unanimously agreed upon the opinion that this was a malignant type of the fever with nephritic complication, it was definitely decided upon trying Sodii Phosph. and antipyrin internally, and turpentine stupes over the hepatic region; but patient became more restless and delirious, and the temperature rapidly rose to 106° F., with running, feeble pulse. Patient rubbed down with brandy and quinine and ether injected; an enema containing quinine sulph. gr. xx., acid sulph. dil. ʒss. and brandy ʒij. was retained, but without producing any effect on the temperature, which has further risen to 107° F. The patient was so much exhausted that he rapidly became unconscious, and died in a comatose hyperpyrexia in the morning of the 4th October, at 6 o'clock.

CASE VI.

Sister L. P., European, aged 23. Recovery.

A Missionary Lady, has been out a little more than two years in the Colony in connection with the Bremen Mission. With the exception of slight attacks of Malarial Fevers she has enjoyed good health. Her present illness commenced four days ago with loss of appetite, weakness, and flying pains about the lower limbs and chest, with feverish symptoms every evening, but she commenced to pass black urine only last evening. On the 21st January, 1894, the fifth day of her illness, I was sent for at 12 a.m. by the Lady Superintendent of the Mission to attend the patient. On seeing her she complains of pain, terrible thirst, nausea, and headache, and said she commenced to pass black urine only last evening. She is restless and groaning on account of pains all over the body, sleeplessness and weakness, frequent vomiting of bile mixed with frothy fluid, skin warm and slightly moist; temp. 102·5° F.; pulse febrile and weak; urine is scanty and quite black, like the colour of molasses, acid in reaction; sp. gr. 1,025; contains a trace of albumen, constituents of hæmoglobin, and a heavy deposit of urates, etc.; no blood, bile, sugar, or tube casts; tongue covered with a

dirty-yellowish fur; bowels indifferent, tenderness on pressure in the hepatic and left lumbar regions. Turpentine stupes over the abdomen. To take Calomelos gr. v. and Quinine Sulph. gr. x. Mist. Pot. Acet. Co. every three hours, sterilised milk and sod. *ad lib.* 6.30 p.m.—Feeling easier, and is able to retain nourishment; temp. 100° F.; pulse rapid, regular, and weak; about four ounces of black urine passed; bowels not open; sweating profusely; thirst persists; headache, pain, and nausea better. Beef-peptone and beef-jelly ordered, and a sleeping draught containing Pot. Bromid and Chloral Hydrat at bedtime.

22nd January, 8 a.m.—Patient had a bad night. She vomited five times during the night; one scanty black-coloured stool; thirst less; temp. 99·8° F.; pulse regular and weak; urine increasing in quantity, clear, and “turning” light-coloured. In spite of the frequent vomitings her general condition shows marked improvement, and taking nourishment. 6 p.m.—Complains of oppressive feeling about the chest and abdomen, with nausea and headache; skin cool and moist; temp. 100·8° F.; pulse regular and fairly strong. Calomelos gr. v. and Quinin. sulph. gr. x. thrice daily. To take antipyrin gr. xv. at bedtime, and a draught containing Ol. Ricini ordered to be taken in the morning.

23rd January, 8 a.m.—Patient had a better night, and slept after the draught. She has much improved, and taking nourishment freely. Temp. 99·4° F.; pulse good; urine is plentiful and normal in colour; bowels have not acted; tongue cleaning. Permitted to take a little Greek wine. 6 p.m.—Feeling much easier, and cheerful. Temp. 99·2° F.; pulse good; urine still normal.

24th January, 8 a.m.—Patient had a very good night, and slept well; temp. 99° F.; pulse good; urine normal; tongue cleaning. 7 p.m.—Temp. 99·6° F. Pulse good; urine normal; bowels not open. Mist. Pot. Acet. Co. stopped.

25th January, 8.30 a.m.—Patient doing fairly well; temp. 99·2° F.; pulse good; urine normal; tongue quite clean; bowels still not open; appetite improving. 6 p.m.—Patient enjoyed a good sleep in the afternoon, and feeling quite refreshed. Temp. 99·8° F.; pulse good; urine normal; bowels not open.

26th January, 8 a.m.—Had a good night. She complains of bad mouth, thirst, and weakness. Temp. 100° F.; pulse regular and weak; urine normal; bowels not open. A draught containing Ol. Ricini administered, and a teaspoonful of champagne ordered to be taken frequently. 6.30 p.m.—Patient is not looking so bright this evening; she is a bit down in the mouth, and complains of sore mouth and throat. Temp. 101° F.; pulse febrile and fairly strong; bowels have acted thrice—stools dark-coloured; urine normal. Calomel stopped. A gargle containing Pot. Chlorat. ordered to be used frequently.

27th January, 8 a.m.—Patient had a good night, and slept, waking up only once during the night. She complains of difficulty of swallowing; urine normal; bowels not open; temp. 100° F.; pulse slightly febrile. 6.30 p.m.—Temp. 100·8° F.; pulse slightly febrile; skin perspiring; taking nourishment freely; urine normal; bowels not open.

28th January, 8 a.m.—Patient suffers from slight tonsillitis with inflamed salivary gland. Temp. 99·8° F.; pulse fairly good; urine normal; bowels not open. To apply poultice sprinkled with tinct. Belladonnæ to the affected parts of the neck. 6 p.m.—Temp. high, 101·8° F.; pulse febrile; Patient complains of pain in hepatic region; urine normal; bowels not free. To apply mustard poultice to the hepatic region.

29th January, 8 a.m.—Patient had indifferent night. She has suddenly taken much worse; hæmoglobinuria has returned, with shivering fits and slight yellow discoloration of the skin. Temp. 99·8° F.; pulse rapid, regular, and weak; about three ounces of black urine passed; bowels still not open. To take Mist. Pot. Acet. Co. 6 p.m.—Temp. 101·2° F.; pulse febrile and weak; urine is plentiful, quite clear, and changed to light-coloured again; sore mouth and throat getting better and the swollen glands subsiding. Bowels not open. To take Pil. Hydrarg. gr. iii. at bedtime, to be followed in the morning by a draught containing sodii. phosph. and sodii. sulph.

30th January, 8 a.m.—Had a very good night, and feeling better. Temp. 100·2° F.; pulse slightly febrile; urine normal; tongue clean; bowels not free; sore mouth and throat getting better; swollen glands have subsided. 6 p.m.—Temp. 100·4° F.; pulse slightly febrile; urine quite normal; bowels have acted thrice; stools are very offensive and dark-reddish coloured; skin perspiring freely. Quinin. Sulph. gr. x. administered.

31st January, 8 a.m.—Patient had a very good night, and slept well. Her general condition has much improved. Tonsillitis, sore mouth, and swollen glands better. Temp. 99·5° F.; pulse fairly good. 6 p.m.—Temp. 99·6° F.; pulse fairly good; urine normal; appetite good.

1st February, 8 a.m.—Patient is favourably progressing to convalescence. She feels quite comfortable this morning, and rapidly gaining strength. Temp. 98.8° F.; pulse good; urine normal; discoloration of skin improved. 6 p.m.—Temperature normal; pulse good. From this date the patient's progress to convalescence was uninterrupted. A bitter tonic was ordered.

2nd February.—Sent home to Germany for a change of air.

CASE VII.

G. D. T., European. Aged 28. Invalided and Died.

An Officer of the Gold Coast Hausa Force; had been a little more than three years in the Colony, and the last was his second term of service. He had not enjoyed good health during this term of service, having suffered more or less from attacks of diseases of malarial origin.

On the 17th June, 1891, the first day of the commencement of the present illness, he started from sleep feeling out of sorts, with general malaise; had no appetite for breakfast nor energy to do anything; he, however, went to his duties, but got worse, and had to take to his bed, and had taken quinine twice.

18th June.—Feeling better on this the second day, he again attempted to return to his duties, but he was attacked by shivering fits with chilliness all over the body, and pains in the back and legs. When seen at 8 p.m. he complained of weakness and lassitude, headache and nausea. Skin cool and moist; Temp. 99° F.; Pulse regular, full, and compressible; Urine high-coloured; Bowels not open; tongue covered with dirty-yellowish fur; pressure elicited pain in the hepatic region. To take quinin. sulph. gr. x. every four hours, and poultice applied to the abdomen; beef tea, Brand's Essence, arrowroot, and champagne ordered.

19th June, 8.30 a.m.—Patient had a fair night. Complains of thirst and not passing sufficient quantities of urine; bowels not open; temp. 102° F.; pulse febrile. 6 p.m.—Skin perspiring freely; temp. 99° F.; pulse regular and weak. To take Pil Coloc et Hyoscy—gr. iv.

20th June.—Called up at 3 a.m. to see the patient, whom I found in bed covered with blankets and shivering with cold dry skin. He complains of chilliness all over the body and of being light-headed. Temp. 104° F.; pulse rather rapid, regular, small, and compressible; urine about six ounces, black-coloured like molasses—acid in reaction, sp. g. 1.030, albuminous, constituents of hæmoglobin present, with a heavy deposit of urates, etc., but no blood, bile, sugar, nor tube casts. Frequent retching and vomiting; vomited matters are black-coloured; bowels have acted twice—stools are black-coloured; icteric tinge of conjunctivæ and skin. To take fresh milk and Sauerbrun frequently: Calomelos gr. x. and quinin. sulph. gr. xv. administered at once. 6 a.m.—Temperature lower—102° F., with subsidence of general symptoms. 10 a.m.—Complains of oppression in the epigastrium, sick several times—vomits now "green" mixed with frothy fluid; urine black; temp. 103° F. A saline aperient draught administered. 4 p.m.—Rather restless; bowels have moved twice, stools still black-coloured; to take quinin. sulph. gr. xv. at once. 6 p.m.—Temperature lower—99° F. Pulse regular and weak; vomited twice—vomited matters are bright yellow; urine black. Calomelos gr. x. given at once. To take iced champagne and suck bits of ice.

21st June, 6.30 a.m.—Patient had a much better night and feeling better this morning. Temperature normal, and pulse regular and full but weak; about ten ounces of urine passed—colour has turned dark-reddish—bowels have opened thrice—stools are dark reddish; stomach is very irritable, and rejects everything swallowed, even to a drop of water; sickness and retching came on in the night; oppressive feeling in the epigastrium is better. As stomach is so very irritable, rectal feeding is temporarily adopted—and so an enema containing quinin. sulph. gr. xv., brandy ʒi. and beef tea administered, to be repeated every three hours. Enema retained till 11 a.m., when bowels moved once; tongue cleaning; temperature normal; pulse regular and weak; skin cool and moist; four motions of the bowels; vomiting incessant, vomited matters are green; thirst insatiable. An effervescing draught containing acid hydrocyanic dil administered at once, afterwards bismuth Dover's powder and soda were also retained. 12 p.m.—Called up to see the patient, who is restless, and complains of being unable to sleep. Vomiting and retching have ceased.

Injectio morphiæ hypoderm administered ; after this patient took about four ounces of barley water and kept it down.

22nd June, 7 a.m.—Patient had a quiet night after the morphia injection. He is gaining strength, and has been able to keep down some brandy and barley water. Nausea and vomiting with headache have ceased ; thirst is much less ; temp. 102° F. ; pulse febrile ; urine turned bright yellow coloured and clear. 6.30 p.m.—Patient had a sound sleep in the forenoon, and on waking up he took some nourishment and retained it. He is doing fairly well. Temp. 100 F. ; pulse regular and weak. To take some arrowroot : rectal feeding stopped. 11.15 p.m.—Called up to see the patient, who complains of sleeplessness. Inject. morphiæ hypoderm repeated.

23rd June, 8 a.m. Patient had a quiet night, but broken sleep. He complains of thirst and sore mouth. Temp. 102° F. ; pulse febrile ; urine clear and light-coloured. One dark-reddish coloured stool. To take milk and soda *ad lib.* Mouth wash containing Pot. Chlor. ordered. 6 p.m.—Temp. 101° F. Pulse febrile ; three motions of the bowels produced great weakness and fainting, but these soon passed off, and patient fell into sound sleep at 8 p.m.

24th June.—Patient has much improved, and is making satisfactory progress. Taking nourishment freely. Temp. 100° F. throughout the day. As the patient has gained sufficient strength to undergo the strain of the voyage, he is recommended to be invalided home to England.

