Yellow fever in the West Indies.

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YELLOW FEVER
IN THE
WEST INDIES

IZETT ANDERSON, M.D.

YELLOW FEVER

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IN THE

WEST INDIES

BY

IZETT ANDERSON, M.D. EDIN.

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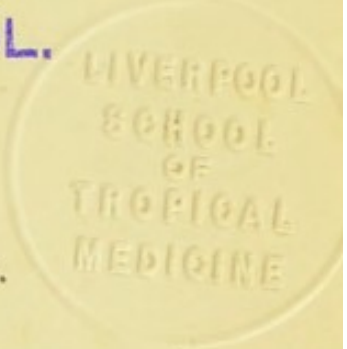

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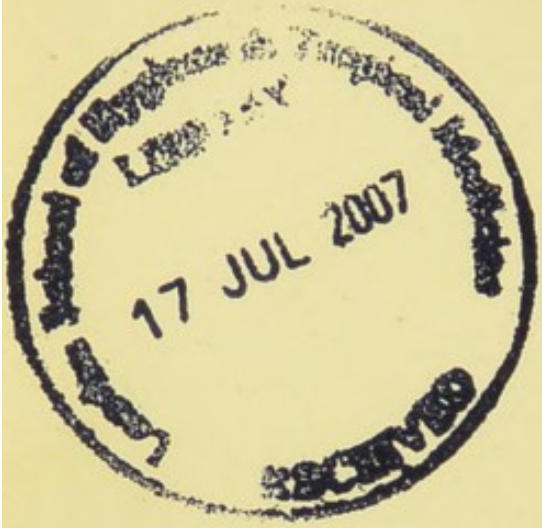

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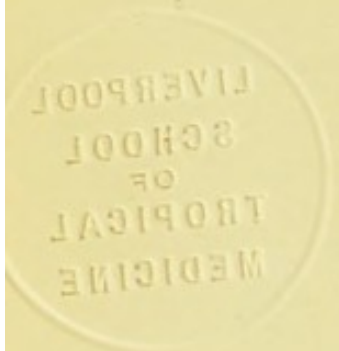

TO

MY DEAR BROTHERS,

WITH MUCH AFFECTION

I DEDICATE

THIS LITTLE BOOK.

PREFACE.

In the year 1894, I retired from practice. I was then worn out, and broken down in health from thirty-four years hard work in the West Indies; for during the whole of this long period, I had less than eighteen months rest and change in England.

When I left England in 1860, I knew nothing of tropical disease, that special branch of medicine not having been the subject of clinical instruction in the Edinburgh University of which I was a graduate. When I accepted a Government appointment in a large hospital in British Guiana, I was fortunate enough to work for some time under Dr. Manget, the Surgeon General, and his partner, Dr. Butts, through whose kind instruction I acquired an elementary practical acquaintance with diseases peculiar to the tropics. An epidemic

of yellow fever broke out in the Colony, and a large number of cases were treated in the Seamen's Hospital of which I was Resident Surgeon, and Dr. Butts took great pains to inform me on practical points connected with its symptoms, diagnosis, and treatment. In 1862, I settled in Jamaica in partnership with the late Drs. Bowerbank and Campbell, men of age and great experience, whose advice and example were of inestimable value to me in still further increasing my practical acquaintance with tropical diseases, and among them yellow fever.

From 1862 to 1894 I worked in Jamaica, and in addition to a very large private practice, held some Government appointments, and thus had ample opportunities of observing various phases of diseases among all classes. And among these diseases there was none that interested me more than yellow fever, of which I had a large amount of practical experience both in the epidemic and sporadic forms during the long period I have above referred to.

I consider that I was extremely fortunate in

having had practical instuction in yellow fever from able and experienced men, before I had unaided to treat my first cases. The lack of this practical instruction is the cause of the most deplorable blunders on the part of the inexperienced practitioner, who for the first time has to treat it without the slightest previous clinical experience of it. It would serve no good purpose to give specific instances that I have known of the disastrous results that followed this regretable ignorance; suffice it to say that they have been of the most painful nature, and the source of great distress to those responsible for them, who certainly were in many cases to be more pitied than blamed.

In the leisure, now to my great regret enforced upon me, I have looked over my old notes and case books, and as I did so, it appeared to me that they might serve a useful purpose, and hence it is that the following pages have been written. There are few works on the principles and practice of medicine which do not contain an article on yellow fever, but with few exceptions, they do

not appear to me to deal with the salient points most deserving of attention when the disease has to be faced and treated. There are also monographs, and long articles on yellow fever in bulky expensive volumes which are useful to consult occasionally, and are in all points worthy of respectful consideration, although some of them are for the most part compilations, and others evidently the result of limited clinical experience of the disease. It appeared to me that a short account in an inexpensive form of the results of long and extensive practical acquaintance with this disease, might be of service to young practitioners settling in the West Indies.

It will be observed that I have written but little on the pathology and bacteriology of the disease. Information on these points can easily be obtained from other sources, and as the following pages are the outcome of personal observation, I did not think it advisable to deal with subjects of which I knew very little, having had under the stress of more important work, no time to devote to their investigation.

I know nothing of yellow fever elsewhere than in the West Indies, and it is possible that what I have written may not correspond with the experience of practitioners in the Southern States of America, or in other places, for the symptoms and results of treatment vary much at different times and in different places.

It is highly probable that the experienced practitioner, after perusal of the following pages, may say that there is nothing in them that he did not know long ago, and that he fails to see why they were written. Suffice it to say that it was not for his use that this little book has been written, but as a help to those who are entirely destitute of any practical knowledge of the disease.

I am painfully conscious that in many ways the manner in which I have detailed my personal experience is very faulty. I am aware that I have here and there repeated details more than once, but this has not been altogether unconsciously done, as I wished to enforce points which are of great importance in yellow fever, and which have not, I think, elsewhere been dealt with in a suffi-

ciently emphatic manner. But whatever its imperfections, I can honestly say, that this little book has been written with the sincere desire of assisting my younger professional brethren, who in settling in practice in the West Indies, will probably meet with difficulties, from which through the kindness of my seniors in the profession, I was in a great measure exempt.

IZETT ANDERSON, M.D. EDIN.

3 HARTFIELD SQUARE,
EASTBOURNE.
March, 1898.

CONTENTS.

CHAPTER X.

CHAPTER XI.

CHAPTER XII.

YELLOW FEVER IN THE WEST INDIES.

CHAPTER I.

Health and Sanitary Conditions in the West Indies Formerly, and at the Present Day.

The West Indies long had the reputation of possessing one of the most unhealthy climates in the world, and were considered in this respect little if at all inferior to that "white man's grave," the West Coast of Africa. It may not be out of place to point out shortly to what extent this unhealthy reputation was justified, to what causes in great measure it was due, and how at the present time many of these are no longer in existence.

Dr. John Hunter* gives ample proof of the frightful mortality that existed among European

* "Diseases of the Army in Jamaica," by Dr. John Hunter, Physician to the Army, 1788.

troops in the West Indies, and particularly in Jamaica during the last century. Of the 88th Regiment in the first year there died about one-third, in the second year the deaths were nearly one-fifth. In the 85th Regiment there died in the first year five-twelfths, in the second year, or rather the next eleven months, the proportion of deaths were rather more than one-eighth. The 92nd Regiment lost in the first year nearly five-twelfths. The 93rd Regiment in all amounted to 404 men. In the space of six months upwards of one-half died, and of the remainder only 72 were fit for service. The 94th Regiment landed 531 men, by the end of the first year upwards of one-half were dead, in the second year there died two-sevenths of the remainder. Hunter also states:— "In the late war 5000 of the bravest soldiers in the world took possession of the Island of St. Lucia; their loss in killed and wounded in the several engagements and desperate attacks that were made upon them by the enemy was not considerable, but at the end of a twelvemonth, scarcely one man remained of the original number." "In less than three years there died in the Island of Jamaica 3500 men, those that were discharged amounted to one-half of that number, which makes in all 5250 men lost to the service in that short period of time, from the climate and

other causes of mortality without a man dying by the hands of the enemy."

In a most interesting work by the late Dr. Maunsell,* the mortality among the European troops stationed in Jamaica during the present century is given as follows. From 1817 to 1836 the average annual mortality was at the rate of 121·3 per 1000, and from 1838 to 1847 at the rate of 63·07 per 1000. Since the latter period the mortality has steadily decreased until in the period between 1880 and 1889 the average annual mortality was only 11·36 per 1000. These statistics give the deaths from all causes, but it may be stated that in the first named period the deaths from fever were 101·9 per 1000, and in the last only 4·3 per 1000.

Some of the causes that led to this frightful mortality are not difficult to appreciate. Many of these European soldiers in the old days were landed in an impaired state of health, after long voyages in sailing transports which were greatly overcrowded, without adequate ventilation, and the food supplied was of an improper character. They were on their arrival at once placed in barracks badly situated, especially as regards adjoining swamps,

* "Contributions to the *Medico-Military History of Jamaica*, a 'Retrospect'" by Brigade-Surgeon S. E. Maunsell, Medical Staff, Jamaica, 1891.

improperly constructed, imperfectly ventilated, and above all overcrowded to an extent unheard of at the present day. Maunsell writes in the work already quoted: "It is stated that at Tobago in the barracks which were the best in the whole command, the men had only 250 cubic feet per man of air capacity; that each man had a space of 22 or 23 inches in breadth; and that they slept in hammocks packed as closely as possible." Hunter states that "many of the military hospitals were very confined, some of the best of them consisting of a double platform on which the sick men were placed as close as they could lie." When it is remembered that even in a well-ventilated house in these Islands, during the hot season the temperature in the lowlands at night rarely goes below 75° or 80° F., some idea may be formed as to what the frightful heat of these barracks must have been, and this along with the impurity of the air caused by overcrowding would go far towards causing great mortality. The soldiers were improperly clad in heavy tight-fitting uniforms with head coverings wholly unsuitable for a tropical climate, and thus dressed often drilled or taken long marches in the hottest time of the day. Fresh meat and vegetables were not often given, but salted meat with biscuits or badly baked bread. But rations of new fiery rum were

issued regularly every day, drunkenness was of continual occurrence, and the punishments consequent thereon excessive and most barbarous. The water supply at many stations was scanty and no doubt often of bad quality. The European troops were frequently employed on active service, and no special care seems to have been taken as far as possible to obviate the injurious results of exposure to the sun, and all the vicissitudes of the weather. Sanitary arrangements of an adequate character were almost non-existent, open cesspits were in use at all the barracks, and were seldom emptied and cleansed. When in addition to all these causes of disease, there was also great heat with occasional heavy rainfall, and here and there swamps reeking with malaria, an explanation is easily found of the heavy mortality that formerly prevailed amongst the European troops stationed in the West Indies.

The mortality among civilians of European birth was not so great as that of the troops, but they also suffered to a very great extent. The insanitary condition of their dwellings, badly situated as regards neighbouring morasses, reckless exposure to the sun by day and the damp chilly land breeze at night, and above all the habitual indulgence in vice and intemperance, rendered them apt subjects for fatal attacks of disease, and especially of fevers.

Books of travels in the West Indies written within the present century are full of allusions to the convivial habits of those days. One writer states,* "on meeting together of a company of this class (planters), they were accustomed invariably to sit and continue swilling strong punch (sometimes half rum) and smoking segars till they could neither see nor stand; and he that could swallow the greatest quantity of this liquid fire, or infuse into it the greatest quantity of ardent spirits, was considered the cleverest fellow. The inferior orders in the town are by no means exempt from the reproach of intemperance, nor are the more opulent classes, generally speaking, behindhand in this respect. Sangaree, arrac-punch, and other potations are pretty freely drunk early in the day in the taverns."

Alcoholic intemperance seems always to have been the bane of the West Indies. A governor in one of these Islands writes in 1665 that† "he has enjoyed as great a measure of health as ever he did in England, but must confess the island is very subject to agues and fevers, but these are brought on by intemperance, surfeiting, and carelessness, and are common, especially with the old

* "Account of Jamaica and its Inhabitants," 1808.

† "Calendar of State Papers—Colonial Papers," vol. xix. Report to Lord Arlington.

army officers, who from strict saints have turned the most debauched devils. The Spaniards who trade with the Royal Company at thèir first coming wondered much at the sickness of our people until they knew the strength of their drink, but then they wondered that they were not all dead." The Governor of another West Indian Colony writes in the same year "the climate is most healthy, the heat by reason of the constant breezes most temperate, so that it is not the country, but the debaistness (*sic*) and intemperance of the people that bring evil report on it."