25th June, 8 a.m.—Patient's progress is satisfactory. He is stronger. Temp. lower, 99° F. Pulse good ; urine normal ; tongue clean ; bowels open. Sent home to England in the afternoon, but he had relapsed on the voyage, and died off the coast of Grand Bassam in comatose hyperpyrexia from suppression of urine.

CASE VIII.

A. G., European, aged 28. Recovery.

Is a Mercantile Factor stationed in the interior district of the Colony. He has been nearly three years out from England in continuous residence without leave, and with the exception of mild attacks of ague he had enjoyed robust health. For three days preceding the present attack he had suffered off and on from intermittent fevers, but they were not such as rendered him unfit to attend to his work. On the 13th September, 1894, however, he had been compelled to take to his bed, as he has been getting worse. This morning the 14th September, the fifth day of his illness, he has had severe attacks of pain all over the body, but principally at the joints, shiverings and chilliness, with thirst, headache, loss of appetite, and weakness ; and on passing urine, he noticed it was black, and so he got frightened, he said, and sent for me. On seeing him at 4 p.m. patient is rather restless, light-headed, and flushed all over the face. Temperature is high, 105° F. ; pulse very rapid, regular, small, and fairly strong ; urine is scanty, black-coloured like molasses, and contains a trace of albumen, constituents of hæmoglobin, and deposits of urates, etc., acid in reaction, but no blood, sugar, or tube casts ; twice vomited green bile mixed with frothy fluid ; bowels had been kept loose by a mixture containing fruit salt and lemon squash taken by the patient this morning. Skin not discoloured, but hot and dry ; tongue covered with dirty yellowish fur ; slight tenderness on pressure in the hepatic region. Antipyrin gr. xv. every hour till 30 grains have been taken, and these to be followed half an hour after by quinin. Sulph. gr. xv. To take Mist. Pot. Acet. Co. every three hours ; sterilised milk and soda *ad lib.* 7.30 p.m.—Patient is much relieved ; temp. 102.5° F. ; pulse febrile and weak ; urine increasing in quantity—colour "turning" ; skin perspiring freely. To repeat antipyrin and quinine.

15th September, 8 a.m.—Patient had a good night. Feeling much better this morning ; temperature normal ; pulse regular and weak ; urine is increasing in quantity, clear and light-coloured ; bowels free ; headache and vomiting have ceased ; thirst much less. Quinin. Sulph. gr. x. every four hours. To take a teaspoonful of Brand's Essence frequently. 7.30 p.m.—Temperature normal ; pulse fairly good ; urine is now plentiful, clear, and red-yellowish coloured. Antipyrin stopped.

16th September, 8 a.m.—Patient passed a good night, and slept till this morning; feeling very much better and stronger. Permitted to sit up, temperature normal; pulse good; urine quite normal; bowels free; tongue cleaning; skin cool and moist; appetite improving. 7.30 p.m.—Patient doing fairly well; condition remains the same as last note.

From this date up to the 18th September patient's progress was favourable and uninterrupted. On the 19th September, however, I was hurriedly sent for, as the patient has suddenly got worse. On seeing him, the patient complains of thirst and headache, skin slightly discoloured yellow, hot but moist; no return of hæmoglobinuria, but temperature is high, 103° F.; pulse febrile and weak; urine plentiful and light-coloured; bowels not open. Antipyrin gr. xx. administered at once, to be followed in half-an-hour by Quinin. Sulph. gr. xx. 6 p.m.—Temp. 103.6° F.; pulse febrile and weak; urine high-coloured. Bowels still not open; skin hot and slightly moist. To take calomel gr. v., to be followed in the morning by a saline aperient draught containing equal parts of sodii sulph. and sodii phosph.

20th September, 8 a.m.—Patient passed a very good night. Temp. 101.4° F. Pulse regular and weak; urine normal. Complains of nausea and oppressive feeling in the epigastrium; bowels not open. To take champagne in small quantities frequently. 6 p.m.—Temp. 101.2° F.; pulse regular and weak; urine normal; bowels have acted twice, stools are dark-reddish coloured; headache and nausea better.

21st September, 8 a.m.—Patient had a very good night. Feeling much stronger and better. He complains of sore mouth. Temp. 100.2° F.; pulse regular and fairly strong; urine normal; bowels not open; oppression in the chest is better. Mouth wash ordered frequently. To take Bovril and arrowroot. 6 p.m.—Temp. 101.2° F.; pulse regular and fairly strong; bowels not open.

22nd September, 8 a.m.—Patient had a good night, and doing fairly well. He complains of slight soreness of the throat. Temp. 99.8° F. Pulse regular and fairly strong. Bowels not free. To take saline aperient draught. 7 p.m.—Bowels have acted thrice, stools reddish coloured. Temp. 100° F. Pulse regular and strong; appetite good.

23rd September, 8 a.m.—Patient feels much better, and is quite cheerful and comfortable. Temperature normal; pulse good; urine normal; tongue clean; appetite keen. Bowels open. 6 p.m.—Patient's condition is the same as this morning.

24th September.—Patient is convalescent.

25th September.—Sent to the seaside town of Lome in German Togoland for a change of air. He has since returned in good health to resume his work, and is quite well.

CASE IX.

J. W. H., European. Age 50. Recovery.

A timber Merchant, with five years' experience of this coast. During this period he had enjoyed good health, with the exception of slight attacks of intermittent fevers. A fortnight previous to the commencement of the present illness he had been in indifferent health, for which he had been treated. On the 27th July, 1895, at 8 a.m., the patient sent for me. On seeing him, he complains of weakness, shiverings, and chilliness all over the body, with pains confined to parts between the soles of the feet and knees, and between the tips of the fingers and elbows, described as "cramp," lightning pains, headache, thirst, and bad mouth. Tongue covered with thin white fur. Bowels irregular; eyes bright, yellow discoloration of the skin; temp. 104.2° F.; pulse rather slow, 60, full and irregular; tenderness elicited on pressure in the hepatic region, but liver is not enlarged; urine is scanty, and colour is like muddy port wine, acid in reaction, and contains a trace of albumen, constituents of hæmoglobin, deposit of urates, etc., but no blood, bile, sugar, or tube casts; bowels not open; vomiting of white frothy fluid substance. Antipyrin gr. xx. administered, and followed in half-an-hour by Quinin. Sulph. gr. xx; to take Mist. Pot. Acet. Co. every three hours; fresh milk

and soda *ad lib.*, and Brand's Essence of Beef. 12.30 p.m.—Perspiring profusely; temp. 101° F.; pulse 80, regular and full, but weak; urine is still black and thick like molasses. Calomel gr. v. twice daily. 6 p.m.—Patient complains of his mind being cloudy, another attack of shiverings with chilliness, and vomiting came on at 3.30 p.m.; bowels have opened once, stool dark-reddish coloured; about 15 ounces of black urine passed; headache and nausea better; temperature 103.2° F.; pulse 80, rapid, irregular, but fairly strong. Antipyrin and quinine repeated.

28th July, 8 a.m.—Had a bad night. Shiverings came on at midnight, with vomiting of white frothy substance, after which the bowels acted twice, and passed urine four times. He complains of his voice being weak and broken, intolerance of light and insatiable thirst. Icteric discoloration of the skin is more pronounced. Tongue covered with dirty-yellowish fur; temp. 101° F.; pulse 55, intermittent and weak. Patient sponged down with tepid water, and underclothing changed. Poultice applied to the hepatic region and a saline aperient draught administered. To take egg-flip, and arrowroot and a tablespoonful of brandy every two hours. 12 a.m.—Complains of feeling tired; one watery stool; urine is of fair quantity but still black; temperature 101° F.; pulse slightly irregular and weak; to take Quinin. Sulph. gr. xv. 7.30 p.m.—Improving, but complains of weakness; temp. 100.8° F.; pulse 80, regular, small, and weak; urine plentiful; colour has turned to dark-reddish colour and is clear; bowels have acted thrice; stools are peculiar, the colour and consistence are not unlike spinach covered with palm oil; thirst persists; skin is cool and moist. To take Quinin. Sulph. gr. xv.

29th July, 8 a.m.—Had a very bad night, but shiverings did not return; temp. 101.4° F.; pulse regular and weak; urine is clear and light-coloured; bowels not free; lightning pains severe in the calves of the legs. A saline aperient draught administered. 12 noon.—Temp. 100.8° F.; pulse regular and weak; urine normal colour; bowels have acted once, stool has the same characters as last note. Patient sponged down and clothes changed. 7 p.m.—Temp. 100.4° F.; pulse 60, regular and weak; urine normal; tongue cleaning; appetite improving.

30th July, 8 a.m.—Patient had a bad night; no sleep whatever; pains and headache better; temp. 100.0° F.; pulse regular and compressible; symptoms of cinchonism developed; bowels not open. Poultice stopped; saline draught repeated. 6 p.m.—Temp. 99.8° F.; pulse fairly good; one stool; urine normal. To take some toasted bread and chicken broth.

31st July, 8 a.m.—Patient had indifferent night, woke up often; symptoms of cinchonism subsiding; urine normal; bowels not open; discoloration of the skin improving; temp. 99.2° F.; pulse 70, fairly good. 6 p.m.—Temp. 99.8° F.; pulse fairly good. Taking nourishment freely. Quinin. Sulph. gr. x. administered.

1st August, 8 a.m.—Patient had a better night, and is improving. Bowels not free; tongue clean; urine normal; temp. 99.2° F.; pulse 70, regular and good; saline draught repeated; Mist. Pot. Acet. Co. stopped. To take chicken broth and blanc mange pudding. 6 p.m.—Temp. 99.8° F.; pulse good; two stools, dark-reddish coloured; urine normal; quinin. sulph. gr. x. administered.

2nd August.—Had a very good night; slept very well, and feeling much better and stronger; thirst much less; temp. 99.2° F.; pulse 70, good; appetite keen; urine normal; pains in calves of legs, sides, and back have returned. Poulticing ordered. 6 p.m.—Temp. 101° F.; pulse slightly febrile. Calomel gr. v. and quinin. sulph. gr. x. administered.

3rd August, 8 a.m.—Patient had a very good night, and slept very well. Bowels not open; temp. 99.4° F.; pulse good; urine normal; quinin. sulph. gr. xv. administered. Brandy stopped, and to take champagne instead. 9 p.m.—Temp. 100.4° F.; pulse fairly good; quinin. sulph. gr. xv. administered.

4th August.—Patient is doing fairly well; complains of neuralgic pains in eyes and about the face. Hands hot, but not the body generally. Bowels not open; urine normal; temp. 99° F.; pulse good. Pil. hydrarg. gr. iii., with saline aperient draught, ordered. 6 p.m.—Two stools at 1 p.m. Temp. 100° F.; pulse slightly febrile and weak. Quinin. Sulph. gr. x. administered.

5th August, 8 a.m.—Patient has made great improvement. Two stools during the night; neuralgic pains persist, but the feeling of intolerance of light has subsided. Temp. 99.2° F.; pulse good. 6 p.m.—Temp. 100° F.; pulse good; quinin. sulph. gr. x. administered.

6th August, 8 a.m.—Patient had a better night, and improvement continues; temp. 99° F.; pulse good; neuralgic pains better. Thirst and headache also better. 6 p.m.—Temp. 99.8° F.; pulse good; patient complains of sore mouth. He is, however, quite cheerful, and taking food well; mouth wash ordered.

7th August, 8 a.m.—Slept very well, and feeling much stronger and better this morning; temp. 98·8° F.; pulse good; champagne stopped. Patient allowed up for two hours. To take port wine, quinin. sulph. gr. v. thrice daily. 7 p.m.—Temp. 99·6° F.; pulse good; nourishment increased.

From the 8th to the 13th August patient progressed favourably to convalescence, and on the 15th August he had quite recovered, and soon after he resumed his work.

CASE X.

Moses D., Native (Negro). Aged 48. Recovery.

A native, born and brought up on the Seaboard—stationed at Akuse—one of the most insalubrious and marshy districts in the interior of this colony. He has been here for nearly five years as native agent of the Mercantile Branch of the Basel Missionary Society, and during this period he had suffered occasionally from intermittent fever and other diseases of malarial origin. His present illness commenced about two days ago with weakness and slight attacks of fever in the evening.