All this is now altered. Improved sanitary conditions and surroundings of the barracks, strict attention to the moral and physical well-being of the European soldier, a clearer apprehension of the predisposing causes of disease, and improved methods of treatment, have led to a steady diminution of the death rate, as is shown by the statistics I have already given. And as regards the civilian population the same improvement also exists. The recognised necessity of avoiding malarial localities, of attending to the sanitary condition in and about a house, the imprudence of reckless exposure to the sun and chills, and above all the diminution of vice and intemperance, have all combined to make the West Indies, under ordinary conditions, rank

among the most healthy British Colonies. During the winter months they are now being continually visited by large numbers of tourists from England, the United States and Canada, who find in the delicious climate of these lovely islands a welcome change from the rigours of their northern homes, and improved health as a result of their temporary residence therein. That now and then a European visitor, or a newly arrived resident, may be attacked by one of the fevers occasionally occurring is quite possible, but even then the attack can almost always be traced to some exposure, excess, or imprudence, which would probably have equally led to illness in a more temperate climate, although of a different type. Apart from the epidemic existence of fevers which but rarely occurs, there is probably no more risk of life, ordinary precautions being observed, than there is in England, and even when there is an epidemic it may be doubted whether the illness and mortality caused thereby, equals that occasioned by the epidemic of influenza that so recently swept over Europe.

CHAPTER II.

YELLOW FEVER—THE COUNTRIES WHERE IT OCCURS—ITS ESSENTIAL CAUSES AND THE CONDITIONS UNDER WHICH IT APPEARS—SOME IMMEDIATELY EXCITING CAUSES.

YELLOW FEVER is an acute, specific, continuous, miasmatic fever, invariably accompanied by albuminuria, and usually by passive hæmorrhages and yellow discolouration of the skin. It generally occurs in the West Indies, the tropical regions of Africa, and North and South America, but it has also been met with in Europe and elsewhere. Sporadic cases are by no means unfrequently met with in these countries, and occasionally it appears in an epidemic form, and when this occurs in the West Indies it is seldom confined to one island only. Sporadic cases may or may not precede an epidemic, but in whichever form it appears, the symptoms and course of the disease are much the same, only differing as regards intensity in individual cases, or in the varying predominance from time to time of one or more of the symptoms. When yellow fever exists as an

epidemic it occasionally becomes engrafted upon other forms of disease, thus giving rise to what may be termed "mixed cases." In referring, however, to an epidemic in the West Indies, the fact must not be lost sight of that as there are often not many susceptible of the disease in a given locality, an epidemic may be said to exist when numerically but few suffer from it.

The pathological or essential cause of yellow fever is still a matter of speculation. At one time it was considered by some as a severe form of malarial disease; but it is now generally admitted that it bears no such relation, as is shown by the fact that in many places where malarial influence is most intense it is unknown.

Since the germ theory of many diseases has been so well established, attempts have been made by many to discover a specific organism as the essential cause of yellow fever, and some years ago this was stated to have been successfully accomplished by Dr. Domingos Freire of Rio Janeiro, Drs. Finlay and Delgado of Havanna, and M. Paul Gibier. Their views, however, at the present day do not meet with much acceptance at the hands of the profession.

Among the latest contributors to the bacteriology of yellow fever are Professor Sanarelli of of Monte Video, and Dr. W. Havelburg of Rio

Janeiro. The editor of the *British Medical Journal*, under date July 31st, 1897, thus epitomises and contrasts their opinions:—"It is evident that Sanarelli and Havelburg cannot both be right, and it is perhaps as well that the points at issue should be put to the test at once. The differences between the two observers are not merely those of detail, there is a fundamental disagreement on almost every important point, so far at any rate, as the descriptions at hand enable us to form any opinion. One finds the organism in the stomach, and considers that this is its habitat; the other finds it only under certain conditions in the stomach, where there has been a possibility of its escaping from the tissues. One holds that it is a visceral parasite, the other that it is a tissue parasite. One holds that certain animals are immune, the other that these same animals are readily affected. One holds that toxins similar to those produced in diphtheria cultures can be produced in considerable quantities, and that these, when injected, give rise to very definite lesions; the other maintains that the poisons are bound up in the substance of the bacillus, and that they can only be separated by means of the action of the gastric juice, and so on through a whole series of essential differences. It may be stated that anyone who reads Havelburg's paper

will insensibly arrive at the conclusion in the first instance, in spite of certain appearances and properties described that Havelburg was dealing with the bacillus coli, but Havelburg himself points out certain very marked differences, and he places it much more near the bacilli of hæmorrhagic septicæmias, to which he says it has certain points of resemblance." At the present day, therefore, there is nothing definitely settled with regard to the bacteriology of yellow fever.

That it is simply a filth disease few who have had much experience of it will admit. It may occur in the most healthy country localities with perfect sanitary surroundings, and be absent in city slums, where from filth, overcrowding, and malaria, it might be expected to exist. I do not believe that the very worst conditions of sanitary neglect will ever by themselves alone generate a case of yellow fever—something else must be added thereto. What that additional factor may be we know not; when it is present, however, the disease will undoubtedly spread most rapidly where insanitary conditions exist. Failing any certain knowledge as to the etiology of the disease, it is allowable to conjecture as some have done, that it may be due to combined atmospheric and telluric conditions, arising and developing from sources, with regard to the exact nature of which

no definite decision has as yet been arrived at. But those who have had the most extensive practical experience of the disease, extending over many years in different colonies, and under manifold conditions, will probably be the most ready to acknowledge that its essential cause is as yet an inscrutable mystery.

It has been observed that yellow fever is more especially apt to occur in the vicinity of wharves whereon coal is stored, in coal ships, in those with foul bilges, or in ships ballasted with earth, tidal mud, or laden with green wood. American observers have attached much importance to recently turned up earth, the cleaning out of canals, ponds, and wells, as fruitful causes of this disease, and in a history of yellow fever in New Orleans, published many years ago, it was positively asserted that every epidemic in that city for upwards of one hundred years had been immediately preceded by some such disturbance. At one time the authorities of Charlestown, Mobile, and other cities in America, found it necessary to pass special ordinances positively prohibiting turning up the soil during certain months of the year. The present writer emphatically agrees with this being one of the causes,* although it must be admitted

* In Kingston, Jamaica, during the past twenty-five years the soil has been extensively turned up on three occasions. In 1872

that occasionally the soil is disturbed to a considerable extent without any such effect following. Probably other conditions must also co-exist, with the precise nature of which we are unacquainted. The disease in the West Indies is usually met with in the Lowlands, and near the seaboard, but may occur in the mountainous districts, and the old opinion that it could not exist above a certain altitude is now exploded. It must, however, be remembered that many of the cases which occur in elevated districts have contracted the disease by a visit to the lowlands, or to a district where the disease existed, and that it only manifested itself after a period of incubation, the exact length of which is very uncertain, and is probably subject to a great deal of variation.

Yellow fever sometimes occurs in, or clings to, certain small defined localities, or appears in certain lines, or well defined zones. I have known in a country district at a time when the disease did not exist, a case to occur in a house near a recently cleaned out pond, then in another about half a mile away, and a third case at another house at a distance of a mile from the second.

and 1873 the new water pipes were laid; in 1876 gas pipes were laid for the first time; and in 1897 drainage pipes were being laid. *On each of these occasions there was a severe outbreak of yellow fever.*

All these houses were in a direct line with one another, and the disease progressed from one to the other against the steady trade wind that daily blows with some force. Another instance I knew in a large town when at a time the disease did not exist, three cases appeared about the same time, in the same street, several hundred yards from each other, and all on the same side of the street. There were no connecting sewers or drains to account for these cases. A well-marked instance of the disease appearing in well defined zones, is given in the late Deputy Inspector-General Lawson's published "Observations on the outbreak of Yellow Fever among the troops at Newcastle, Jamaica." The pertinacity with which the specific yellow fever poison will continue to cling to a ship or house is too well known to require more than this passing allusion.

Yellow fever may occur during the hot or the cold seasons, in wet as well as in dry weather, and in a peculiar condition of weather when in the sun it is extremely hot, while in the shade a sensation of chilliness is produced. Gales of wind and heavy falls of rain exercise a restraining influence on the progress of an epidemic, while frost in those countries where it may occur is said to put a stop to it completely.

Other conditions with which we are unac-

quainted being present, the immediately exciting causes are at times very obscure, while not unfrequently they are so well defined, that it may be almost confidently asserted that had not a certain act of imprudence been committed the attack would not have occurred. The following cases among a number within the experience of the writer prove this. A high legal official was employed in a hot crowded court in the lowlands for about twelve hours continuously. Exhausted, with all his clothes saturated with perspiration, he rode many miles up into the mountains late at night meeting a cold land wind laden with moisture from recent rain, was thoroughly chilled, and yellow fever at once developed. A young lady about noon in the full blaze of a tropical sun wearing a thick habit and a black hat, rode many miles in the lowlands, and on returning to the cool mountains was at once attacked with the disease. After attending a dance in the lowlands a gentleman returned to the mountains and without changing his wet clothes laid down on a sofa exposed to a damp night wind and fell asleep. He woke with yellow fever. A young man played tennis until he was exhausted, and all his clothes were thoroughly wet through with perspiration, and then sat down to rest for some time exposed to the usual strong sea breeze, and yellow fever

at once ensued. Many other instances of this kind could easily be given. Exposure to the sun and a chill may, therefore, be considered the most potent exciting causes of this disease, and next to them, or combined with them, intemperance and debauchery. Excessive fatigue, fear, and depressing mental emotions, often seem to be exciting causes.

In giving the preceding as exciting causes it must not, however, be forgotten that with rare exceptions they only act on those who are, as will be elsewhere shewn, liable to be attacked by yellow fever, and more particularly when an epidemic influence exists.

CHAPTER III.

THOSE MOST LIABLE TO BE ATTACKED—ACCLIMATIZATION—NATIVES AND NEGROES MAY BE ATTACKED—SECOND ATTACKS ARE POSSIBLE BUT NOT PROBABLE—ANIMALS ATTACKED IN AN EPIDEMIC.

IN a West Indian Colony where the necessary conditions exist for the genesis of yellow fever, those who have recently arrived from a temperate climate are the most liable to be attacked, and of these the most susceptible come from the more northerly and colder countries such as Sweden, Norway and Russia. Occasionally, and more particularly during an epidemic, those arriving from a neighbouring West Indian Colony in which they had long resided, and where the disease was capable of existing, have been attacked. The late Dr. Manget, Surgeon-General of British Guiana, in the epidemic that existed in that colony in 1866, met with upwards of 100 cases of well marked yellow fever in black immigrants from Barbadoes. But as a rule the black and coloured races are but little liable to contract the disease.

Previous residence in the locality where the disease has manifested itself diminishes the liability to contract it, and in many cases apparent immunity is produced, and the individual is believed to be thoroughly acclimatised. As a rule the longer the previous residence, the greater the apparent immunity, and among old West Indian practitioners two or three years residence was considered necessary for complete acclimatization. But it is no less certain that while a relative immunity is thus generally produced, absolute exemption cannot be assured by any length of residence, and several instances of this have come under my notice. And it is a recognised fact among those who have had much practical experience, that occasionally those born and living all their lives in the locality which has become tainted, have been attacked. I have known a young lady twenty-two years old, who was born and lived all her life in a West Indian colony, attacked during an epidemic. I have also met with more than one sporadic case of most malignant type in children who were born and lived all their lives in a West Indian city, and those attacks in Creole children are by no means unfrequent during an epidemic. Visitors from the country, especially from the cool mountainous districts, to lowland areas where yellow fever is

epidemic may be attacked, particularly if they are Europeans or of white parentage, although persons of colour and even negroes have under these circumstances been known to suffer.

Residence in the temperate zone, but for what period is uncertain, will in great measure remove the comparative immunity conferred by previous tropical residence. Children born and residing for years in the West Indies, after returning from a long residence in Europe for their education, are just as liable to be attacked as if they had never before resided in the colony.

Adults of the male sex and especially European soldiers and sailors are considered more liable to be attacked than females, and if this is so it is probably because they are more exposed to the exciting causes referred to elsewhere. This greater liability, however, may possibly be more apparent than real, owing to the smaller number of European females resident in the West Indian Colonies.

Yellow fever rarely attacks an individual more than once. Exceptions, however, do occur to this rule. During the prevalence of an epidemic I attended a sailor through an attack following the usual course and attended by the usual presence of albumin in the urine. The attack passed off entirely, all symptoms disappearing, the urine had

for days been free from albumin, the patient was convalescent and out of bed. Another attack came on accompanied by precisely the same symptoms, and rapidly proved fatal.

It is somewhat curious that animals are at times liable to be attacked by yellow fever. "During the Gibraltar epidemic an unusual mortality was observed among dogs, cats, monkeys, birds, horses and domestic animals in general, and many of them died with the characteristic symptoms of the prevailing epidemic."

CHAPTER IV.

The Symptoms and Course of Yellow Fever.

Those who have had much practical experience of yellow fever will probably allow that it is by no means uniform in its manifestations, and that some of the symptoms which are predominant in one case are nearly absent in others. This is often markedly observed in different epidemics, or when as is frequently the case, it is engrafted upon or associated with other diseases such as intermittent or remittent fever, influenza, pneumonia, pleurisy, or even some other more chronic diseases, it will be readily understood that such cases are as regards diagnosis of a most perplexing nature.

But although cases differ frequently from each other in intensity, there is a pretty constant group of symptoms characteristic of this disease, and as these are present in the large majority of cases, I propose to describe an ordinary case as usually met with, leaving others of an irregular character to be dealt with hereafter.

Yellow fever has two distinct stages, the first being the febrile stage, and the second the stage of calm or depression in which there is either a rapid fall of temperature, apyrexia, or even a subnormal temperature. Some observers consider a third stage exists in which there is another rise of temperature, but this is an opinion with which I do not coincide. I consider that should there be any subsequent distinct rise of temperature, it does not occur at any fixed period, is not associated with any new or special group of symptoms and can usually be accounted for by local lesions such as abscesses or congestion of internal organs.

The patient usually states that he was quite well until the moment of attack, which is very frequently at night or in the early hours of the morning. That he was seized with intense headache and severe pains in the back and limbs, great heat of skin, with frequent chilly sensations, and not seldom vomiting. That he felt very ill and was completely prostrated. At 2 p.m. one day I saw a robust merchant captain, who was so thoroughly ill and prostrate that he could not walk across the deck without a sailor on each side to support him, and yet he assured me that only two hours before he was perfectly strong and attending to his duties without a symptom of illness.

In the **first stage** the general aspect of the pa-

tient is one of severe illness. The face is flushed, and often slightly dusky and expressionless. The eyes are red and "ferrety" in appearance from dilatation of the conjunctival capillaries, but seldom watery. The facial expression is not unlike that of one awaking from a drunken sleep. The cutaneous capillary congestion observed in the face is also present more or less all over the body, and an open hand pressed upon the chest will leave a white imprint, which often lasts for several seconds. Not unfrequently the cutaneous congestion in the face is most marked in the form of an indistinct band, extending across the face from just above the eyebrows to the level of the nostrils or the mouth. The lips are frequently of a brilliant red colour. The tongue is usually furred, and red at the tip and edges, and the fauces are also red.

Almost invariably complaint is made of most intense headache, generally confined to the supra-orbital region. When asked to indicate the locality of the headache, the patient generally places the edge of his hand just over the eyes, and states that it is only there that he feels pain. Sensations of chilliness frequently alternating with flushes of heat, and severe aching and soreness of the limbs and back, aggravated by movement, are always present. Intense backache is,

by some writers, considered an important diagnostic symptom. It may be so in some epidemics, but such is not my experience, as in not more than three or four cases have I found the backache a more prominent symptom than in ordinary malarial fever. Epigastric pain and tenderness are usually present and vomiting is not unfrequent.

The temperature from the commencement rapidly rises, and usually attains its maximum sometimes within a few hours, or on the second or third day. It may range anywhere between 101° F. and 109° F., which is the highest I have noted. Somewhere between thirty-six and seventy-two hours—or even in rare cases later—the temperature generally falls rapidly, until within twenty-four hours it has fallen to normal or even sub-normal. It may, however, after falling rapidly, oscillate one or two degrees above normal for some days subsequently. As the disease advances, there may be sometimes after several days a slight rise of temperature, but this is not frequently the case. As regards the temperature in yellow fever, the point to be borne in mind is, that there is a rapid rise to the maximum, and after a period of elevated—perhaps very high—temperature, there is a sudden and marked fall often to normal or sub-normal, and

coincident with, or shortly after this fall, other symptoms occur which will be hereafter described.

The pulse in the first stage is accelerated and full, as in all fevers, but is frequently not so rapid as the temperature would lead one to expect. At this stage there is nothing, however, in the pulse of any very marked diagnostic value, thus differing materially from the pulse in the second stage, the peculiar characteristics of which are of the utmost value in this respect.

The alvine evacuations are not in any way pathognomonic. In sailors, however, the vast accumulations brought away by purgatives are frequently of an ancient and ill-smelling character, and of various shades of green, yellow, and black.

The urine is acid, somewhat scanty, and high coloured.

The commencement of the **second stage** on whatever day it may occur, is marked by a decided fall in the temperature and along with this there is generally such a mitigation or alleviation of nearly all the symptoms, that the patient not unfrequently says he feels "all right now," wishes to get out of bed and expresses himself as being very hungry. The skin is moist and much cooler, the headache and pain in the back and limbs have

much diminished, and often nearly disappeared, thirst is less, vomiting if it previously existed is much less troublesome, the pulse is quieter, the mind is clear, and the patient much more cheerful. The evacuations are of a much more healthy character, and the urine increased in quantity and not as high coloured. The absolute necessity of recognising the signification of these altered symptoms will be dealt with hereafter, when alluding to the important question of diagnosis.

The careful observer will, however, note that the cutaneous capillary congestion although not so vivid is still present, and probably of a somewhat darker colour. The eyes are still injected and "ferrety" in appearance, and a slight yellowish tinge of the conjunctiva is usually perceptible. The urine is highly acid, and if examined with heat and nitric acid a trace of albumin is generally found to exist, although this symptom may not coincide with the first fall in the temperature, but occur some hours subsequently. These symptoms indicate the *commencement* of the second stage or the period of calm or depression as it has been called, and they are of variable duration; they may last only a few hours, or for a good deal longer period. But the patient, to use an expressive West Indian phrase, soon "turns for the worse," and other symptoms gradually

supervene. He loses his cheerfulness, and either becomes apathetic or irritable and despondent. The pulse which with the fall of the temperature had assumed nearly its normal frequency, becomes softer and fuller, and the number of beats per minute is much reduced. Fifty per minute is very common, but I have known the pulse rate as low as forty-five, and in one or two cases much lower than this. The tongue previously coated, but red at the tip and edges, rapidly cleans off and is of a bright red colour, and in the later stages becomes dry and glazed and often stained with hæmorrhage from the gums. As the disease advances great tenderness exists on pressure being made in the epigastrium, with intense burning pain, which is also frequently complained of in the œsophagus and pharynx. The stomach is very irritable and vomiting frequent, and in a large proportion of cases black vomit sooner or later makes its appearance. The albumin in the urine which was at first a mere trace, rapidly increases in amount until it occupies a third, or even more than half the tube. The urine becomes scanty and loaded with bile, contains tube casts, and is often completely suppressed. The yellow colour of the eyes increases, and in the majority of cases the whole body assumes a yellow colour, with often here and there livid

patches, particularly in the dependent parts. The skin is cool and there is usually a moderate amount of perspiration which stains the linen yellow, and is of a most peculiar and offensive odour. Hæmorrhages from all the mucous membranes, and from blistered or abraded surfaces are of frequent occurrence. The alvine evacuations are often clay-coloured, or black and slimy, and not unfrequently contain blood.

A fatal termination is usually arrived at in one of two ways. If the case is of the hæmorrhagic type, the black vomit is copious, and the hæmorrhages are well marked, the pulse becomes rapid and thread-like, the skin covered with cold sweat, and the patient usually remains conscious until within a short time of his death, which apparently occurs from asthenia. If the case is one of the renal type, the urine is very highly albuminous and loaded with bile, and is at the last nearly, if not quite, suppressed. Under these circumstances delirium, convulsions, and coma, usually precede the end, apparently due to uræmia and septicæmia.

But although these two types of disease are generally well marked, in many cases there is no such clear distinction to be observed, and the course of the disease, and the symptoms preceding the end partake of the character of both.

The foregoing is a brief description of yellow fever as ordinarily met with; but some of the symptoms of this disease require more extended consideration, and will be thus dealt with in the succeeding chapters.

CHAPTER V.

The Urine in Yellow Fever.

Some writers consider that yellow fever is not necessarily accompanied by albumin in the urine as one of its prominent symptoms, and describe a non-albuminuric form of this disease. Such is not my opinion, for unless the disease has been aborted by early treatment, as will be hereafter described, I have never considered a case as one of genuine yellow fever unless albuminuria existed. That during an epidemic of this disease cases sometimes occur in which some of the symptoms somewhat resemble those in the *first* stage of yellow fever I will allow, but I have always considered them as examples of malarial fever, in which as is not unfrequently the case, some of the characteristics of the epidemic have been impressed upon the malarial fever, but I have never regarded them as genuine veritable cases of yellow fever, and I have never known them prove fatal. Of one fact I am certain, and that is, that during an experience extending over thirty years, I have never known a case of yellow fever prove fatal, or

black vomit to come on, unless the urine was albuminous. In this opinion I am supported by Dr. Blair, who in his work on yellow fever states: "In every case of decided yellow fever I have found the urine highly albuminous, a condition which it assumes about the second or third day and maintains throughout, increasing as the disease advances, and in cases of protracted convalescence continuing long after all symptoms but debility have left the patient."

Albumin may be found as early as the first day of the attack, but this is rare unless the case is one of a very malignant character. It commonly appears on the second or third day of the disease, but occasionally not until later. In thirty-one cases I treated at the commencement of an epidemic albumin first appeared:—

In thirteen on the second day.
In eleven on the third day.
In three on the fourth day.
In four on the fifth day.

These were all severe hospital cases in seamen who had been only a few days in the Colony. In private practice among persons longer resident, I think that the third is the day on which albumin usually first appears. At first there is a mere trace, but if examined at intervals of twelve or twenty-four hours, it is found in rapidly in-

creasing amount, until the albumin when allowed to subside, frequently occupies one-third or one-half of the tube. I have known the contents of the test tube become so solid that it could be inverted without the escape of any of its contents. The amount of albumin usually attains its maximum somewhere between the fifth and the seventh days, then varies in amount but slightly for two or three days, after which if the case is to terminate favourably, it usually begins to decline rapidly, but seldom altogether disappears for some days subsequently. In notes I have of seventeen cases which recovered, the duration of albuminuria was as follows: —

In two cases for two days.
In four cases ,, four days.
In three cases ,, five days.
In two cases ,, six days.
In one case ,, eight days.
In one case ,, nine days.
In two cases ,, ten days.
In one case ,, eleven days.
In one case ,, fourteen days.

But rarely the latter period is exceeded. Cases are not unknown, however, where the albuminuria never disappears, a condition of chronic renal disease being established. This was the case with a girl I attended with yellow fever, who two

or three years subsequently married, and died in her first confinement from puerperal eclampsia.

During the progress of a mild case, where the amount of albumin is small, it may intermit for a day, once or even twice, but this is very rare, and I do not think I have met with more than two or three cases in which this occurred.

The urine is almost invariably highly acid from the commencement of the attack, and continues so until convalescence is established, when it becomes alkaline in many but not in all cases. There may be some exceptions, but as a rule as long as the urine is albuminous it is acid. I do not remember any case proving fatal in which the urine at the time was alkaline in reaction.

The specific gravity of the urine is generally high during the first few days, often varying between 1·027 and 1·033. As the disease advances as a rule it becomes much lower, but varies a good deal from day to day.

The colour of the urine is at first simply that characteristic of all fevers, but as the disease advances into the second stage it becomes loaded with bile, and assumes various shades of yellow or yellowish-brown, or even nearly black, except in those cases where there is passive hæmorrhage from the kidneys, when it is generally of a light claret colour. In advanced severe cases where

suppression is threatened, the very scanty urine has an oily appearance, and in this and its colour exactly resembles olive oil.

The amount of urine passed is in the first stage somewhat scanty, but as the temperature goes down and the second stage commences, it usually increases in quantity. In many cases I have measured the urine passed from 6 p.m. to 6 a.m. and found as much as from thirty to eighty ounces had been passed during this period. As the disease advances, however, it often diminishes, and in fatal cases either partial or total suppression of urine frequently occurs. In some of them the amount of urine gradually diminishes from day to day until it nearly or quite ceases altogether. In others, suppression occurs unexpectedly and with great suddenness, when hitherto there had been copious secretion of urine even to a considerable amount, and the case was apparently doing well. In testing for albumin, when the urine has been boiled, the addition of nitric acid frequently produces violent effervescence, and the urine becomes of some shade of green or even black.

In examining the urinary sediment during the second stage, I have almost invariably found tube casts, generally of a granular character. Uric acid, the urates, phosphates, broken down epithelium, mucous and blood corpuscles are frequently

to be observed. On one occasion I examined seven ounces of urine passed in twelve hours, acid, albuminous, sp. gr. 1·029, which on standing deposited a copious jet black sediment. On examining this with the microscope it was found to consist of granular tube casts, broken down epithelium, large compound granular cells of a deep yellow colour, and some large irregularly angular particles of a jet black colour. Next day the albumin had disappeared, though the same black sediment existed, but continued only for that day. The patient recovered. This is the only occasion on which I have seen these peculiar jet black particles.

CHAPTER VI.

Black Vomit and the other Hæmorrhages of Yellow Fever.

Among the symptoms of yellow fever, there are none more striking than the hæmorrhages, that almost invariably appear at some time or other during the course of the disease, and the cases are few in which hæmorrhage from one or more of the mucous outlets of the body does not occur. Two of the names by which yellow fever has been known—hæmagastric fever and vomito nigro—indicate the frequency with which hæmorrhage occurs from the stomach, although it does not invariably come on in every case.