On the 25th November, 1892, I was sent for to see the patient. On arriving at the factory, I was met on the verandah by the principal European Agent, Mr. Aepli and Mr. Kaeser, of the firm of Chevalier & Co., who informed me that the patient had got Blackwater Fever. On seeing him he complains of nausea, headache, loss of appetite, pain in the abdomen, obstinate constipation, thirst, difficulty of passing urine, which is scanty, cold sweat, shiverings and chilliness and sleeplessness, with vomiting of dark-greenish fluid substance and being light-headed.

He is rather restless, doubled up with contortions and twistings on account of pains, legs drawn up, breathing slightly affected; breath offensive; tongue covered with a leaden yellowish fur; eyes suffused, conjunctivæ tinted yellow; nails, palms of hands, and soles of feet are extremely jaundiced; pain elicited on pressure in the hepatic region; temp. 105° F.; pulse very rapid and irregular and weak. About three ounces of urine drawn off. Colour like molasses, acid in reaction, sp. g. 1,030, and contains a trace of albumen, constituents of hæmoglobin, deposit of urates, etc., but no blood, bile, sugar, nor tube casts; bowels not open for three days. Antipyrin gr. xxx. administered, to be followed in half-an-hour by quinin. sulph. gr. xv.; enema containing Ol. ricini, Liq. opii. sed. and soap also administered at once, and brought away very scanty and hard, shotty, black fæces; poultice ordered to be applied to the whole of the abdomen. To take mist. pot. acet. co. every three hours; fresh milk and soda *ad lib.* 9 p.m.—Temp. 103·2° F.; pulse febrile and weak; skin perspiring profusely; about three ounces of black urine drawn off; vomiting much less; pain less; constipation still obstinate; thirst persists, but head is clearer. Antipyrin and quinine repeated. Enema of castor oil and soap ordered.

26th November, 8 a.m.—Patient had a very bad night. No sleep whatever, on account of pain and vomiting in the night. He is restless and weak this morning. Temp. 102·5° F.; pulse rapid, irregular, and weak. Bowels have acted once—stool is black, hard, and “shotty” fæces; about six ounces of urine passed is black; headache better; pains are less. To take calomelos gr. v. and quinin. sulph. gr. x. every four hours. 7 p.m.—Temp. 103° F.; pulse febrile, irregular, and weak; urine passed is still black and scanty; shiverings with chilliness came on at 3 p.m. Antipyrin gr. xxx. repeated. A tablespoonful of brandy every three hours.

27th November, 8 a.m.—Patient had a quiet night but no sleep. He is improving. Temp. 101·4° F.; pulse regular and weak; urine is increasing in quantity, clear but still black-coloured; vomiting has ceased; thirst abating; bowels acted twice last night; feeling no pains anywhere in the body generally. 7 p.m.—Temp. 100·8° F.; pulse regular and weak; urine still black; tongue cleaning. To take pil. hydrarg. gr. iv. at once, to be followed in the morning by a saline aperient draught containing sodii sulph. and sodii phosph.

28th November, 8 a.m.—Patient had a better night. Slept fairly well, but woke up early this morning feeling out of sorts. Temp. 96·8° F.; pulse regular and weak; bowels free after taking

draught; urine increased—colour has turned dark-reddish; tongue quite clean; appetite improving 7 p.m.—Patient is quieter. Temp. 100.4° F.; pulse regular and weak.

29th November, 8 a.m.—Patient slept well and has made improvement. Bowels free; skin moist; discoloration of conjunctivæ, nails, palms, and soles is improving; urine is plentiful and light-coloured; thirst better; temp. 99° F.; Pulse fairly good. To have Akassa, chicken soup and bread. 7 p.m.—Temp. 99.2° F.; pulse good. Slept for two hours in the afternoon.

30th November, 8 a.m.—Patient doing fairly well. He is gaining strength rapidly. Appetite keen; patient's request to have peppered soup refused. Temp. 99° F.; pulse good; urine normal; bowels regular; discoloration of conjunctivæ, nails, palms, and soles better. Patient complains of soreness of mouth. Calomel, mist. pot. acet. co. and poultice stopped. Mouth wash ordered. Quinine reduced to five grains thrice daily. 7 p.m.—Temp. 99° F.; pulse good.

1st December, 8 a.m.—Patient feeling stronger and quite well. Temp. 98.8° F.; pulse good. Brandy stopped. 7 p.m.—Temp. 98.4° F.; pulse good; urine normal; bowels regular.

2nd December.—Patient is convalescent. Quinine stopped. Port wine and a bitter tonic ordered. From this date the patient's progress was uninterrupted, and on the 10th December he had quite recovered. Sent down to the Seaboard for a change of air. He has since returned in good health and resumed his work.

CASE XI.

G. E. C., Native (Mulatto), aged 65. Death.

A native Merchant, born and brought up on the Seaboard, and with the exception of occasional attacks of intermittent fever and chronic urethritis he had enjoyed a robust health. On the 20th November, 1887, I was hurriedly sent for by the patient. On seeing him he complains of fever, headache, weakness, sleeplessness, constipation, passing of scanty urine, loss of appetite, vomiting with positive aversion to food, shiverings and pains in the joints and back. Restless, skin and conjunctivæ jaundiced; tongue covered with a dirty-yellowish fur; tenderness elicited on pressure in the hepatic and left hypochondriac regions. Temp. 104.6° F.; pulse rather rapid, small, and weak; about three ounces of black-coloured urine passed is like molasses, acid in reaction, sp. g. not ascertained, and contains a small amount of albumen, heavy deposit of urates, etc., but no blood, bile, or casts; vomited matters are green-coloured like spinach.

Pil. col'oc. et hyoscy. gr. vi. and calomelos gr. vi. administered. To take mist. quiniæ every three hours. 8 p.m.—Temp. 103° F.; pulse febrile and weak; urine scanty and black.

21st November, 8 a.m.—Patient had indifferent night. Pains and vomiting less; pulse 100, rapid, regular, and weak; temp. 103° F.; skin acting slightly; urine still scanty and black. 6 p.m.—Temp. 101.6° F.; pulse febrile and weak. There is considerable abatement in general symptoms.

22nd November, 8 a.m.—Patient had a good night, and feeling somewhat better. Temp. 102.2° F.; pulse 80, regular and weak; urine still black and scanty; bowels not open; Jaundice of skin and conjunctivæ increased. Milk and soda, arrowroot and Akassa ordered. 6 p.m.—Temp. 102.8° F.; pulse 85, regular and weak.

23rd November, 8 a.m.—Had indifferent night. Feeling weaker this morning. Vomited once—vomits are black-coloured; urine still black and scanty; temp. 103° F.; pulse 100, regular and weak; tenderness over the liver and spleen persist; thirst, jaundice, and constipation persist. Chicken soup with Brand's Essence; large Poultice over the abdomen. 6 p.m.—Temp. 103° F.; pulse febrile.

24th November, 8 a.m.—Patient had a fairly good night. Temp. 101.2° F.; pulse 105, regular and weak; urine still black and scanty and passed with difficulty; it is thicker in consistence and having all the characters of "coal tar"; swallowing difficult; no pain or nausea; bowels costive; calomel stopped; enema ordered. To take champagne frequently. 6 p.m.—Weaker and listless; slight hæmorrhage from the nose; temp, 103° F.; pulse febrile and weak. Patient sponged down

with tepid water ; he refuses nourishment ; Rectal feeding ordered. Antipyrin gr. xx. administered, to be followed in half-an-hour by quinin. sulph. gr. xv.

25th November, 8 a.m.—Had a bad night, and is weaker. Temp. 102.6° F.; pulse febrile and weak ; urine still black and scanty ; discoloration of skin and conjunctivæ pronounced. 6 p.m.—Patient is powerless, and can hardly raise his head on the pillow ; urine drawn off is still black ; temp. 103.6° F.; pulse very rapid, small, and weak ; patient is so much exhausted that death was thought inevitable. He suddenly became unconscious for two hours, after which he again rallied but partially. Rubbed down with brandy and quinine, hypodermic administration of ether, and brandy and quinine mixed with a strong beef tea per rectum.

26th November.—Patient's condition alarming. Temperature higher— 104.2° F.; pulse running, He is delirious ; about two ounces of thick black urine drawn off, which contains about one-fifth of albumen, but no blood, bile, nor tube casts. Dry cupping over the kidneys and foot-warmers applied to the feet with cold sponging of the head had not the slightest effect whatever on the course of the symptoms. At 3 p.m. he had had three successive attacks of shiverings, followed by convulsive seizures. Urine now completely suppressed. At 6 p.m. temperature has risen higher— 105° F.: pulse so weak and running that it is hardly perceptible at the wrist. Every effort was made to mitigate the patient's condition, but all unavailing. The temperature rose higher— 106° F., under which the patient rapidly became unconscious, and soon afterwards died in comatose hyperpyrexia from suppression of urine.

SYNOPSIS OF CASES.

CASE I.

| Nation-ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmoglobin-uria. | Date of Cessation of Hæmoglobin-uria. | Length of Residence in the Colony. | First or Subsequent attack. | Treatment. | Result. |
|---------------|------|---------|-------------|---|--|-------------------------|-----------------------------------|---------------------------------------|------------------------------------|-----------------------------|--|---|
| German | M. | 32 yrs. | Missionary | Feeling hot all over the body; thirst, weakness, loss of appetite; pains in the back and waist; light-headed and sleeplessness. Restless, conjunctivæ and skin jaundiced, almost lemon-yellow discoloration, "green" vomits; Temp. 104° F. Pulse 120, rapid, regular, and compressible. Tongue covered with dirty-yellowishfur. Tenderness over the Liver and Spleen. | Urine is scanty and black like muddy Port-wine and contains constituents of Hæmoglobin, a trace of albumen, and a heavy deposit of urates, etc., but no blood, bile, or tube casts. Stools are scanty and dark-reddish coloured. | 1-1-90 | 4-1-90 | 6-1-90 | Two years | First attack | Cold sponging of the head and application of foot warmers; quinine, calomel. Draught containing Warburg's Tincture, poultice to abdomen; Bismuth and soda; a draught containing castor oil, sleepingdraught, egg-flip, fresh milk, slops, Barley water, champagne and soda; Bitter Tonic | Recovery: sent to Europe for a change of air. |

CASE II.

| Nation- ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmo- globin- uria. | Date of Cessation of Hæmo- globin- uria. | Length of Resi- dence in the Colony. | First or Subse- quent attack. | Treatment. | Result. |
|-------------------|------|------------|-------------|--|---|-------------------------------------|--|--|--|---|--|---|
| French. | M. | 28 yrs. | Missionary | Restlessness, thirst, periodical shiverings with chilliness all over the body, headache, a feeling of uneasiness in the lumbar regions, but no pain, sleeplessness, loss of appetite and costiveness; icteric dis- coloration of skin and conjunctivæ, eyes dazed, tongue covered with a dirty - yellowish fur. Temp. 105° F. Pulse 120, febrile. Incessant vomiting of at first white glairy mucoid fluid, afterwards dark muddy; Dysuria; no tenderness over the abdominal organs. | Urine is scanty and black like molasses, acid in reaction, and contains a trace of albumen, con- stituents of Hæmoglobin, and a heavy deposit of urates, etc., but no blood, bile, sugar, or tube cast. Stools are fluid, scanty and dark- reddish coloured. | 29-7-90 | 1-8-90 | 7-8-90 | One Year | Second attack. First in June, 1890. | Cold sponging of the head and application of foot warmers. Poultice to abdo- men, antipyrin, quinine, and calomel. Bis- muth and soda, saline draught, Pil Podoph Co. Mist. Pot. Acet Co. Mouth wash, sleeping draught, milk and soda, slops, Champagne and white wine. | Recovery : sent to Europe for a change of air. |