With the exception of epistaxis, which occasionally appears during the first stage, when temperature is high and headache intense, black vomit and the other hæmorrhages do not usually occur except during the second stage, marked as before mentioned by complete or partial apyrexia, and the invariable presence of albuminuria. The only exceptions I know to this rule, are the rare cases when during an epidemic a patient dies within a few hours, overwhelmed by an attack of

a most malignant character, and in these the hæmorrhages are often profuse.

The most marked of all the hæmorrhages is black vomit. For a long time much doubt existed as to its precise nature, many considering it a secretion peculiar to the disease, while others regarded it as altered bile. No doubt, however, is now entertained that black vomit is simply blood which has oozed from the mucous membrane of the stomach, altered in appearance by the gastric fluids.

During the whole course of yellow fever, but more especially in the second stage, intense burning pain is complained of in the epigastrium, with great tenderness, on pressure being made in that region. This is most marked in those cases where the gastric and hæmorrhagic complications predominate over the renal, and then vomiting is often one of the most distressing symptoms from the beginning of the attack.

In the **first stage** of an ordinary attack of yellow fever, the matters vomited are usually whatever food, drink, or medicine, may have been taken, together with watery bilious fluid of a yellow or green colour, often to a very large amount. After the stomach has been thoroughly emptied once or twice, in many cases (particularly where the diet is restricted to small quantities of iced fluid

nourishment) vomiting does not recur with much frequency until the second stage is entered upon, and even then a few cases occur in which there is little or no vomiting until near the end, when a few mouthfuls of black vomit may be brought up, and these are the cases where the renal symptoms predominate over the hæmorrhagic and gastric. In some cases, however, no black vomit is brought up during life, but it may almost invariably be found in the stomach after death.

In the **second stage**, when the urine has become albuminous, the vomited matters—apart from what have been swallowed—are usually of a clear colourless, slimy, glairy character, and intensely acid, and in a few cases may be slightly tinged with bile and contain a few specks of bright coloured blood. The appearance of this clear acid vomit* is usually preceded by great uneasiness, and increased burning pain and tenderness in the epigastrium, and it is brought up at first in small quantities with great straining and retching. This clear acid vomit continues for a varying period, but before long it contains here and there brown specks and striæ, as if a pinch of snuff had been sprinkled over it. Although as has been

* Blair and other writers following him have called this "white vomit." As it is, however, not white like milk, but white like water, I have thought it best to call it the clear acid vomit.

mentioned, yellow fever may exist without black vomit occurring during the progress of the case, and it may also only appear suddenly and unexpectedly in a small quantity near the fatal termination, yet in the vast majority of cases this clear acid, brown speckled vomit, precedes the black vomit, and hence its appearance may be looked upon with apprehension, and considered as an indication of what may probably follow. At the same time, however, in some cases this characteristic vomit does not necessarily merge into the true black vomit, but continues more or less varying in appearance until the termination of the case.

Black vomit may appear suddenly in a typical form, or as is more common, the brown particles existing in the clear acid vomit may increase in amount and deepen in hue until the whole fluid is of a brown or black colour. As the colour deepens so as a rule does the quantity of fluid increase in amount, and less difficulty is found in ejecting it.

"Black vomit" is of all shades of colour from brown to the deepest black. If allowed to settle in a large test tube it is found to consist of a dark brown or black sediment, deposited from a fluid which is usually somewhat lighter in colour. It is generally compared to coffee grounds, and the

resemblance is certainly very close, although probably a closer one would be a mixture of coffee and chicory grounds. At times in malignant cases it is jet black, and at others it has a reddish hue, due to the amount of blood effused into the stomach being greater in amount than can be altered in colour by the gastric secretions. Very rarely does it contain any admixture of bile. When ejected upon linen a light brown stain is formed, whereon can be plainly distinguished specks and stains of a darker colour. It is usually highly acid in reaction, but occasionally when in large amount it may be found alkaline.

In severe cases where the gastric symptoms are predominant, the amount of black vomit ejected is often very large, and as correctly stated by an old writer, "is in quantity so enormous that we could not help wondering whence it had been supplied, as it bore no proportion to the liquid that had been drunk." When in large amount it is usually ejected with considerable spasmodic force, without any difficulty or straining, one or even two pints not unfrequently being brought up at a time. Sometimes, however, only a mouthful or two is brought up with a gulp or hiccough.

It is a somewhat curious fact that I do not remember having before seen noticed, that a yellow fever patient rarely seems to recognise the colour

of what he vomits, or asks a question about it, although he may know much about and greatly dread yellow fever and black vomit. Possibly the yellow discolouration of all his tissues, including those of the eyes, produces a different appearance in the vomit.

Black vomit although undoubtedly a grave symptom, does not necessarily imply that the case will terminate fatally. I have had many cases of recovery after it had appeared to a considerable amount for several days running. I am not sure that a moderate amount of it may not have a beneficial effect on the progress of the disease.

Although not recognisable during life, a post-mortem examination frequently shews that hæmorrhages occur in the substance of, and underneath the serous membranes covering, various internal organs. Subcutaneous and subconjunctival hæmorrhage is of common occurrence.

Hæmorrhage from one or more of the mucous outlets is almost invariable, even in an ordinary case, and sometimes it occurs from all of them. Epistaxis, hæmorrhage from the mouth, and black vomit, are the most frequent. Vaginal hæmorrhage almost always comes on, whether the catamenia are or are not due. From the bowels occasionally pure blood flows, but usually it is

of a black and slimy character. Sometimes a fluid undistinguishable from black vomit is passed per anum, and old West Indian nurses refer to this as "the black vomit turning down," and consider it a favourable symptom. Hæmorrhage from the male urethra is not unfrequent, as well us from blistered or abraded surfaces.

I once attended a young woman who in addition to black vomit had hæmorrhage from the nose, mouth, eyes, ears, bowels and vagina, as well as from a blistered surface. To my great surprise she recovered.

CHAPTER VII.

Affections of the Skin in Yellow Fever.

A marked feature in this disease is the cutaneous capillary hyperæmia that more or less exists in all cases, and persists with little variation, except as to colour, throughout its whole course. It manifests itself as a pink or rosy flush (not unlike mild erythema), of a more or less deep hue all over the skin, but more particularly in the face and trunk. Sometimes it varies in shade in different localities, and is often found more marked in an indistinct band, extending across the face from just above the eyebrows to the level of the nostrils or mouth. Pressure on the skin will cause this flush to disappear, leaving a white or yellow mark, and several seconds may elapse before the colour returns. Occasionally when sweating is excessive sudamina appears.

Although this disease is termed yellow fever from the colour of the skin, this symptom does not always appear during life. I have never however known it to be absent at a sooner or later period after death. The first indication of yellowness is best detected by depressing the lower eyelid, when

it will be observed at the angle between the ocular and palpebral conjunctiva. The skin soon after gradually assumes a pale yellow tinge, which as the disease advances deepens in colour. The shade of yellow varies much from pale lemon to a deep orange, or even bronzed hue. The particular shade is I think in a measure determined, not only by the extent to which the liver is implicated, but also by the amount of cutaneous hyperæmia that exists throughout the disease. Although difficult in words to express the difference, the colour of the skin is entirely unlike that occurring in jaundice and bilious remittent fever. At times here and there the skin presents an ecchymosed appearance, with violet or purple patches or stripes, particularly in the dependent parts.

The period of the disease at which yellowness first appears varies much. Unless there has been previous liver derangement, it is seldom noticeable as early as the first or second day. As a rule, to which there are of course many exceptions, the yellowness begins when the temperature falls, and the first trace of albumin is found in the urine. In the majority of cases it is found on the third day.

Excoriation or abrasion of the skin, especially round the anus and on the scrotum readily occurs, and often blood oozes from the denuded surface. Blistered surfaces often ulcerate and bleed. Loca-

lised gangrene is by no means rare, particularly of the genital organs of both sexes. Boils and small carbuncles often occur during convalescence.

According the stage or character of the fever, the skin may be hot and dry, hot and sweating, cool and dry, or cool and sweating. The sweat often is profuse, and stains the linen a deep yellow colour. Whether sweating or not the body exhales a peculiarly offensive and nauseating odour, unlike any other that I know of, at all times perceptible, but more particularly after a hot air or vapour bath. Dr. Summers, an American author correctly states: "Yellow fever has a peculiar nauseating odour, unlike any other that I know of, which I do not venture much in affirming to be pathognomonic of the disease. In years past, I have often heard old nurses in the South declare that they could smell a case of yellow fever as soon as they stepped into the room where the patient was lying. Upon personal investigation, I am satisfied that they are correct. I have tried to find something with which to compare it, but it is so positively *sui generis* that I have discovered as yet nothing which will impart any definite idea of the odour to any one who has not observed it, but the odour of mash in a brewery more nearly resembles it than anything else."

My experience fully confirms every word in this quotation.

CHAPTER VIII.

Unusual and Mixed Forms of Yellow Fever.

In the foregoing pages I have endeavoured to give in a succinct form the general characters of yellow fever as it is met with in the West Indies, and so far as my experience extends, this is the type which is almost invariably met with in sporadic cases. When an epidemic exists, however, cases occur of a most unusual character, and their possible existence should be borne in mind.

Fulminating cases are those in which a man apparently in health is suddenly struck down and dies in a few hours, overwhelmed by the malignity of the disease. It is thus described in an Army Medical Report as occurring in Jamaica many years ago.* "A soldier goes on sentry feeling in the enjoyment of perfect health. Suddenly he becomes unwell, ere he can give the alarm he drops down in a state of insensibility, and he is dead before he can be brought into

* Quoted by Maunsell, *op. cit.*

hospital;" or "another case is similarly attacked, but the paroxysm may be in a slight degree less severe. He falls down, but retains consciousness, his comrades carry him to the hospital, the paroxysm continues unabated for seven, eight, or twelve hours, when he dies without a remission;" or "the man outlives the paroxysm, his strength is exhausted, what would have been a remission is unfortunately collapse, and he dies in a few hours." I have met with three or four of these cases, but unfortunately have not kept notes of them. But one case made such an impression on me that I can clearly state the facts connected with it. Yellow fever was prevalent in Jamaica, when a high official arrived in the island accompanied by his house steward. Within a week of their landing I was sent for one afternoon, and found the steward comatose with a temperature of 109°, and he died within half an hour. The The history given was, that the man who was very plethoric, had been shopping for two or three days in Kingston during the heat of the day, but was quite well until the previous evening, when he said he felt slightly indisposed and asked to be excused waiting at a late dinner. The morning he died he made no particular complaint, but the condition in which I found him gradually supervened. The official appalled at such an early

fatality in his household, doubted my diagnosis of yellow fever, stating that he had had much experience of the disease in other West Indian Islands and had never known a similar case. I insisted upon a post-mortem examination in association with a medical man experienced in the disease. The body was golden yellow, and the dependent parts of a violet black, the stomach full of black vomit of the most marked character, blood was oozing from the nose and mouth, and decomposition was setting in, although less than twelve hours had elapsed since death.

Algid cases I have never met with, but they are thus described by an old writer as observed during an epidemic in Gibraltar. "The patient although in possession of his faculties, lies for the most part on his back in a state of collapse, his limbs pulseless, clammy, and stricken with a degree of coldness considerably below that which is found to take place in a corpse under similar atmospheric temperature; while probably he complains of agonising internal heat and casts off the bed clothes incessantly." Many similar cases occurred among the troops in Jamaica between 1834 and 1845.

Walking cases I have not met with; but have heard of their occurrence in the West Indies. In these cases patients go about with

little or no complaint of illness, until collapse and black vomit come on and death almost immediately follows.

I think it is highly probable that in these unusual forms of yellow fever, the deaths occur in the second stage of an attack in which the fever of the first stage was, as is frequently the case, of a mild character, perhaps not exceeding 101° or 102°, and the other symptoms such as headache, epigastric tenderness, &c., did not exist in a marked degree. Fever to a slight extent is so common in the West Indies, that I can well conceive a man impelled by a strong sense of duty, or of unusual force of character, may not complain if the symptoms are mild. Or during an epidemic, a nervous man may try to persuade himself that he cannot really be the subject of the prevailing fever, and will not "give in," but continues his usual work until the more pronounced symptoms of the second stage are developed, and he is within a short time of the fatal end. The deceptive calm and great relief from painful symptoms that usher in the commencement of the second stage, would encourage the belief that what he had felt for a couple of days previously had been simply a trifling indisposition, not worth noticing, and that he was again quite well.

Mixed cases. During an epidemic, occasionally yellow fever occurs mixed up with other forms of disease. I have met with several cases where an intermittent or remittent fever has after some days merged into the genuine yellow fever. The symptoms of the original complaint have gone on for some time in the usual form without any occasion for anxiety; when suddenly the whole aspect of the case changed, the temperature rose much higher, frontal headache, ferrety eyes and epigastric tenderness have appeared, and in due time albuminuria and the other symptoms of the second stage followed. Blair, of British Guiana, refers to yellow fever mixed up both as a primary and secondary affection, with small-pox, chronic phthisis, pneumonia, pleurisy, influenza, delirium tremens, and many other diseases. The old experienced practitioner does not err therefore, when he refers to the possibility of a case "turning into yellow fever."

It is somewhat remarkable that before and during an epidemic, some one or more of the symptoms of this disease may appear in other fevers or chronic complaints, even among those not ordinarily susceptible to the disease. There may be at one time severe frontal headache and epistaxis, at another epigastric tenderness with troublesome vomiting, or even slight yellowness.

But never albuminuria, unless the disease merges into genuine yellow fever as referred to in the last paragraph.

CHAPTER IX.

The Diagnosis of Yellow Fever.

Much has been written regarding the difficulties of diagnosing yellow fever, and this embarrassment arises from various causes.

Errors in diagnosis are most frequent among newly arrived practitioners, in consequence of their absolute ignorance of the symptoms and course of the disease from a clinical point of view. This need not be a matter of surprise, for they have been taught but little about it in their medical schools, and the information to be gained from articles in some modern European text-books on general medicine, is scanty and often misleading. Medical men in the old days frequently confessed the disastrous results consequent on their ignorance of this disease. One writer states,* "The first person who came under my care was within a few hours of death before I knew the disorder, or even suspected it to be of

* "Treatise on the Fevers of Jamaica," by Robert Jackson, 1791.

a dangerous nature." Another author writes :* "It has been too often found that the inexperienced European practitioner when he considered the patient in a safe state, found out too late that he had not more than an hour to live." The young inexperienced practitioner, therefore, should not be blamed for failing to recognise a disease of which he has had no clinical experience, but rather be pitied, for there is no more painful position in which a man can be placed, than after having assured a patient's anxious friends that the case was not serious, to find by the unexpected appearance of black vomit, irresistible and mortifying evidence produced that a fatal error in diagnosis had been made, and that in all probability the end was not far off. To avoid this in all cases that present doubtful features, the inexperienced practitioner should not hesitate to avail himself of the advice of one who thoroughly knows the disease.

Errors in diagnosis are occasionally made by those who, having had considerable experience, arrive at a premature and incorrect opinion after a hurried and insufficient examination and consideration of the case. I knew an old and experienced practitioner, who when the period of

* "Medical and Miscellaneous Observations relative to the West Indies," by John Williamson, M.D., 1796.

calm at the commencement of the second stage came on, sent his patient many miles into the country for change, believing him to be convalescent from an ordinary attack of intermittent fever. During the journey the unfortunate man brought up black vomit and died a few hours subsequently.

When yellow fever is known to be epidemic, errors in diagnosis are not so frequently made, for the practitioner is on the look out for the disease and soon learns by experience its leading clinical features. Sporadic cases, unusual and mixed cases, and those occurring just at the beginning of an epidemic, are those which usually occasion mistakes in diagnosis.

As regards sporadic cases they are usually of the ordinary type, but the real nature of them is liable to be overlooked not only from their unexpected appearance, but also from the fact that occasionally persons not usually considered susceptible to the disease are attacked. Careful consideration of the circumstances and symptoms of every case are necessary to avoid mistakes.

The unusual, or fulminating, algid, and walking cases, are very rare, and so far as I know only occur during an epidemic, and this fact, together with the intensity of the symptoms, and their rapidly fatal character, will probably leave but

little doubt as to their real nature. Careful enquiry should however be made, as to the possible antecedent existence of the symptoms of a first stage.

The mixed cases also occur almost entirely during an epidemic, and thus a guide is found to their real character, if one susceptible to yellow fever is attacked, and the symptoms of this disease are substituted for, or rather superimposed on those of the original complaint.

But one important fact in connection with yellow fever which should always be remembered is that the symptoms often vary very much. Even in ordinary and what may be considered typical cases the variance is often marked in different patients, in different epidemics, and at different times of the same epidemic. Probably the two symptoms most commonly associated with this fever are yellowness and black vomit. Yet it is an undoubted fact that cases occur and even prove fatal without either of these symptoms appearing during life. Intense backache is stated by some observers at times to be almost a pathognomonic symptom, but I cannot confirm this statement. In one case the hæmorrhages and gastric symptoms are severe, vomiting is excessive all through the course of the disease, black vomit and free hæmorrhages from many parts

occur, while the urine throughout is freely secreted and contains only a moderate amount of albumin. In another case little or no vomiting occurs, there is no black vomit and but little hæmorrhage; but the urine is scanty, very highly albuminous and often suppression precedes the end. The temperature also varies a good deal. Although in the first stage it usually rapidly rises to a high point, and sharply falls about the third day to normal or even sub-normal, yet the elevation of temperature may be but slight, the subsequent fall not so well defined, and it may remain one or two degrees above normal for two or three days thereafter. In some cases the nervous symptoms are well marked by intense headache, delirium, and convulsions, while in others they may be nearly absent. Many other instances might be given in which from time to time the symptoms greatly vary and it is hardly an exaggeration to say that the observant practitioner will learn something from every case that he attends.

Difficulties in diagnosis occur most frequently in the **first stage,** for in it there is no one symptom which is absolutely pathognomonic of the disease; thus differing as I will subsequently shew, from the second stage, wherein there is one symptom which is invariably present in all cases of genuine yellow fever. The question, therefore, arises

whether an absolutely correct diagnosis can be made in the first stage. In the presence of an epidemic, the peculiar features of which are known, careful observers should rarely or ever err. But in sporadic and mixed cases the diagnosis is *occasionally* not so clear, and although the symptoms may be most suspicious and lead the practitioner strongly to believe that the case is one of yellow fever, yet if he is a prudent man he will defer giving a definite opinion until the case is further advanced. In the present day when so much importance is properly attached to a prompt and accurate diagnosis, this may be a most unsatisfactory conclusion to arrive at, although similar difficulties regarding other diseases are not altogether unknown in countries far distant from the West Indies. But the existence of yellow fever is strongly indicated when with a rapid rise of temperature suddenly occurring in a susceptible subject, there is also an aspect of severe illness not present in ordinary cases of malarial fever, intense supra-orbital headache, injected and ferrety eyes, marked cutaneous hyperæmia, red tip and edge of the tongue, congested fauces, early epistaxis, epigastric tenderness and persistent vomiting. All these symptoms may not be present, but the majority probably will be, and when this is the case, grave

suspicions of the nature of the case should be entertained, and until the second stage begins the diagnosis given to the patient's friends should be of an extremely guarded character. A careful observer, however, with clinical experience, and fully alive to the possible existence of the disease, will rarely make a mistake even in the first stage.

I have described yellow fever as consisting of two stages only, and that at the commencement of the second stage when the temperature has fallen to normal or nearly so, there are often a few hours when great relief to all symptoms is experienced, and the patient often declares that he feels quite well and only a little weak. I can well imagine that on the first visit being paid at this particular time, and the temperature found normal, a hasty opinion might be formed that the patient had only suffered from an ordinary attack of malarial fever, and that he would shortly be quite well. This is a most deceptive calm, and at this time more than any other should great care be exercised in arriving at a diagnosis. But with the knowledge that this often exists in a more or less marked degree, errors should rarely be made if all the symptoms are investigated, and the case watched for a short period. I have elsewhere given the symptoms that at this period should arouse suspicion, and will only add that

when they exist the urine should at once be examined for albumin. Should this not be found the examination should be repeated several times at intervals of a few hours for at least thirty-six hours.

The **second stage** of yellow fever is invariably accompanied by albumin in the urine, and I have never known an exception to this rule. Unless the disease was aborted by treatment (as will be hereafter described) and consequently never proceeded beyond the first stage, I have never considered a case one of yellow fever unless this symptom was present. Some writers have considered that only in severe cases does this symptom occur, and refer to mild non-albuminuric cases of yellow fever. I have before stated that I do not believe that these cases belong to the genuine yellow fever type, but regard them as cases of malarial fever in which some of the symptoms of the *first stage* are present, as is often the case during an epidemic. It would certainly greatly conduce to the good reputation of a practitioner, to include these cases in statistics of the results of his treatment of yellow fever, for I have never known them prove fatal, and thus the frightful mortality that so often occurs in genuine yellow fever, even under the best treatment, would be apparently greatly diminished.

I have already stated that yellowness, hæmorrhages, slow pulse, apyrexia more or less complete, red tongue, epigastric tenderness, irritable stomach and frequently black vomit are all characteristics of the second stage. All these may be present, or only some of them, and the symptoms in individuals may vary in intensity at different times, and under different circumstances. But the one symptom that is never absent in this stage is albuminuria, and thus it may be considered as pathognomonic of yellow fever, if due regard is paid to the whole history of the case.

It has been said that albuminuria may appear in severe cases of ordinary malarial fever, and this statement has been made principally I believe by some American writers. I know nothing of these fevers in the United States, but this I know, that during an experience in the West Indies extending over upwards of 30 years, during which I have attended most pernicious forms of malarial fever, some of which proved fatal, I have never met with one case in which albumin could be found in the urine. That some observers have found albuminuria in malarial fevers would be presumptuous for me to deny, as the statement has been so clearly made by competent authorities. I cannot avoid suggesting, however, as an explanation of the difficulty I feel in reconciling

this discrepancy, either that malarial fever in the United States differs from that of the West Indies; that the patients had acute or chronic kidney disease on which malarial fever supervened; or that the cases in which albumin appeared were what I have described as mixed cases.

To emphasize my opinion as to the diagnostic importance of albuminuria, I will add once more, that I have never known this symptom absent when black vomit came on, or before the death of a patient from yellow fever.

It necessarily follows that the urine should be carefully examined at regular intervals throughout the whole course of the disease, and more especially during the second stage. As in women vaginal hæmorrhage almost invariably comes on, the importance of this examination should be explained to the patient's friends. Careful and thorough ablution between the labia with tepid water by the nurse, and the use of a catheter will be required to secure a pure specimen of urine.

Boiling, with the subsequent addition of nitric acid, is the test I have always used for albumin. At the very beginning of the second stage, it is useful to remember that in employing these tests, the urine may sometimes appear while still warm perfectly clear, but on cooling the first indications

of albumin may be found. It might be useful as a matter of routine, to employ at first one of the portable bedside tests the moment a case is seen at all of a suspicious character, in order to make sure that there is no chronic kidney disease. But the double test I have mentioned is by far the best when the case is well established.

As regards black vomit as a symptom, caution is necessary. I never saw a better specimen than was brought up by an aged negress with malignant disease of the liver. So it may occur in other cases than yellow fever. Also other matters may be mistaken for black vomit. My late partner Dr. Bowerbank was once called to a gentleman, with the statement that he was dying of yellow fever, and had just brought up a quantity of black vomit. The basin was produced, and its contents were certainly black, but it was as obvious to an experienced eye that it was not the black vomit of yellow fever. Enquiry elicited the fact that the patient had a few hours previously eaten a large quantity of black currant jam. A young man went to a ball, and towards morning was found in a room apparently very ill and vomiting a black fluid. An excellent experienced practitioner was hastily sent for, and found him stupid, confused, feverish, and vomiting a black fluid, and thereupon stated that he had malignant yellow fever

and black vomit. The patient was quite well in a few hours. It appears that he had too much wine at supper and became more or less intoxicated. Conscious of this, he retired to a private room, and drank some strong black coffee which had been hastily made. It was not properly filtered, was soon ejected, and was certainly an admirable imitation of the genuine black vomit. As yellow fever was prevailing at the time, the error was excusable, but it would have been avoided had the urine been examined before the diagnosis was announced.

If further investigation confirms the existence of a special bacillus—the bacillus icteroides—only to be found in yellow fever, and it can be differentiated from others, many of the difficulties now found in diagnosis will probably disappear. Possibly also the existence or non-existence of the malarial parasite in the blood may aid in diagnosis, although hardly I should imagine in what I have termed "mixed cases."

A suspected yellow fever case should always be examined in a good light. In many West Indian houses, particularly those of the old type, the bedrooms are often in the interior of the house, and their windows open into piazzas. Or the bedrooms, if they are not thus situated, are scantily or not at all supplied with glass windows, but

have instead green jalousie blinds, which impart a greenish hue to objects within the room. The ferrety eye, cutaneous hyperæmia and yellow tinge, may, under this peculiar light be easily overlooked.

CHAPTER X.

The Treatment of Yellow Fever.

The remedial measures proposed for yellow fever are as numerous as those for cholera, and as equally unsatisfactory, for none have been suggested for either which can in any way be pronounced to be specific, or anything approaching to it. In epidemics of both diseases there are certain cases which from the first are death-struck, and no treatment is of any avail, while there are others in whom careful nursing and suitable alimentation, with but little or no medicine, will terminate in recovery. But so far as regards yellow fever, the majority of cases lie between these two extremes, and judicious treatment may be carried on with a very fair hope of success. But the treatment must not consist solely in the selection and administration of certain drugs, but if success is looked for, strict attention must also be paid to a variety of little details principally of nursing and feeding, which are of the utmost importance.