CASE III

| Nation-ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmoglobin-uria. | Date of Cessation of Hæmoglobin-uria. | Length of Residence in the Colony. | First or Subsequent attack. | Treatment. | Result. |
|---------------|------|---------|-------------|--|---|-------------------------|-----------------------------------|---------------------------------------|------------------------------------|-----------------------------|--|--|
| English. | M. | 28 yrs. | Merchant. | Incessant vomiting of at first "green" afterwards "coffee-ground" frothy fluid, strong headache, thirst, bad mouth, weakness, pains all over the body, especially in joints and back, constipation, cold and shivering occasionally, loss of appetite, pain in abdomen, difficulty of micturition and utter aversion to food. Restless, skin and conjunctivæ very jaundiced, eyes slightly injected, tongue coated with dirty-yellow fur. Temp. 101° F. Pulse weak. Tenderness to pressure in hepatic and lumbar (left) regions. | <i>Urine</i> is scanty, about 2oz. drawn off is thick and black like molasses, contains albumen, constituents of Hæmoglobin, deposits of urates, etc., but no blood, bile, or tube casts. <i>Stools</i> scanty, scybulous, dark-reddish colour. | 9-10-88 | 10-10-88 | 15-10-88 | 1½ years. | First attack. | Quinine and calomel. Haust Sennæ Co.; an effervesc. mixture containing acid Hydrocyanic Dil. Inject. Morph. Hyp.; Poulitice to Abdomen, Barley water; sleepingdraught, Enema of Castor oil and soap; milk and soda freely; Champagne, beef tea, Brand's Essence, arrowroot and chicken broth, with egg-flip. | Invalided after convalescence to Aburi for a change of air, but had relapse on disem-barking at Accra, and died there. |

CASE IV.

| Nation- ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmo- globin- uria. | Date of Cessation of Hæmo- globin- uria. | Length of Resi- dence in the Colony. | First or Subse- quent attack. | Treatment. | Result. |
|-------------------|------|------------|-------------|---|--|-------------------------------------|--|--|--|---|---|---|
| French. | M. | 25 yrs. | Missionary. | Chilliness, with period- ical shiverings, head- ache, lassitude, pains over the body, thirst, loss of appetite, consti- pation, weakness, op- pressive feeling in the epigastrium, and fright from noticing his urine turned black. Rather restless, skin icteric, but not the conjunctivæ. Tongue covered with dirty - yellowish fur, vomiting green bile. Tenderness in hepatic region. Temp. 103° F. Pulse irregular and weak. | <i>Urine</i> scanty and black, like muddy port wine, acid, contains a trace of albumen, con- stituents of Hæmoglobin, heavy deposits of urates, etc., but no blood, bile, nor tube casts. <i>Stools</i> scanty, fluid, and black coloured. | 12-6-92 | 12-6-92 | 15-6-92 | Six months | First attack. | Antipyrin, calo- mel, quinine, mouth wash, mustard poul- tice, Mist. Pot. Acet. Co., sleep- ing draught, purgative draught mist. sedative. Hot water bottles to feet, tepid water sponging, saline aperient, milk and soda freely, Bovril, arrow- root, Brand's es- sence, chicken broth, toasted bread, cham- pagne and brandy. | Recovery. Sent to France for a change of air. |

CASE V.

| Nation-ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmoglobin-uria. | Date of Cessation of Hæmoglobin-uria. | Length of Resi-dence in the Colony. | First or Subse-quent attack. | Treatment. | Result. |
|---------------|------|---------|-------------|--|--|-------------------------|-----------------------------------|---|-------------------------------------|------------------------------|--|--|
| Dutch. | M. | 21 yrs. | Merchant | Periodical attacks of cold shiverings with headache, thirst, pains all over the body and eyes, especially knees and back. Dizziness, light-headedness, sleep-lessness, loss of appetite, and constipation with inflamed hæmorrhoides. Face flushed, rather restless, tongue covered with thick dirty - yel- lowish fur, vomiting green frothy fluid, skin and conjunctivæ icteric. Tender to touch in hepatic region. Temp. 105.4° F. Pulse febrile. | Urine scanty and dark coloured like sherry at first, afterwards muddy port wine with little deposit of urates, etc. A trace of albumen at first, but half albumen on 30-9-90 con- stituents of Hæmoglobin, but no blood, bile, or cast. <i>Stools</i> scanty, shotty, hard, and black - coloured faeces. | 21-9-90 | 24-9-90 | There was no cessa- tion of Hæmo- globin- uria before death | Six months | First attack | Antipyrin, calo- mel, quinine, hot water bottles to feet and tepid sponging of head, sleeping draught, saline draught. Enema of castor oil and soap. Poulrice to abdomen. Ung Gallæ with opium to piles. Diaphoretic mix- ture. Phenace- tine. Blisters to the nape of the neck. Milk and soda, beef tea, arrowroot, cham- pagne and brandy. | Death from suppression in a state of comatose H y p e r - p y r e x i a. |

CASE VI.

| Nation-ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmoglobin-uria. | Date of Cessation of Hæmoglobin-uria. | Length of Residence in the Colony. | First or Subsequent attack. | Treatment. | Result. |
|---------------|------|---------|-------------|---|---|-------------------------|-----------------------------------|---------------------------------------|------------------------------------|-----------------------------|--|--|
| German. | F. | 25 yrs. | Missionary. | Slight attacks of shiverings, with headache, pains all over the body, chiefly in the abdomen, sleeplessness, terrible thirst, but ejects fluid as soon as it is swallowed, loss of appetite, a feeling of oppression in the epigastrium, bad mouth, nausea, and constipation. Restless and groaning, light-headed, incessant vomiting of green frothy fluid, skin and conjunctivæ slightly icteric. Tongue covered with dirty yellowish fur. Tenderness over abdomen. Temp. 102.5° F. Pulse weak. | Urine scanty and black, like molasses, acid, sp.g. 1.020, with a trace of albumen, constituents of hemoglobin, and a heavy deposit of urates, etc., but no blood, bile, nor tube cast. Stools scanty and black - coloured faeces. | 17.1.94 | 21.1.94 | 23.1.94 | Two years. | First attack. | Turpentine stupes, antipyrin, calomel, quinine, and castor oil; Dover's powder and Bismuth, Mist. Pot. Acet. Co., and cold application to head, sleeping draught, milk and soda, beef peptone, beef jelly, arrowroot, and chicken soup, Greek wine, brandy, and Champagne. Mouth wash. Bitter tonic. | Recovery Subsequently left for Germany, on usual leave of absence. |

CASE VII.

| Nation-ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmoglobin-uria. | Date of Cessation of Hæmoglobin-uria. | Length of Residence in the Colony. | First or Subsequent attack. | Treatment. | Result. |
|---------------|------|---------|-----------------------------|--|--|-------------------------|-----------------------------------|---------------------------------------|------------------------------------|-----------------------------|---|--|
| English | M. | 28 yrs. | Officer in the Constabulary | Chilliness and shiverings, pains in the back and legs, headache, thirst, nausea, not passing sufficient urine, loss of appetite, constipation, weakness, bad mouth. Restless, retching and vomiting of black coffee - ground fluid. Tongue covered with dirty - yellowish fur. Tenderness to pressure in the hepatic region. Temp. 99° F. Pulse regular and weak. Icteric tinge of skin and conjunctivæ. | <i>Urine</i> scanty, at first high coloured, but afterwards turned black and thick like molasses; acid in reaction, very albuminous with deposit of urates, etc., and contains constituents of Hæmoglobin, but no blood, bile, or cast. <i>Stools</i> scanty, black - coloured faeces. | 18-6-91 | 20-6-91 | 23-6-91 | 3½ years | First attack | Quinine, calomel Pil. Coloc et Hyoscy., saline aperient. Ice to suck, poultice to abdomen generally, Mist. Pot. Acet Co., Dover's powder and Bismuth. Bland diet; Iced Champagne, Brandy, milk and soda freely. Rectal feeding adopted when stomach rejected. | Invalided after convalescence to England, but had relapse and died on the voyage from Urmia. Suppression of comatose Hyperpyrexia. |

CASE VIII.

| Nation- ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmo- globin- uria. | Date of Cessation of Hæmo- globin- uria. | Length of Resi- dence in the Colony. | First or Subse- quent attack. | Treatment. | Result. |
|-------------------|------|------------|-------------|---|---|-------------------------------------|--|--|--|---|---|--|
| English. | M. | 28 yrs. | Merchant. | Pains all over the body, chilliness and shiver- ings, thirst, loss of appe- tite, headache, oppres- sive feeling in the chest, insufficient quantity of urine, which is black. Restless, light-headed, vomiting of green frothy fluid. Tongue covered with dirty-yellowish fur. No tenderness over the abdominal organs, nor skin and conjunctivæ icteric. Temp. 105° F. Pulse small, regular, and fairly strong. | <i>Urine</i> scanty and black coloured like molasses, acid, a trace of albumen, consti- tuents of hæmo- globin, and heavy deposits of urates, etc., no blood, bile, sugar, or cast. <i>Stools</i> .—Fæces are dark-reddish coloured. | 13-9-94 | 14-9-94 | 16-9-94 | About three years. | First attack. | Antipyrin, qui- nine, calomel, blue pill, saline aperient, Mist. Pot. Acet. Co., mouth wash, milk and soda freely, beef tea, chicken soup, arrowroot, egg- flip. Brand's Essence, cham- pagne. Bitter tonic. | Recovery. Sent to the sea- board for a change of air. |

CASE IX.

| Nation-ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmoglobin-uria. | Date of Cessation of Hæmoglobin-uria. | Length of Resistance in the Colony. | First or Subsequent attack. | Treatment. | Result. |
|---------------|------|------|-------------|---|---|-------------------------|-----------------------------------|---------------------------------------|--|------------------------------------|--|-----------|
| English. | M. | 50 | Merchant. | Periodical attacks of chilliness and shiverings, pains in the back and joints, nausea, thirst, headache, constipation, bad mouth, weakness. Restless, skin and conjunctivæ icteric, vomiting of white frothy fluid. Tongue covered with thin white fur, light-headed. Tenderness to pressure in the hepatic region. Temp. 104.2° F. Pulse 60, irregular, but fairly strong. | Urine scanty, thick and black like molasses, acid, and contains a trace of albumen, constituents of hæmoglobin, heavy deposit of urates, etc., no blood, bile, sugar, or cast. Stool—Scanty and offensive; peculiarly green-red-dish coloured, like pounded spinach mixed with Palm Oil. | 25-7-95 | 27-7-95 | 29-7-95 | Five years only. Twice absent from Col'ny. | Second First attack two years ago. | Antipyrin, quinine, Mist. Pot. Acet. Co., Calomel, saline aperient, mouth wash, Milk and soda freely, Chicken soup, arrowroot, egg-flip and Brand's Essence, Brandy and port wine. Bitter tonic. | Recovery. |

CASE X.

| Nation-ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmo-globin-uria. | Date of Cessation of Hæmo-globin-uria. | Length of Resi-dence in the Colony. | First or Subse-quent attack. | Treatment. | Result. |
|----------------|------|------|------------------|--|---|-------------------------|------------------------------------|--|---|------------------------------|--|---|
| Native (negro) | M. | 48 | Mercantile Agent | At first griping pains in abdomen. Dysuria, constipation, nausea, cold clammy sweat, afterwards periodical attacks of chilliness and shiverings, thirst, loss of appetite, sleeplessness and headache. Restless, vomiting of dark-greenish fluid, constantly in contortions and doubled up with pain, breathing slightly affected, breath offensive. Tongue covered with dirty - yellowish fur, conjunctivæ, and nails, palms and soles icteric. Pain in Hepatic region, light-headed, Temp. 105° F. Pulse weak and regular. | Urine scanty and blacklikemuddy Port wine, acid, small quantity of albumen, constituents of Hæmoglobin, deposit of urates, etc., no blood, bile, or cast. Stool—Fæces hard, shotty (scybalous), and black coloured. | 23-11-92 | 25-11-92 | 29-11-92 | All his life on the sea-board. Five years in the interior of Colony | First attack | Poultice, anti-pyrim, quinine calomel, enema of soap and castor oil, with Liq. Opii sedativ Mist. Pot. Acet. Co., Saline Aperient, Mineral water and milk freely, Akassa Chicken soup, Brandy and Port wine. | Recovery: sent to the seaboard for a change of air. |

CASE XI.

| Nation- ality. | Sex. | Age. | Occupation. | Complaint and condition of patient. | Condition of Urine and Alvine evacuations. | Date of onset of Fever. | Date of onset of Hæmo- globin- uria. | Date of Cessation of Hæmo- globin- uria. | Length of Resi- dence in the Colony. | First or Subse- quent attack. | Treatment. | Result. |
|----------------------|------|------|-------------|--|--|-------------------------------------|--|--|--|---|--|--|
| Native. (Mulatto) | M. | 65 | Merchant. | Pains in the back and joints, periodical attacks of chilliness and shiverings, with nausea, headache, thirst, constipation, sleeplessness, passing very little urine, aversion to food, and weakness. Tongue covered with brown, yellowish fur, icteric tinge of skin and conjunctivæ. Tender to pressure in hepatic and lumbar regions. Temp. 104.6° F. Pulse weak. | Urine scanty and black, not unlike molasses, acid, and contains albumen and constituents of Hæmoglobin, with deposit of urates, etc., but no bile, blood, nor cast. Stool—Fæces are scanty, shotty, hard, black coloured (scybala). | 18-11-87 | 20-11-87 | No cessation of Hæmoglobinuria before death took place. | All his life on the sea-board. | First attack. | Poultice to abdomen, calomel, Pil. coloc. et Hyoscy, quinine. Enema of Ol. Ricini and soap. Antipyrin, milk and soda freely, chicken soups, akassa, champagne. | Died from exhaustion in comatose hyperpyrexia. |

SPECIMENS OF CLINICAL TEMPERATURE CHARTS.