The effects of treatment vary much in different epidemics. Hence it is, what succeeds in the hands of one practitioner will often fail when adopted by another, at some other time or place. Some of this uncertainty may be due to the different types of fever, indicated as before mentioned by the varying predominance from time to time of certain symptoms. With intelligence and a fair knowledge of his profession, the most successful practitioner should be the one who has most frequently met with the disease at different times, and under different circumstances, and has been taught by experience how to surmount difficulties as they may arise.

On first seeing a case of yellow fever it is necessary to determine in what stage it is, and the symptoms already given of the two stages must therefore be carefully considered. The urine should at once be examined before treatment is commenced. If there is no albumin—presuming it is a case of yellow fever—it must be in the first stage. If there is albumin it must be in the second stage, unless indeed acute or chronic kidney disease exists, a possible contingency which should always be remembered. And the practical point to be borne in mind is, that throughout the whole course of yellow fever while there exists the slightest trace of albuminuria,

neither mercury nor any preparation of opium should ever be given.

The first point to be considered, is whether it is possible to abort the disease in its first stage, and thus bring the attack to an early and satisfactory conclusion. It was certainly considered at one time, that this could be done. In 1861 when I was Resident Surgeon to the Colonial and Seamen's Hospital of Georgetown, British Guiana, an epidemic of yellow fever commenced, and in all cases considered suitable, this abortive treatment was carried out, and with a considerable amount of success. It then went by the name of the "20 and 24 treatment," and consisted of twenty grains of calomel and twenty-four grains of quinine for a dose, administered only in the first stage of the fever.

Sometimes two or even three of these doses were given at intervals of three or four hours if the case was very severe, and were followed by castor oil or a saline purgative. This treatment was introduced and warmly recommended by Dr. Blair the Surgeon-General of the Colony (whose published observations on yellow fever are most valuable), and adopted by his successors Drs. Manget and Butts, under whose directions I carried it out in the Seamen's Hospital. From the year 1861 to 1866 (both years included) no

less than 3242 cases of yellow fever were treated in the Seamen's Hospital, as well as a large number in the Colonial Hospital and in private practice. At the end of this period and after this large experience, Dr. Manget, the Surgeon-General, stated:* "The calomel and quinine treatment is generally, it can be said, altogether adopted in this Colony. Some practitioners do not hesitate to prescribe two or even three doses of 20 and 24 in the first twenty-four hours, followed by an aperient." Another leading practitioner also stated: "The combination of calomel and quinine in doses of about a scruple each has been found after a long trial in this colony, as far as I am aware, to be the best if not the only means at all trustworthy for checking the progress of the fever. That this treatment should have so signally failed in other Colonies, may be due in a great measure to the fact, that the remedy was administered at improper times and in improper doses." I treated many cases of yellow fever by this method in Guiana, and subsequently in Jamaica, and feel convinced that in many of my cases the disease was cut short by the treatment. In some of them the fever was checked and the case never proceeded beyond the

* In his evidence before the Commission on Yellow Fever in Demerara in 1867.

first stage; in others, although the disease was not aborted, the severity of the symptoms was mitigated, the second stage was very mild and the amount of albumin was trifling; while in others, although the fever of the first stage was lessened, the disease ran its usual course, sometimes to a fatal issue.

The abortive treatment was as follows: Twenty grains of calomel and twenty-four grains of quinine were rubbed up together in a mortar (to thoroughly mix them, and by destroying the crystals of quinine to reduce the bulk of the powder) and administered in wafer paper* with a little water thoroughly iced. After intervals of three or four hours, a second or even in a few cases a third similar dose was given if the fever continued high, and the symptoms severe. Subsequently a saline purgative or castor oil was given until the bowels were freely acted upon. Occasionally if heat of skin continued after this treatment, diaphoretics and the wet pack with ice to the head were used. If this treatment failed to abort the disease, and it went on to the second stage, the case thereafter was conducted on no special lines, but as experience suggested as suitable to the various symptoms when they appeared.

* In the absence of wafer paper, tissue or cigarette paper answers very well.

I never knew this treatment do any harm. I have seen two or perhaps three very mild cases of slight ptyalism result from the powders, but it easily yielded to treatment. Hypercinchonism was also of very rare occurrence. Once I saw a sailor boy, aged nineteen, an hour after taking a second powder become suddenly collapsed, livid, nearly pulseless, with cold extremities and irregular action of the heart, and he complained of severe abdominal pain. He died half an hour after these symptoms first appeared, remaining sensible to the end. A post-mortem examination showed the heart distended with large fibrinous clots and a large patent foramen ovale.

This abortive treatment should never be used if there is the slightest trace of albumin in the urine. Although for various reasons I have not recently employed this abortive treatment as frequently as I did twenty-five or thirty years ago, I still think it is worthy of trial if it is employed *early in the first stage*, particularly in sthenic cases occurring in plethoric men like soldiers and sailors, who have recently arrived in the colony where the disease is prevailing.

It may be said that as there is in the first stage of yellow fever no symptom which is absolutely pathognomonic of the disease, the cases which were aborted were simply cases of malarial fever.

I can only say that they were diagnosed as yellow fever by men who had had an enormous amount of practical experience in this disease, that they occurred during the prevalence of an epidemic, when the symptoms were particularly well marked, and that they presented precisely the same symptoms and *many of them came out of the same ships*, from which before and after their treatment, fatal cases of yellow fever were admitted.

As yellow fever is often developed only in certain districts, it is highly desirable, if possible, to treat the patient in a different locality to that in which he contracted the disease, and thus remove him from the influences which originally gave rise to it, and may if he continued exposed thereto aggravate the attack.

No case can be treated satisfactorily without abundance of ice, as every article of food given as well as all medicine should be ice cold.

Presuming that the abortive treatment is not employed in the first stage, unless excessive diarrhœa is present, the treatment should always be commenced with from six to ten grains of calomel. I do not recommend podophyllin, euonymin, or iridin, or that the calomel should be given in smaller doses. It should be combined either with Pil. Rhei co. or Pil. Colocynth. et Hyos., and given in pilular form with a little iced water.

Three or four hours after, a saline purgative should be given, and the following is the form I usually adopt :—

℞ Magn. Sulph., ʒvj.
Magn. Carb., ʒj.
Potass. Bicarb., ʒj.
Aq., ℥vj. Misce.

Sign. Shake the bottle and give a wineglassful every third hour well iced, while effervescing, with a dessert-spoonful of fresh lime juice.

This should be continued every third hour until the bowels have freely acted. As an old writer says, "a spontaneous diarrhœa is always a favourable symptom in the beginning of this fever, and when there is no discharge of that kind, due care should be taken to procure it." If the case is, however, seen for the first time in the second stage, calomel is inadmissible, and purgatives should be used with great caution. Should, however, constipation exist, a moderate dose of some mild laxative such as castor oil or a seidlitz powder with enemata may be employed.

After the bowels were freely acted upon, the treatment I pursued for many years, was the steady administration of carbolic acid and bicarbonate of potash in effervescence with fresh lime juice throughout the whole course of the disease, and until convalescence was established, and I

had every reason to be satisfied with it. So much so that it became a matter of routine with me in all cases to make use of this treatment, under the restrictions and modifications which will be presently alluded to. I always used this formula with adults.

℞ Acid. Carbolic., gr. xviii.
Potass. Bicarb., ʒiij.
Aq., ʒxij. Misce.

Sign. A wineglassful, well iced, every second or third hour, while effervescing, with a dessert-spoonful of fresh lime juice.

There are certain little matters it is desirable to attend to in giving this medicine. Although a wineglassful is ordered, the dose is two ounces, and care should be taken that this exact amount is given, as glasses vary so much in size. The mixture should be well iced by keeping the bottle in an ice pail, and not by adding ice to it as the bulk is thereby increased. The lime juice should be freshly squeezed from the limes, and filtered to remove any seeds or fragments of pulp. As lime juice varies much in strength at different seasons, the patient may sometimes complain that the mixture is acid. Should this be the case, the amount of lime juice must be lessened. The object should be to have the mixture either neutral or slightly alkaline. Possibly an accurately proportioned amount of citric acid would

act as well, but I much prefer the fresh lime juice.

Although it is better to give the mixture while effervescing, sometimes in the second stage the carbonic acid gas evolved appears to distend the stomach and give rise to uneasiness, flatulent eructations, or hiccough. When this is the case effervescence should be allowed to subside before the mixture is given.

The mixture should be given regularly every second or third hour during the first stage, unless the urine becomes markedly affected by it, when it should be given at longer intervals. But this is rarely necessary. In the second stage, especially if the urine is highly albuminous, it may in a few cases be advisable to lessen the dose or frequency of administration, or in some cases to suspend the use of it altogether for a short time, the appearance of the urine being a guide in this respect. The object should be to saturate the system with the carbolic acid, but not to a greater extent than to produce a slight appearance of carboluria.*

* In case anxiety should be felt with regard to giving carbolic acid for so long and in such appreciable doses, I would refer to an article in the "Lancet" of Oct. 23rd, 1897, entitled "Isolation in Scarlet Fever, unnecessary and inexpedient," by Arthur Wigglesworth, L.R.C.P. and M.R.C.S. In it, he states, that he gives carbolic acid in scarlet fever, in doses of from 1 to 6 grains, according to age, freely diluted with water every second hour

With these modifications and limitations, this medicine should be continued until a marked and steady decrease in the albumin in the urine indicates the approach of convalescence. It is well, however, even then, to give it occasionally as long as albuminuria continues, unless this is protracted to an unusual degree.

If the temperature in the first stage is high, and the skin dry, the wet pack should be used as follows. Spread two blankets on a bed and cover them with a sheet wrung out of cold water, and on these the patient in a nude condition is placed. The sheet is then folded over and tucked around the patient, each limb being previously enveloped with towels also wrung out of cold water. The blankets are then folded over so as to completely envelop the patient. At the same time cold is kept constantly applied to the head, either in the form of an india-rubber ice bag, or a bladder full of broken ice. I have often used instead of these the "iced drip" to the head, applied by hanging a vessel of water

until the rash has disappeared, and then he reduces the dose and frequency of administration until convalescence has been fully established. He also states, "to a child from 3 to 5 years of age, I gave 30 grains of carbolic acid in 24 hours, and in children from 8 to 10 years, 36 grains would be the amount in 24 hours." No harm resulted from this practice, but the reverse.

to the rail at the head of the bed with a large lump of ice in it, and from this depend several woollen threads from which the iced water continually drips on the head, the hair having been previously cut short. The patient usually experiences great relief from these applications, and often asks for their repetition.

Since adopting the treatment I have just described, I have not met with any cases requiring special treatment for hyperpyrexia. It is possible, however, that this may be met with, and if so, it must be treated on the general principles adapted to this complication. Cardiac depressants, however, should be used with great caution.

Neither have I had under this treatment, the profuse and uncontrollable black vomit that I previously met with. The carbolic acid seems to keep it in check. But if it should fail to do so, other medicines may be tried. Ergot, either in a mixture or ergotine as a hypodermic injection may be used. Creasote and soda in iced mucilage are often of service. Acetate of lead, the tincture of the perchloride of iron, hydrocyanic acid, liquid extract of hamamelis, the various preparations of bismuth and nitrate of silver in small doses frequently repeated, may all be tried. In all cases of profuse black vomit, an ice bag should be kept applied to the epigastrium, and small pieces of

ice frequently swallowed. In some cases it seems desirable to stop all medicine and food for a time, only giving the ice, and supporting the patient with nutrient enemata or suppositories. In cases where the black vomit is very profuse and of a reddish colour, and the patient appears to be sinking rapidly, solely or principally from the gastric hæmorrhage, transfusion of blood or of a saline solution has been suggested. I have never tried it, but in desperate cases, this suggestion appears to me worthy of consideration.

Hiccough is frequently very distressing, and is best treated by the Sp. Æther. Co., or a few drops of chloroform given with an alkali in iced mucilage. Musk may be tried. In one very severe case where this complication greatly exhausted the patient, a little chloroform given by inhalation completely stopped the hiccough, and gave the patient a refreshing sleep.

Suppression of urine is the most fatal symptom that can arise in yellow fever. However profuse, intense and long-continued black vomit and the other hæmorrhages may be, recovery is not impossible, and is not unfrequently met with. But I have never known a patient recover after suppression proved to be complete, by the absence of urine after the catheter had been passed twice with an interval of twelve hours between each introduc-

tion. But I have seen many cases recover where the urine secreted amounted to but a few ounces daily, and it had the appearance of olive oil, and became nearly solid in the tube when tested for albumin. I found no treatment of any avail when complete suppression had occurred, but when it is only partial, treatment may be of some use. I have seen good results from repeated dry cupping over the kidneys, followed by the continued application over the same region of a large piece of spongio-piline wrung out of very hot water, and freely sprinkled with turpentine, and a hot water bag placed over this. The turpentine produces a good deal of smarting and redness of the skin, but so long as it does not cause vesication it should be persevered with. I have also used tincture and infusion of digitalis applied in the same way instead of turpentine, and I think with benefit. Acetate and citrate of potash seem to do good, but I have most faith in one-drachm doses of spirit of nitrous æther given every hour, well diluted with iced water. Caffeine may be tried the more so as it is of service as a cardiac tonic. If the stomach is tolerant, large quantities of fluid should be drunk, and if the patient's strength permits—which is not very likely—saline purgatives might be tried. Large enemata of iced water frequently repeated have been advised, but

I have had no experience of this method of treatment. Whatever treatment is employed, the results are far from satisfactory, but I think I have had fewer cases of partial or complete suppression, since I have used so largely from the beginning of the attack, the carbolic acid and citrate of potash mixture.