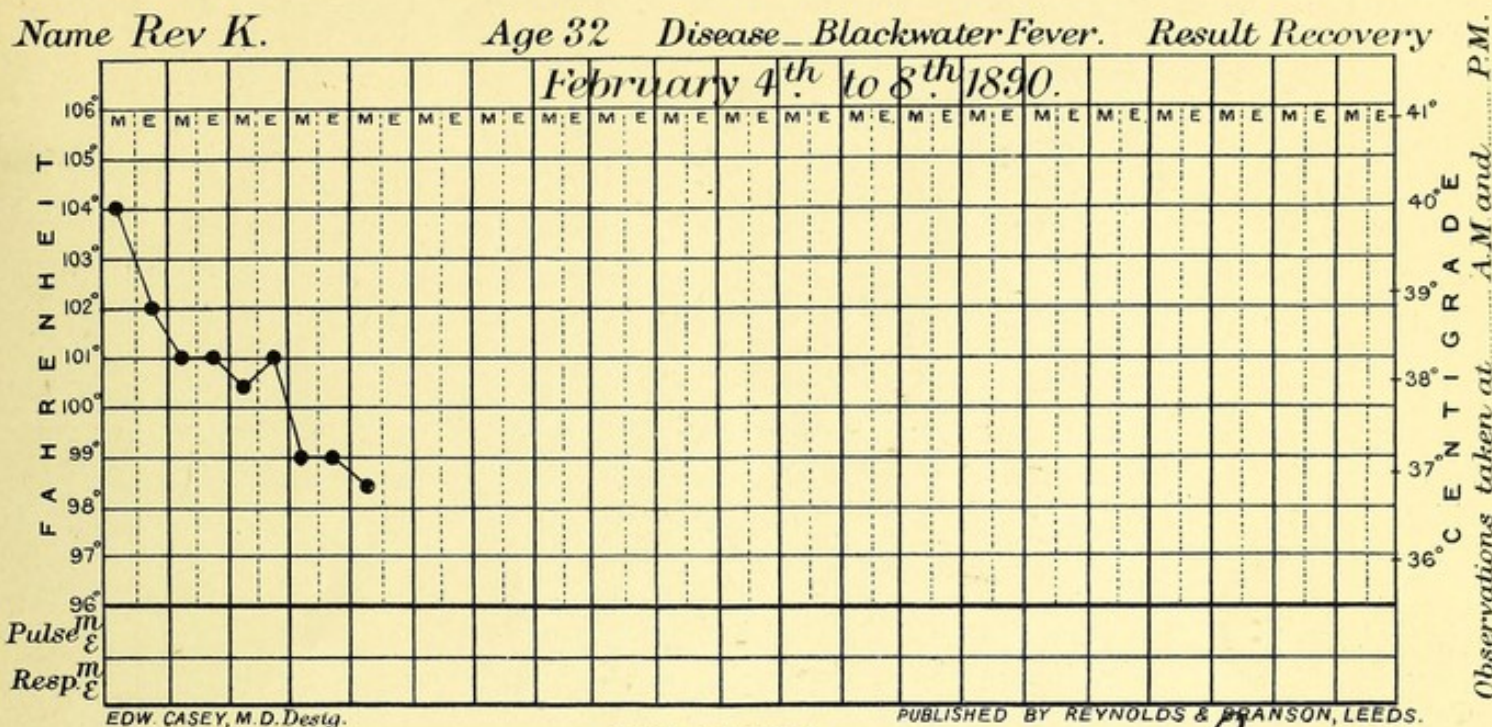


CHART I

Rev. K. Blackwater Fever.

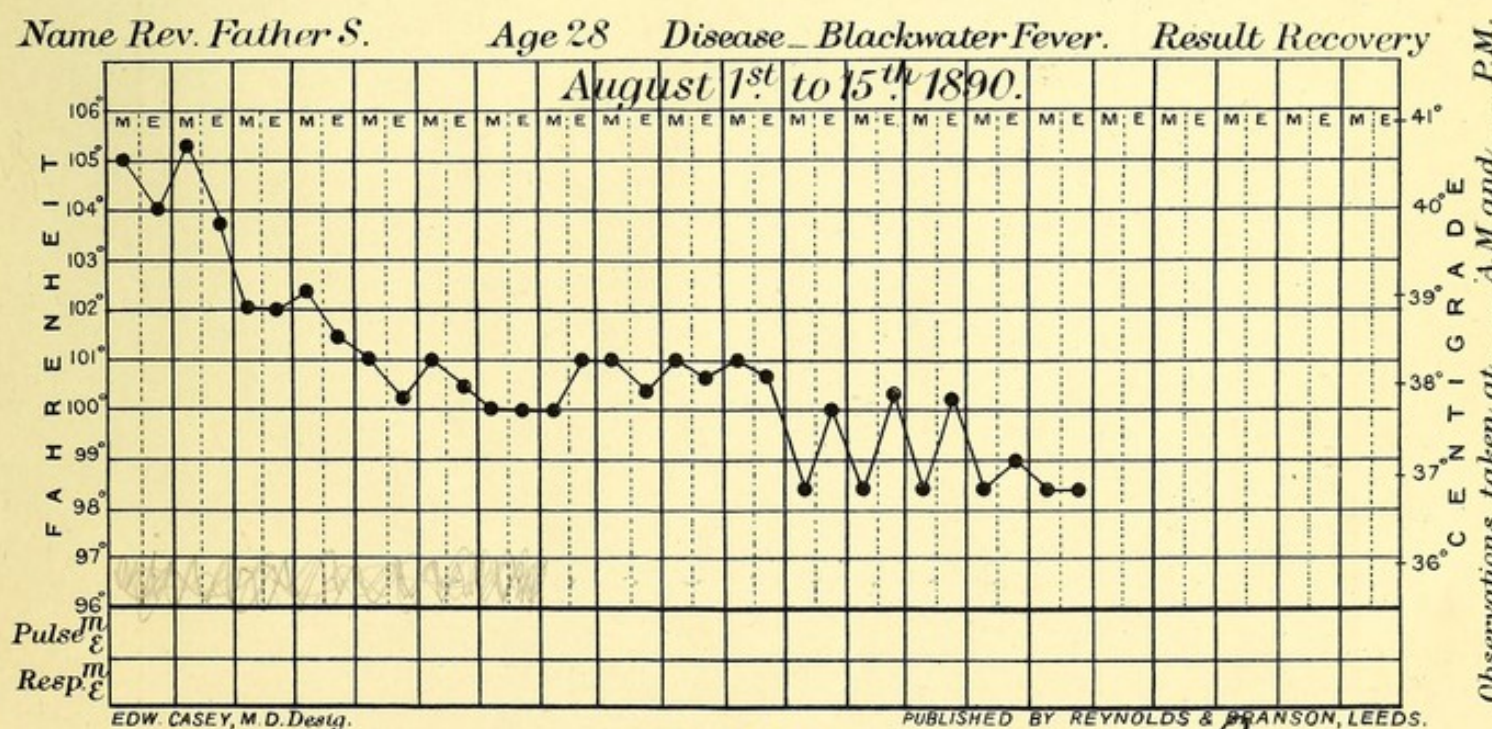
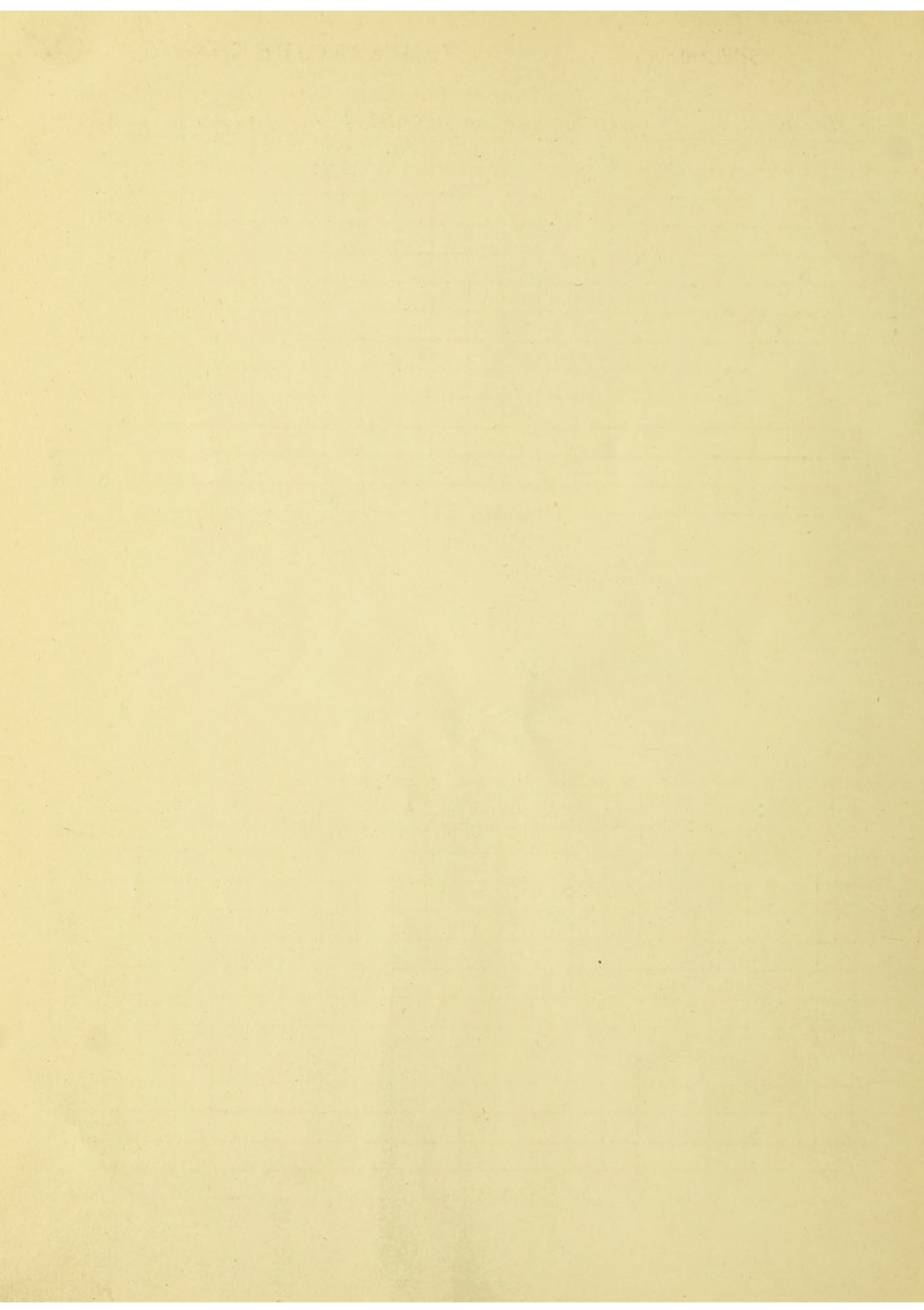


CHART II

Rev. Father S. Blackwater Fever.