In some cases, urine is freely secreted and the stomach is tolerant, but heart failure is threatened, as indicated by very slow pulse, sighing respirations, faintness on the slightest movement, and cold perspiration. Strychnine given in small doses every third or fourth hour, is the most valuable remedy I know for this condition. I seldom found it necessary to give more than the equivalent of one-twelfth of a grain in divided doses in one period of twenty-four hours. Possibly in some cases, more may be required, but its effects should be most carefully watched. Alcoholic and medicinal stimulants are also needed. Caffeine might be used as a substitute or in addition to the strychnine, but its bad effects in causing insomnia will probably interfere much with its use, although its diuretic action is also beneficial.

Insomnia is often complained of. A full dose of bromide of ammonium given in iced milk is the safest remedy to employ. Those sedatives that depress the heart's action should never be

used. Nor under any circumstances should any preparation of opium be given as long as there is any trace of albuminuria. I once saw a patient, who was doing fairly well and whose recovery was hoped for, take one grain of opium for insomnia. Fatal suppression of urine was the immediate result.

For many years past I have refrained from using blisters, as in severe cases the denuded skin is almost certain to bleed, and often ulcerates. Sinapisms are occasionally useful and are not injurious.

As it is important to know the amount of urine secreted, all passed should be kept for the inspection of the practitioner. It should be examined regularly, morning and evening, during the whole course of the disease. After testing the urine and allowing the albumin to subside, the tube should be compared with the specimen previously examined, and by the increase or diminution of the albumin a fair idea is obtained as to the progress of the case.

During convalescence a mixture of quinine, dilute nitro-hydrochloric acid and strychnine acts as a good tonic. Occasional doses of podophyllin, euonymin or iridin, with mild purgatives and diuretics, appear to hasten the removal of the yellow colour of the skin. Change of air always does

much good, but this will not of course be advised as long as there is any albuminuria.

Dr. Sternburg, an American author of great and deserved repute in yellow fever, strongly recommends the following medicine :—

℞ Sodæ Bicarb., gr. 150
Hydrarg. Perchlor., gr. $\frac{1}{3}$
Aq., ʒ40.

Mix. *Sign.* Three tablespoonfuls every hour to be given ice cold.

He reports having met with great success in the use of this medicine. Like the mixture I have used for so many years, it consists of an antiseptic and alkali combined, and both are given well iced.

CHAPTER XI.

Nursing, Food, and Stimulants, in Yellow Fever.

As properly trained nurses are not frequently to be met with in the West Indies, and more particularly in the country districts, the duty will devolve upon the practitioner of pointing out to those capable of understanding them, what he has learned by his hospital experiences, are the general duties that they should perform. But in addition to these, it may not be out of place to indicate in a few words some specific details, which are worthy of consideration by nurses who have charge of yellow fever patients.

Before doing so, however, I would again call attention to the necessity of having the patient in a good white light, in order properly to appreciate some of the symptoms, and therefore, if for no other reason, the sick room should never be one in the inside of a house surrounded by piazzas, or one with green blinds only, and no glass windows. If it can be obtained, an outside bedroom, not on the ground floor, and on the

windward* side of the house should be selected, as thereby the benefit of the refreshing daily sea breeze is secured, and the heat of the sun in the afternoon avoided. The bed should be placed opposite a window, and in order to keep off the glare of the morning sun, it should be furnished with a green blind which can be raised when necessary to inspect the patient. When the cold damp land wind sets in at night, or after rain, the windows on that side of the house towards which it blows should be kept closed, otherwise a chill is apt to ensue. The room should be kept as cool and well ventilated as possible, but neither sea nor land wind should be permitted to blow directly upon the patient, and draughts from any direction should be most carefully avoided.

A separate day and night nurse are necessary, who should never leave the patient for a moment, and be strictly charged to obey implicitly the orders of the practitioner and no one else. This caution is only necessary to one unacquainted with the West Indies, and particularly the country districts. Attached to many families may often be found an old native woman, who has occupied for years the position of nurse, and is looked upon as a great

* Windward is a common term in the West Indies. It denotes the quarter from which the usual strong trade wind blows, which is generally E. or S.E.

authority in domestic medicine, and for whom much affection is felt. This "Grannie" or "Nana," as she is generally called, is fond of "helping the doctor," or "working with the doctor," as she calls it, and will, if not carefully looked after, surreptitiously give the patient some infusion of a native herb under the name of "bush tea," or a hot bath in which various plants have been boiled. When the patient is hanging between life and death, such practices are not calculated to promote his recovery, and therefore the possibility of these occurrences should be most carefully guarded against. But all their attempts in this direction should be met with kindly courtesy and consideration, for these good old souls have the best intentions in what they propose. An inexperienced practitioner will also do well not too cavalierly or contemptuously to regard their remarks, for many of them are old and keen observers, and know well by long experience the difference between yellow fever and malarial fever, and a little kindliness and consideration will often secure an ally who may be of service in case an unfortunate error in diagnosis has been made, and yellow fever overlooked. Tact and courtesy are not thrown away upon them, even if rendered only from self-interest and as an act of expediency.

The patient should be kept as quiet and free

from excitement as possible. With this end in view, in addition to the nurse, but one, or at the most two members of the family should be allowed in the sick room. It is often a matter of difficulty to keep out numbers of well meaning but injudicious friends, who crowd into the house and often into the sick room, and do much harm to the patient by their presence. Nothing but the most explicit and peremptory orders on the part of the medical attendant will prevent this, as it is one of the peculiar customs of the West Indies, and a most pestilent one it is.

A yellow fever patient should remain in bed from the beginning of the attack until convalescence is fairly established. As long as albuminuria is present, it is seldom desirable for the patient to leave his bed unless this condition is unusually prolonged, when, if the other symptoms are favourable, he may be permitted to do so for a few hours daily, strict care being taken to avoid the possibility of contracting a chill. The patient should also be prohibited sitting up or even raising himself in bed, as fatal cardiac syncope might be the result. It therefore necessarily follows that the bed pan, the urinal, and feeding cup must always be used.

Unless the symptoms demand absolute quietude, the patient may be carefully lifted as occasion

may demand from one bed to another, care being taken not to raise the head while doing so. Body and bed linen should be frequently changed, as the odour given off by the patient is often most offensive. Sponging the patient with tepid vinegar and water, two or three times a day, is very refreshing, but strict care must be taken to avoid a chill.

The nurse should carefully measure all urine as soon as passed, and keep a note of the amount in ounces. Having done this, it should be kept until some more is discharged and measured, when that first passed may be got rid of. This will ensure a sample being always at hand for examination. Two test tubes should be labelled six a.m. and six p.m., or two other equi-distant hours in the twenty-four, and at these periods the urine should be examined for albumin, and the patient should be encouraged to pass it as near as he can to these times. The urine in the test tube after examination is then set aside (covered to keep out dust) to cool, and allow the albumin to settle. Twelve hours after another sample is examined, and after cooling and settling, it is compared with that last before examined, and thus by the increase or diminution of the albumin an estimate can be formed of the progress of the disease. It is useful to gum a strip of paper down the tube

divided into eighths, and thus approximately accurate information is obtained as to the amount of albumin. Acidity or alkalinity of the urine should also be ascertained by the use of test papers. Unless the nurse is thoroughly competent, examination of the urine is best conducted by the medical attendant.

Fæcal excreta need not be kept for examination unless they are clay coloured, bloody, black, or of a tarry consistency, but their character should be noted.

It is rarely necessary, in the first stage of yellow fever, to keep the vomited matters. In the second stage, however, everything vomited should be kept for inspection, and as far as practicable, a different vessel should be used each time vomiting comes on. This is most important where the symptoms indicate the probable approaching advent of either the clear acid, or the black vomit.

The urine, vomit and fæces (the latter only when necessary) should of course, be kept in a separate room, which had better be locked with the key in the possession of the nurse. Otherwise officious servants may carry them off and destroy them at a time when a careful examination of them is highly desirable. Or friends and amateur medicos may take a morbid pleasure in

inspecting them, and forming and expressing crude opinions on their nature, and the probable course of the disease, which for many reasons is undesirable.

Bed sores are very rare in yellow fever, but of course, the possibility of their occurrence should be carefully guarded against.

In deference to the views of those who consider yellow fever communicable, it may be desirable to use all the precautions which are generally considered of an antiseptic nature, to carefully disinfect the excreta, and to either destroy, or carefully disinfect everything that has come into contact with the patient. If thought necessary after recovery or death, the sick room, or even the house may be disinfected.

All food should be given thoroughly iced, but for many years past I have given nothing except iced milk throughout the whole course of the disease, and until convalescence was established. Along with this I always give the Liquor Calcis Saccharat. (recently prepared) in doses of about a drachm, to two ounces of milk, every hour or two hours. This amount is usually easily retained, but if it is vomited, it should be given in smaller quantities and more frequently. If the vomited matters are highly acid, the amount of lime water should be increased.

Sometimes in the West Indies at certain seasons, the milk is tainted by the cows feeding on "guinea hen weed." This tainted milk should be carefully avoided, as the use of it is apt to give rise to vomiting, and diarrhœa. During the hot season with the temperature between 80° and 90° F. and even higher, milk often soon turns sour. To avoid this, the milk as soon as procured should be placed in a bottle which has been thoroughly washed out with boiling water and soda. The bottle should be completely filled, one or two teaspoonfuls of bicarbonate of soda added, and at once tightly corked with a *perfectly new unused cork* which has been previously soaked in boiling water. The bottle is then kept constantly in a pail of broken ice. New corks should be used every day. If these suggestions are carefully followed, the milk will keep well for twenty-four hours. Of course, if milk fresh from the cow can be procured two or three times a day, so much the better, but this is not often the case, and even when it is, the method of preservation I have suggested had better be followed.

If the patient complains of being tired of the milk, it may be flavoured with a little essence of bitter almonds or vanilla.

I have sometimes given white of egg beaten up with a little orange flower water, and well iced. It may also be given along with the iced milk.

Any of the gruels or paps, as well as beef or chicken tea are objectionable until convalescence commences, as indicated by mitigation of all the symptoms, and the steady daily diminution of the albumin in the urine. Of course, anything like solid food is utterly out of the question. I once had a patient who in the second stage was doing well, and I had every hope that he would pull through. He was on the milk and lime water diet, but complained of being ravenously hungry. In the absence of the nurse, he ate a slice of bread; uncontrollable black vomit came on at once, and he died in less than twenty-four hours.

Much thirst is often complained of in the first stage, and the patient craves for large draughts of iced water or lemonade, and vomiting is often the result of this indulgence. Lemonade I have usually found unadvisable, although I often allowed the patient to wash out his mouth with it, but not to swallow it. If he can retain iced water, and it occasions no discomfort, moderate draughts of it may be allowed, and they may be beneficial in increasing the secretion from the kidneys. But I have found the thirst quenched equally as well by small sips of iced water, or by sucking or swallowing small pieces of ice. Large draughts of soda water are usually rejected. Tea seems almost always to disagree. One small cup of it

freshly made, infused for only a few minutes, and without sugar, may be tried in the morning, and if retained, proves refreshing after a restless night.

A dry glazed tongue, and burning pain in the pharynx and œsophagus, are often relieved by sipping thin gum water well iced.

Alcoholic stimulants should be given with great caution in yellow fever, and only when absolutely required. In the first stage I cannot conceive any necessity arising for their use. In the second stage, if the case is a severe one they are generally needed, especially when the pulse is very slow, or when it is weak or quick, and the symptoms indicate threatened heart failure. With very rare exceptions, the only alcoholic stimulant I ever give is the very best still hock that can be procured, and of the value of it in bad cases I cannot speak too highly. Of course care must be taken that it is a thoroughly sound wine, and it must be well iced by being kept in an ice pail. Two ounces should be given at stated intervals and it is but rarely vomited. In severe and long-continued cases of black vomit, hock is often retained when everything else is immediately rejected, and I have often given one or two bottles of it in twenty-four hours. I much prefer it to either brandy or whisky. Champagne and other

aerated wines I have but rarely given, for they generally occasion flatulent distension and eructations and increase acidity and epigastric pain. European sailors will often express a strong desire for some particular form of stimulant, especially bottled porter or rum and water, and compliance with their wishes to a moderate extent is permissible, the effects of course being carefully watched, the amount to be given strictly defined, and care being taken that the liquor supplied is of the best quality and given well iced.*

In this chapter I have dealt with various little details which to many may appear unworthy of notice. But I have no hesitation in stating, that long experience has taught me, that it is attention to, or disregard of, these little minutiæ that often turns the scale between life and death, and he will be the most successful in saving life, who not only gives directions, but makes sure as far as he can by personal supervision, that his instructions are intelligently understood and carried out to the letter.