Name *J. E.*

Age *28*

Disease *Blackwater Fever.*

Result *Invalided*

Observations taken at *A.M.* and *P.M.*

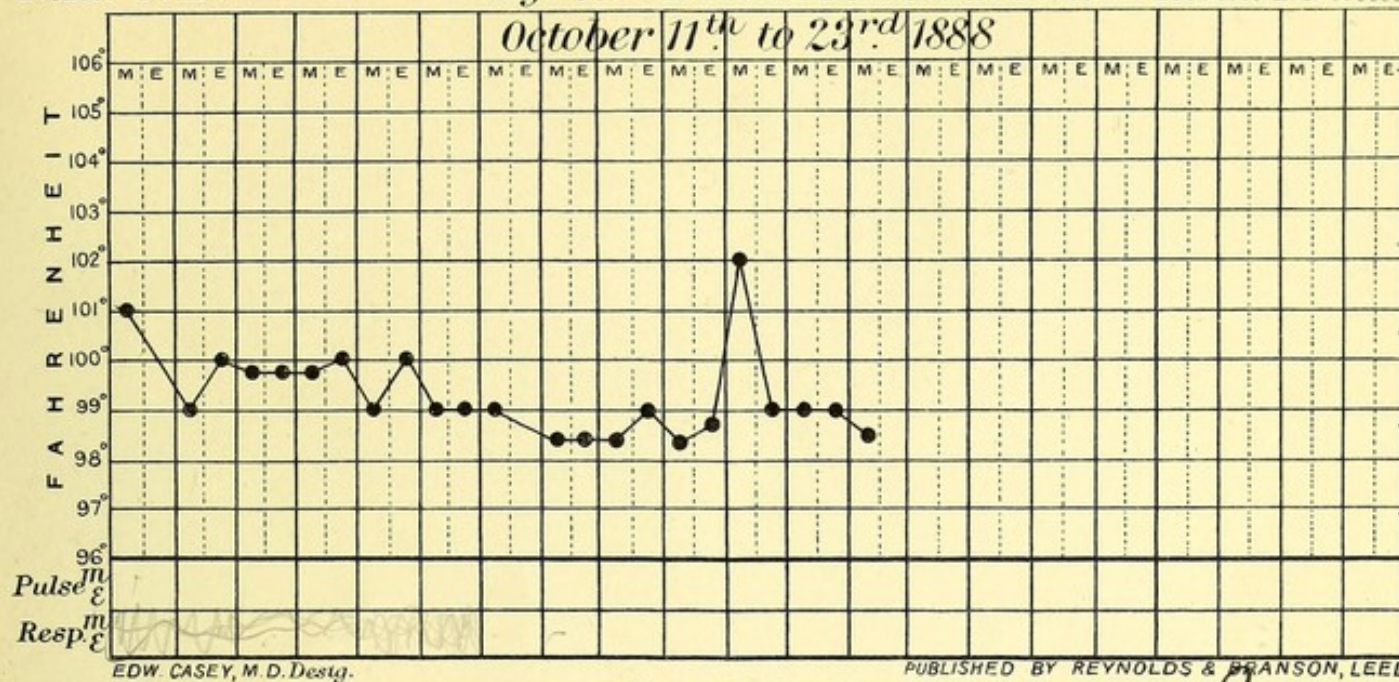


CHART III

Br. Quin. Iod. Ap. fer.

Name *Rev. Father Daniel*

Age *26*

Disease *Blackwater Fever.*

Result *Invalided*

Observations taken at *6 & 12 A.M.* and *6 P.M.*

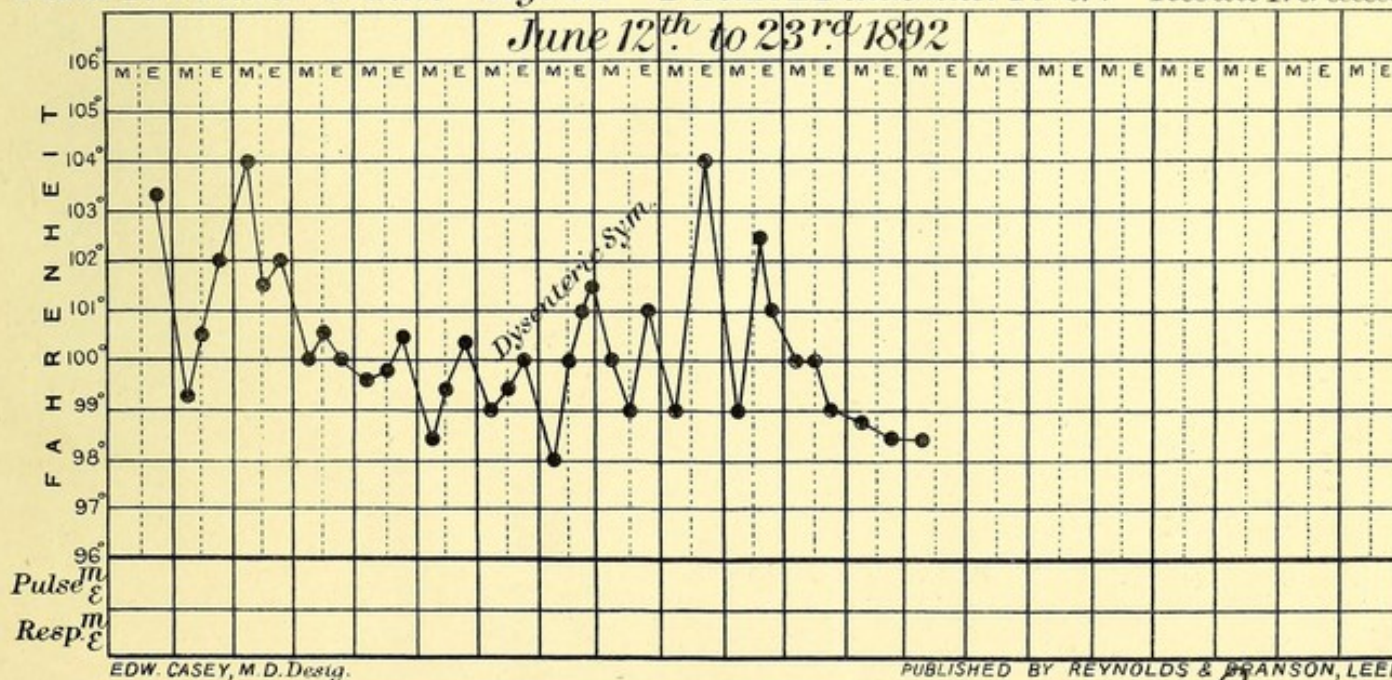
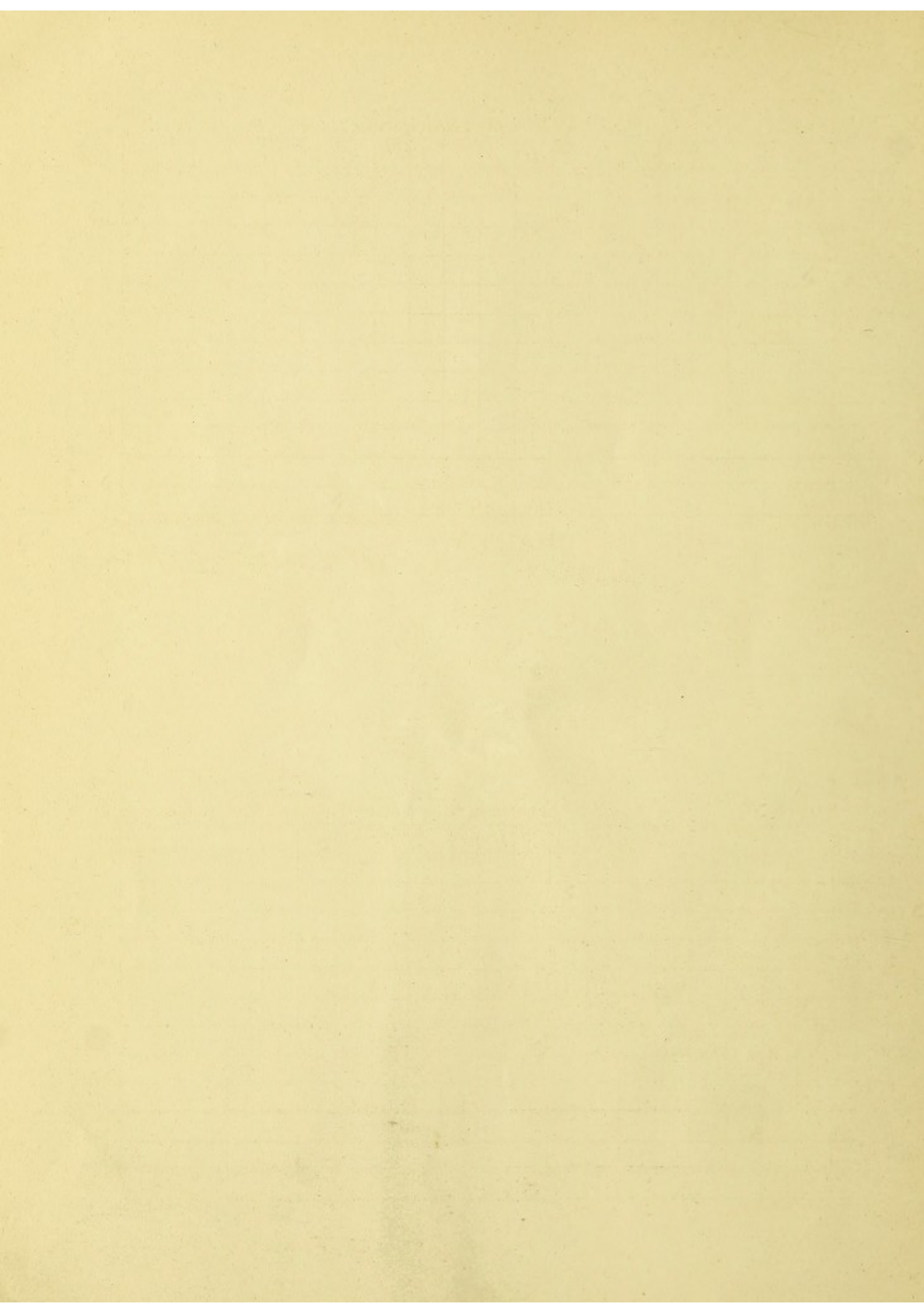


CHART IV

Br. Quin. Iod. Ap. fer.



Name *D.G.D.*

Age *21*

Disease *Blackwater Fever.*

Result *Death*

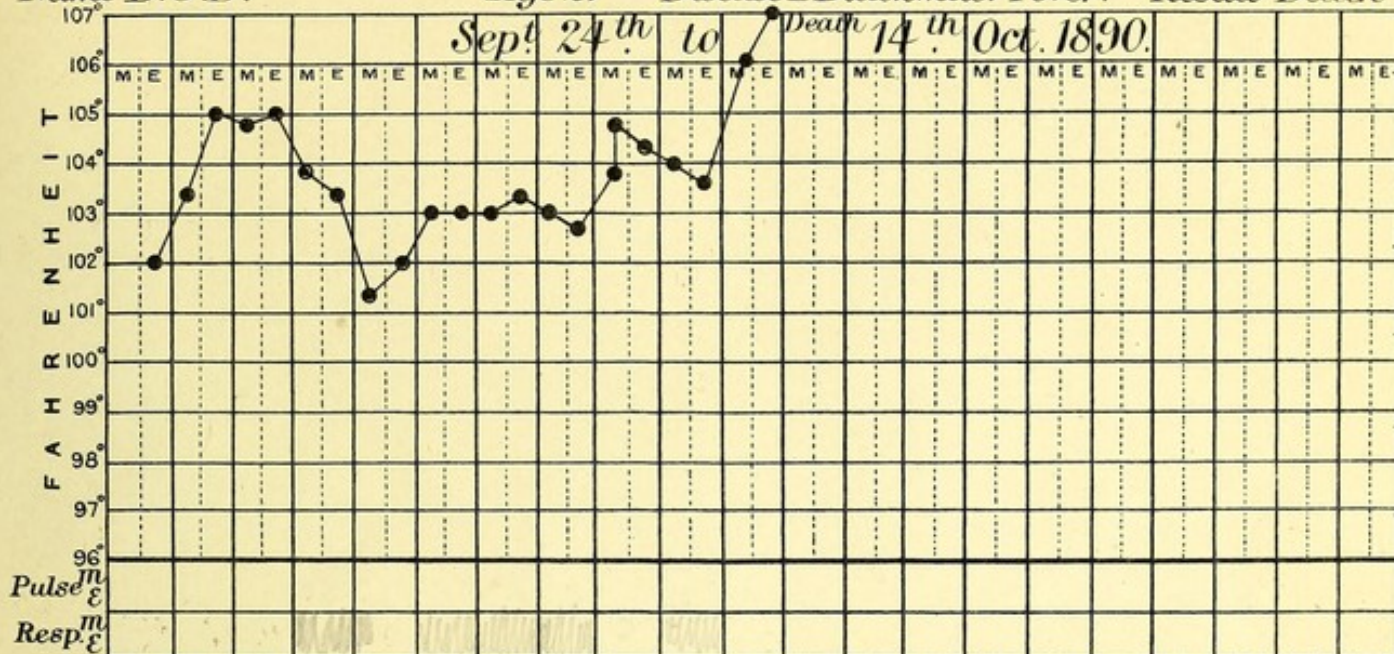


CHART V

B.P. Quinby Apapatin

Observations taken at *A.M.* and *P.M.*

Name *Sister L.P.*

Age *23*

Disease *Blackwater Fever.*

Result *Recovery*

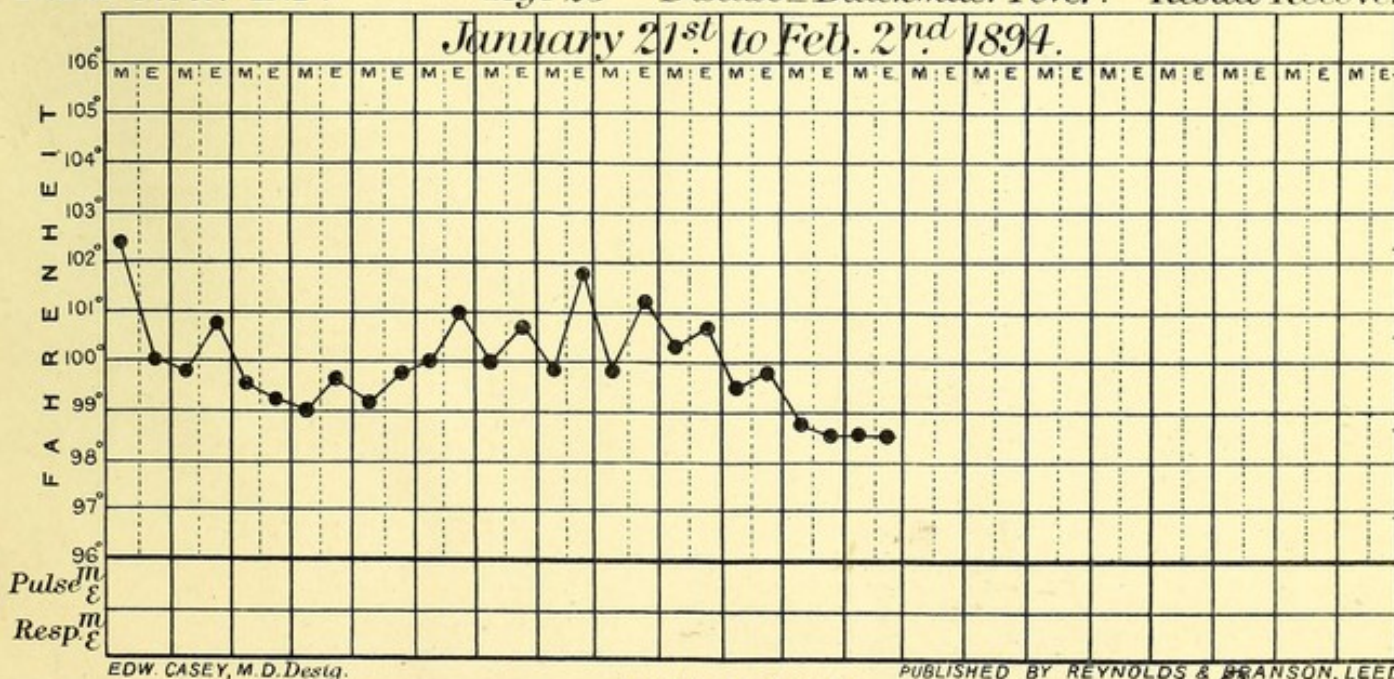
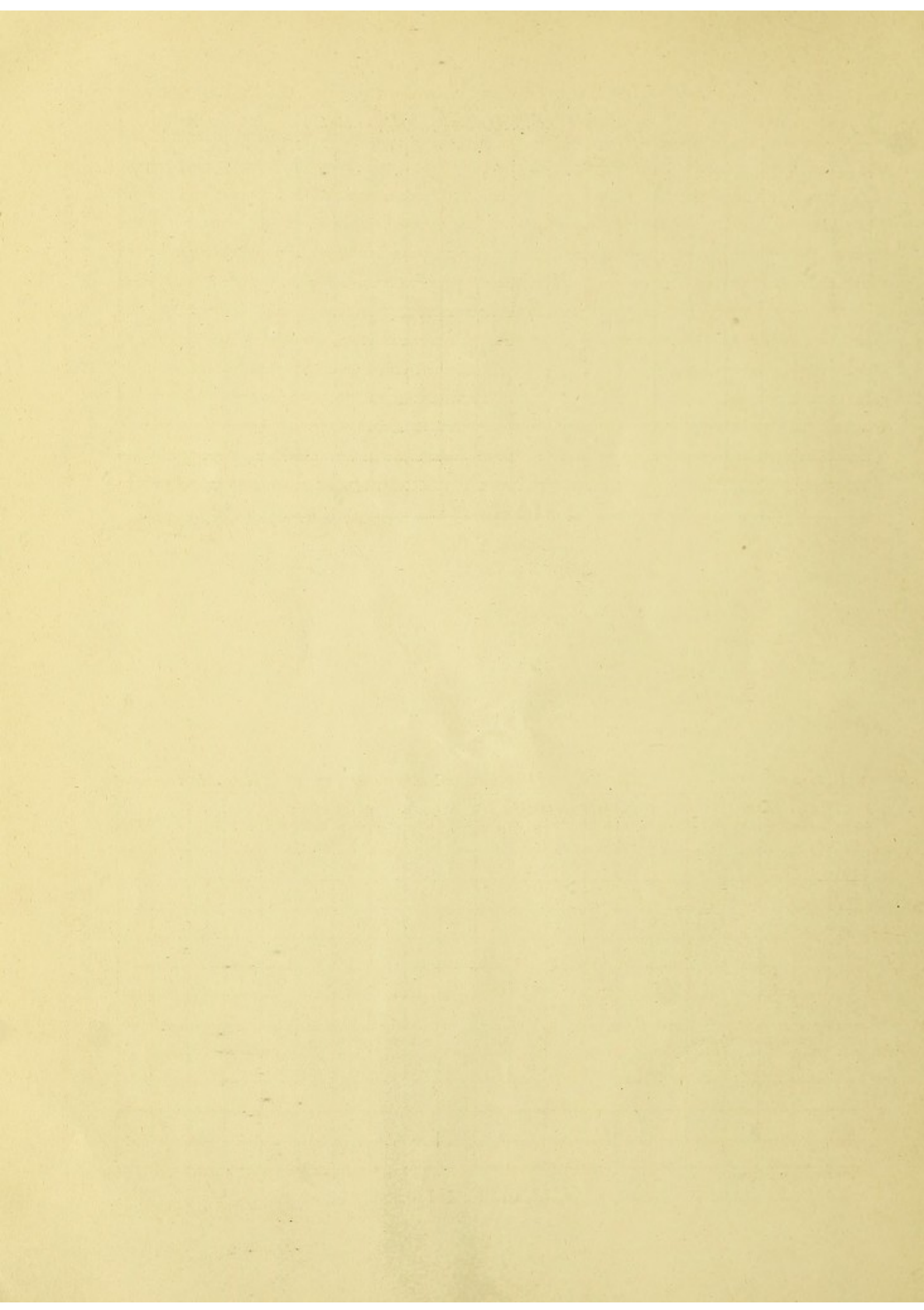


CHART VI

B.P. Quinby Apapatin

Observations taken at *A.M.* and *P.M.*



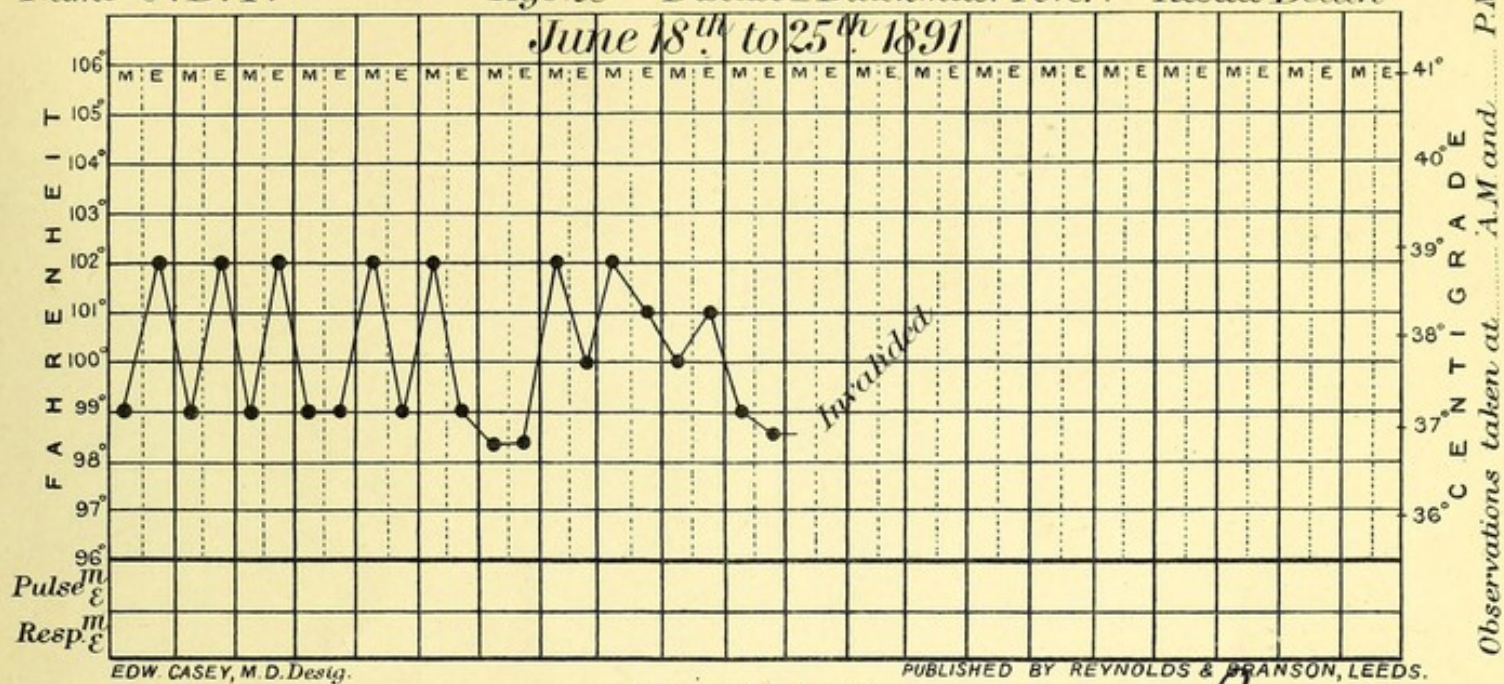
Name *G. D. T.*Age *28*Disease *Blackwater Fever.*Result *Death*