* Dr. Jackson, in 1791, writes:—"I have heard of some well attested instances, where plentiful draughts of rum and water have checked the vomiting, and apparently saved the lives of patients, after the medical people had given them up for lost."

I certainly cannot advise this rough and ready way of administering stimulants in yellow fever.

CHAPTER XII.

Is Yellow Fever Contagious, and if so, through what Means?

It is only after much hesitation that I have thought it advisable to write anything on the vexed question of the contagion of yellow fever. Volumes have been written on the subject, arguments used, and so-called facts adduced, which to the writers themselves appeared to settle the matter forthwith, and yet at the present day professional opinion is as much divided as ever. Legends exist in the West Indies, that in the old days the subject was discussed with so much excitement and acrimony, that duels between medical men were not infrequently the result.

Although it is not in the slightest degree likely that anything I write on the subject can have much effect one way or the other, yet having had during thirty-four years' practice in the West Indies, extensive experience of this disease, both in the epidemic and sporadic forms, I venture to submit the results of my observations on the subject.

As regards personal communication of the disease, I may at once state that during the whole course of my long experience, I have never met with a single case in which I thought yellow fever had been contracted by either mediate or immediate contact with a previous case, or with a patient's exhalations or excreta. My experience leads me entirely in the opposite direction, for I have never seen the most intimate association with yellow fever result in its extension among those who for this reason might have been expected to contract it. Some instances may be given. A few months after I left England (and therefore susceptible) an epidemic broke out in Georgetown, British Guiana. I was then in charge of the Seamen's Hospital as Resident Surgeon, and had under my care a large number of cases. I was in the wards at all hours of the day and night, took all the clinical records myself, daily measured and examined numerous specimens of urine, and often used the microscope. More than once I had black vomit ejected over my clothes. I never used any disinfectants, and so far from contracting the disease never enjoyed better health. Among many other cases I attended in Jamaica, the following are noteworthy:—An officer with his wife arrived at the same time from England, and after a few months he was

attacked with yellow fever. His wife nursed him day and night, slept in the same bed with him, kissed him, and hardly ever left his room as long as he was ill, and yet she did not contract the disease. Two young ladies arrived from England at the same time. Within a week one was down with a severe attack, and was devotedly nursed by the other, who did not contract the disease, although she had a slight attack of ordinary intermittent fever ten days subsequently. Yellow fever broke out in a small detachment of troops just arrived from England, who after some deaths had occurred were removed to an isolation camp, and immediately thereafter a sergeant's wife took ill with the disease, which was evidently contracted at the spot from which she had just been moved. Her husband nursed her day and night in a small hot ill-ventilated bell tent, and yet he never suffered. I have often attended merchant captains and mates with yellow fever in lodging houses, and frequently their shipmates came to visit them, but I have never known the disease communicated to them. Were it advisable, I could give many other instances of a similar nature in support of the views I hold on this subject.

In discussing this question, the following points appear to me worthy of consideration, and some of them I may say, have been already frequently employed by other writers.

Great importance should be attached to the persistent difference of opinion among medical men on the subject. No such doubt is felt with reference to small-pox, scarlet fever, or measles, as all regard them as communicable.

The disease is usually considered contagious by medical men who have had but small experience, having seen only a few cases of it, or only one epidemic, and on the strength of this limited experience they pronounce it contagious. More especially has this been the case, since the germ theory of some diseases has been so well established. On the other hand, among the large number of medical men who have had many long years of experience, have seen several epidemics, and have treated numerous sporadic cases, there are very few who consider the disease communicable. When I settled in the West Indies in 1860, I made enquiries on the subject from many men who had been thirty or forty years in practice, and during a period when yellow fever was far more common than it is at present, and I failed to find one who did not hold the same opinion that I now and always have held. It is impossible to ignore or minimize the opinion of men whose experience extended over long periods, and under whose observation in a variety of circumstances, hundreds and even thousands of

cases had been treated, and who although their medical acquirements were not perhaps up to the standard of the present day, were not altogether fools, and might be considered equal to the task of forming and expressing an opinion on such a simple matter as the communicability of a certain disease. An opinion with which so far as I am aware, the laity have always entirely concurred, and they are not bad judges in such a matter.

The proportion of susceptible persons to the general population in the West Indies is but small, and when one of them is attacked by yellow fever the fact is soon generally known in the locality, and his previous movements can easily be traced. It is thus easily ascertained whether he has been in contact with any previous case of yellow fever, and my experience is that rarely or ever has this been the case. I am willing to allow, that in some very rare cases (so rare that I have never personally attended any) a man may be attacked after visiting a house wherein was a yellow fever case, but so far from this demonstrating that the disease is contagious, it may with equal force be maintained that in doing so, he thereby exposed himself to the same local influences that gave rise to the original case. And the more so, as it is an accepted fact, that yellow fever is a disease that

generally arises in, and clings to well-defined localities.

Sporadic cases occasionally appear among old residents in a locality in which no case has been known to occur for months or years previously, and which it is impossible by the strictest inquiry to trace to any pre-existing case. These sporadic cases do not communicate the disease to other individuals living in the same house, although in the most intimate association with them, nor to those from other houses who come to visit them. One, out of the many instances of the kind that I have met with, was a creole child, attacked in a house that was built by, and always inhabited by patients of mine, and therefore I could be certain that no case of yellow fever had ever been in it. No case of the disease had been known in the district for months, if not years previously, and even if there had been one, it was quite impossible that the child could have come into contact with it. The attack proved fatal with black vomit and suppression. The child's young brothers and sisters, as well as other relatives and friends, were frequently in the sick room, but none of them were attacked. I have also known sporadic cases occur in European soldiers, who had been for weeks confined in a prison of which I was surgeon, and where, of

course, communication with any other pre-existing case was entirely out of the question. Those who maintain that yellow fever is contagious, try to get over the difficulty caused by these cases, by suggesting that epidemic yellow fever is contagious, and sporadic is not. I can only say, that the clinical features of both are absolutely identical, and that there is little or no difference in the amount of mortality attendant on both these forms.

When yellow fever arises in an epidemic form, it often does so when the strictest enquiry fails to connect the first case with any pre-existing one. The epidemic does not radiate from the first case as from a centre, but isolated outbreaks occur in other localities, and among individuals who have had no connection with the first case.

If bodies of men, such as soldiers from barracks, or sailors from ships, wherein yellow fever is spreading, are removed to a healthy locality where the disease does not exist, its further development is almost invariably arrested. Any who are attacked shortly after removal, have evidently carried with them the seeds of the disease from the place were it originally appeared. Neither is the disease communicated to those with whom they associate in their new locality.

Patients with yellow fever do not communicate

the disease to those with other maladies in a hospital in which they may be placed, or to nurses, or physicians. I never saw any bad results follow placing yellow fever cases among other patients in the Seamen's Hospital to which I was attached. Of course if yellow fever extends to the district in which the hospital is situated, individuals inside as well as outside are liable to be attacked, but not otherwise. In fact according to some authorities, the hospital seems to afford a certain amount of protection. Many years ago Dr. Menzies, Inspector-General of Hospitals, stated in an official return :—" During the time in which *every fifth man* of the whole strength of the garrison had been attacked with fever, only *one in twenty-eight* of the whole number of orderlies employed in hospital (amounting to 188) had been attacked, and that only two deaths occurred from fever among these orderlies, giving a proportion of one death in 94. It is ascertained that of the orderlies discharged by their own desire, or from misconduct, none came back as patients." In an epidemic at Newcastle in Jamaica, the experience of the late Deputy Inspector-General Lawson was, that out of 156 men *who attended fever cases* only 5·1 per cent. were attacked; while of 523 men *who did not attend fever cases* no less than 17·0 per cent. were at-

tacked. Many other instances of a similar nature might be adduced from the writings of men who had hundreds and thousands of cases under their care.

One or two hard frosts in countries where they occur at once put an end to the spread of yellow fever. In the tropics, heavy falls of rain and gales of wind, greatly check the spread of an epidemic, sometimes altogether, but at all events for a time.

When yellow fever appears as an epidemic, the strictest isolation of each case does not prevent the extension of the disease.

Although the black and coloured races are just as liable as the whites to be attacked by contagious diseases, such as small-pox and measles, with the rarest exceptions they do not contract yellow fever. Nor as a rule do whites who have been long resident in the locality, the ones attacked being generally those recently arrived. Instead of the weak, the old, the sickly, and women being attacked, it is generally robust healthy men in the prime of life who fall victims to it.

Seamen on ships from Europe, which in their passage touched at no port, nor held communication with other ships, have been attacked with yellow fever when they approached a country in

which it was epidemic, and long before they had any communication with the shore.

In closing these remarks on the personal contagion of yellow fever, I will quote the opinion of an eminent physician, whose name, although he died long ago, is still held in respect in the West Indies, although I by no means approve of the hard words he uses towards those who differ from him in opinion.* "I can safely aver that several thousand cases of this disease fell under my observation in the West Indies, and that I did not find the least appearance of a contagious quality in any of them.....If the disease were contagious, the fact must have been indisputably demonstrated more than ten thousand times, considering the multitudes who have been victims to it, and there would long since have been no more doubt on the subject than there now is of the contagious nature of small-pox and measles. The uniformity of nature, and the necessary connection between cause and effect, will not allow us to believe in the fortuitous occurrence of a few rare instances of contagion from yellow fever, in opposition to the immense mass of facts by which that

* "An Essay on the Disease called Yellow Fever," by Edward Nathaniel Bancroft, M.D., F.R.C.P., 1811. Partly delivered as the Gulstonian Lectures before the College of Physicians in the years 1806 and 1807.

disease has been proved destitute of any such quality, and the probabilities will always be a million of times greater that these supposed rare instances have originated in ignorance, error, prejudice, or falsehood, than that effects so *monstrous* should ever have really occurred."

Whether yellow fever is ever contracted from fomites, is a question not yet decided, although there is, I believe, a general opinion that *occasionally* it can be. I have never met with an instance in my own practice where there could be the slightest suspicion that this had occurred. But I cannot altogether ignore a few very exceptional cases I have heard of in the West Indies, where bedding and clothing from a locality where yellow fever existed, when transferred elsewhere, apparently led to an extension of the disease. But considering the strong evidence there is against yellow fever being personally communicable, I feel inclined to adopt the views of Dr. William Bailey* as given in an article on the "Etiology of Yellow Fever" in the "Lancet" for September 6th, 1879. Referring to the importation of yellow fever by ships, he considered that "the transmission rested with the vessel, not with the persons

* Professor of the Principles and Practice of Medicine, and of Clinical Medicine in the Hospital College of Medicine of Louisville, Kentucky, U.S.

carried by it. It was a transmission of a *section of the climate of a yellow fever district*, the ship brought something from the climate, and not from the sick. And for this something to be effective, it was requisite that the locality into which it was imported, should have for the time being, a temperature equal or approximate to that of a true yellow fever district." There appears to me nothing impossible in the supposition that yellow fever can be transmitted in this manner, for it appears in certain well-defined localities, and susceptible persons therein are liable to be attacked. Blankets and clothes of a loose absorbent texture are thoroughly permeable by the atmosphere of these tainted localities, and no doubt if removed therefrom may long retain some of its peculiar characters. That an atmosphere in which these articles have been kept, can thoroughly impregnate them with its own peculiar characters, is proved by the odour that so persistently clings to them, when derived from the dissecting room, tobacco, or the musty hold of a sailing ship. I can well conceive therefore, that where certain conditions—probably combined atmospheric and telluric—necessary for the production of yellow fever have arisen in a given locality, if they exist in a sufficiently potent and concentrated form, bedding and clothes therefrom

may convey in "a section of the climate" the specific contagium of yellow fever—whatever it may be—and that *quite independently of any connection with any case of yellow fever that may be existing therein, and even previous to the occurrence of a single case.* And if this specific contagium, thus derived from the climate of a yellow fever district, is conveyed to a place, hitherto exempt, it is allowable to conjecture that under certain favourable conditions it may multiply, and thus give rise to another centre, from which the disease may be propagated by similar means.

With the views I entertain regarding the non-contagious nature of yellow fever, I need hardly state, that I have never considered it necessary to isolate patients, or to employ disinfectants, and I have never had occasion to regret not having done so. At the present time, however, when so much importance is being justly attached to the germ theory of many diseases, and attempts are being made to demonstrate the existence of a specific bacillus as the essential cause of yellow fever, it will probably conduce to the mental tranquillity, and enhance the reputation of the practitioner, if he treats all his cases of this disease, as if they were of the most contagious character.

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