CHART VII

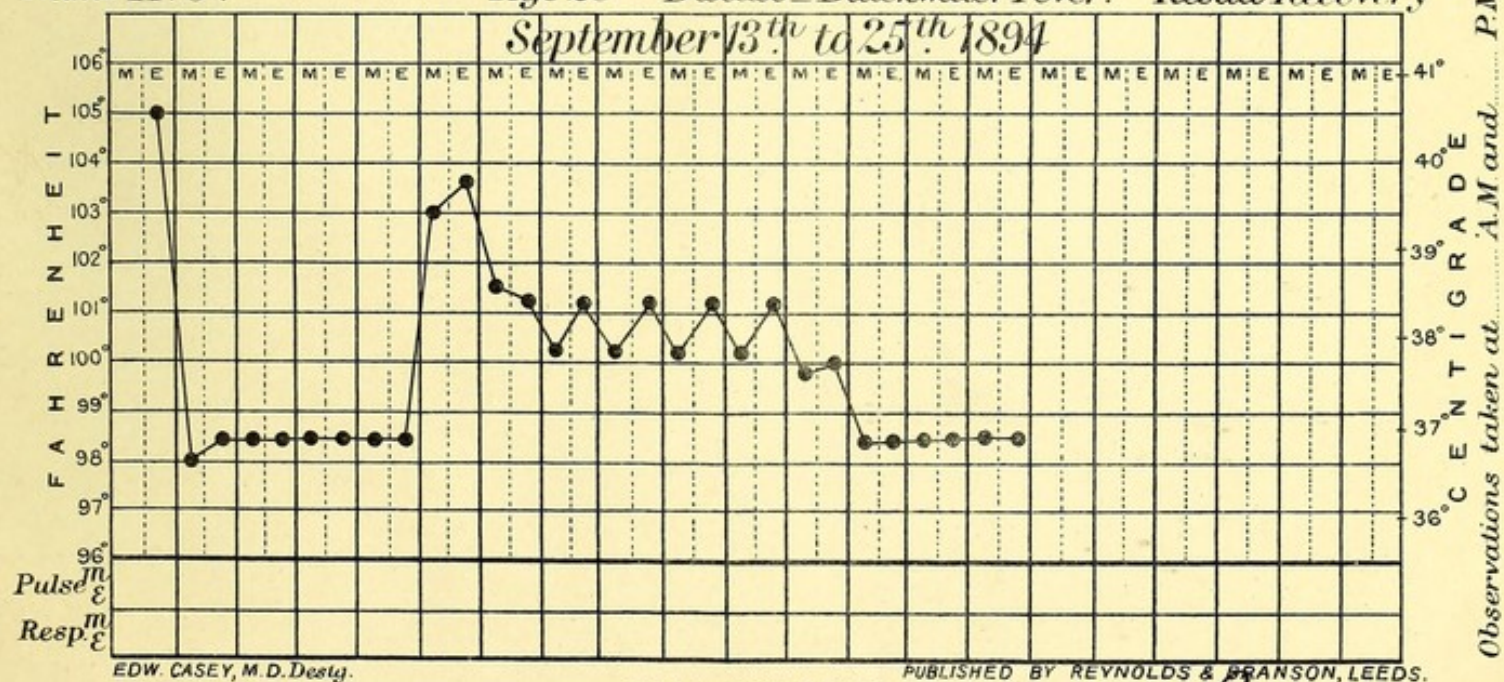
*B. W. Quilty Apoplectic*Name *A. G.*Age *28*Disease *Blackwater Fever.*Result *Recovery*

CHART VIII

B. W. Quilty Apoplectic

Name *J. W. H.*

Age *50*

Disease *Blackwater Fever.*

Result *Recovery.*

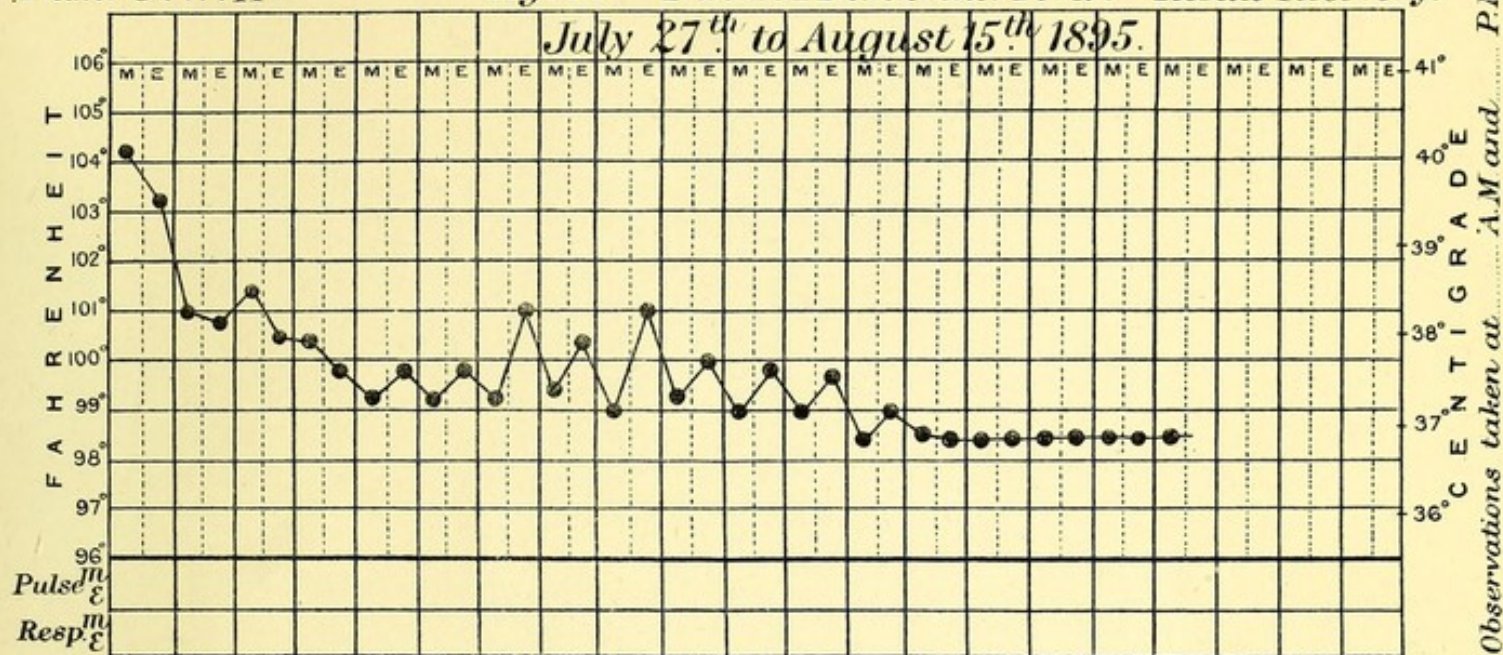


CHART IX

B.P. Quinby Apapofia

Name *Moses D.*

Age *48*

Disease *Blackwater Fever.*

Result *Recovery*

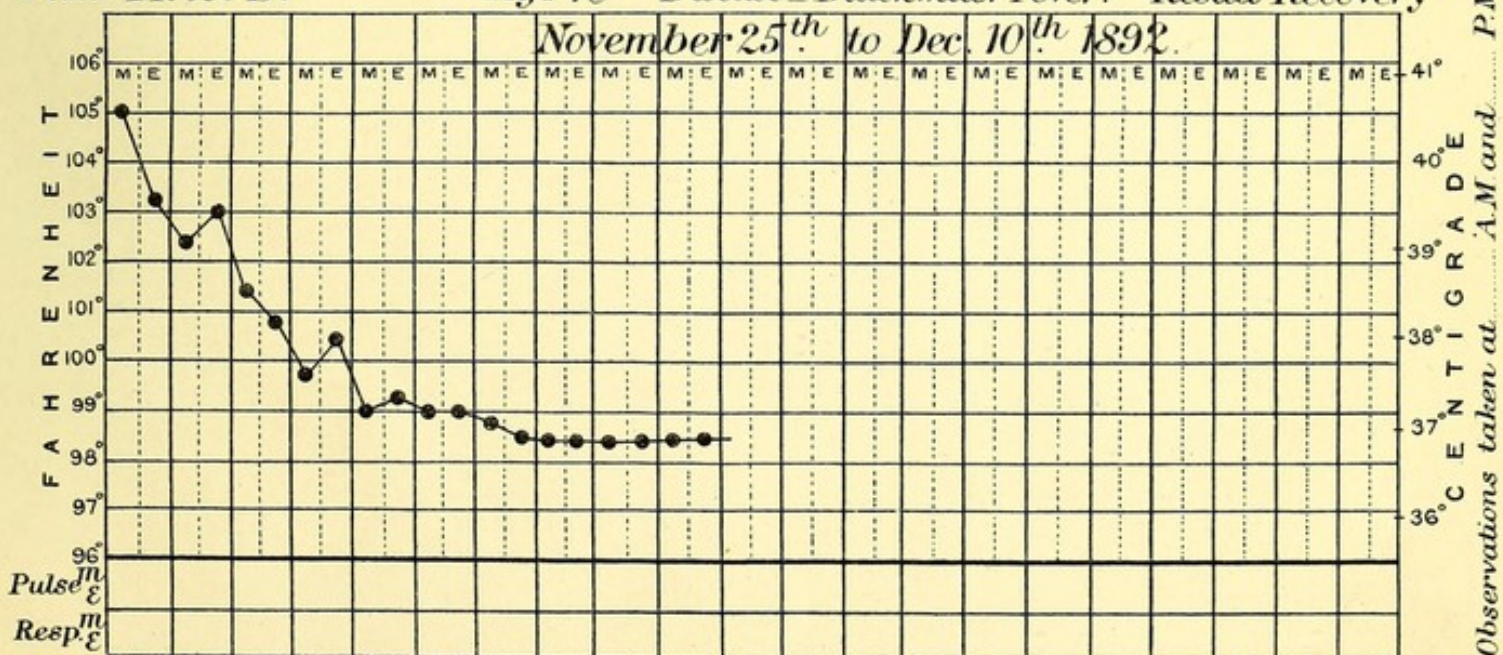
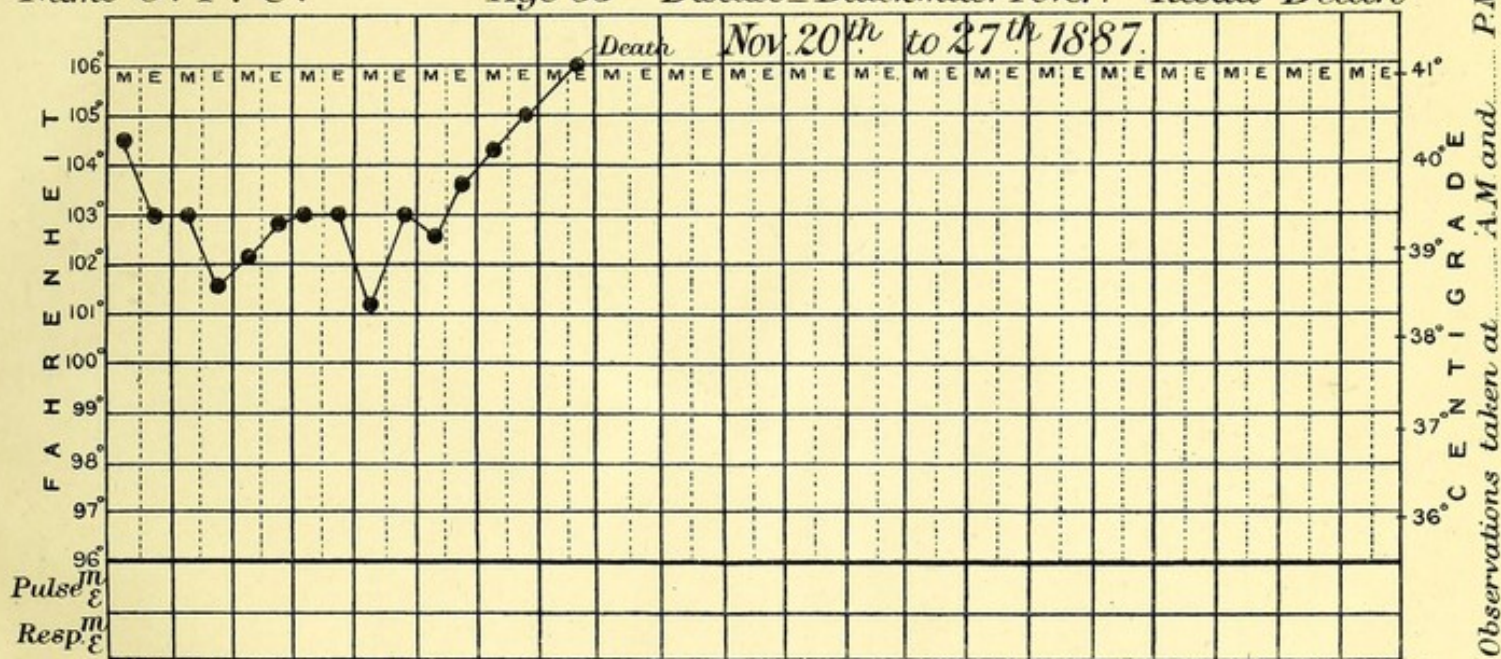


CHART X

B.P. Quinby Apapofia

Name *G. F. C.* Age *65* Disease *Blackwater Fever.* Result *Death*



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CHART XI

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