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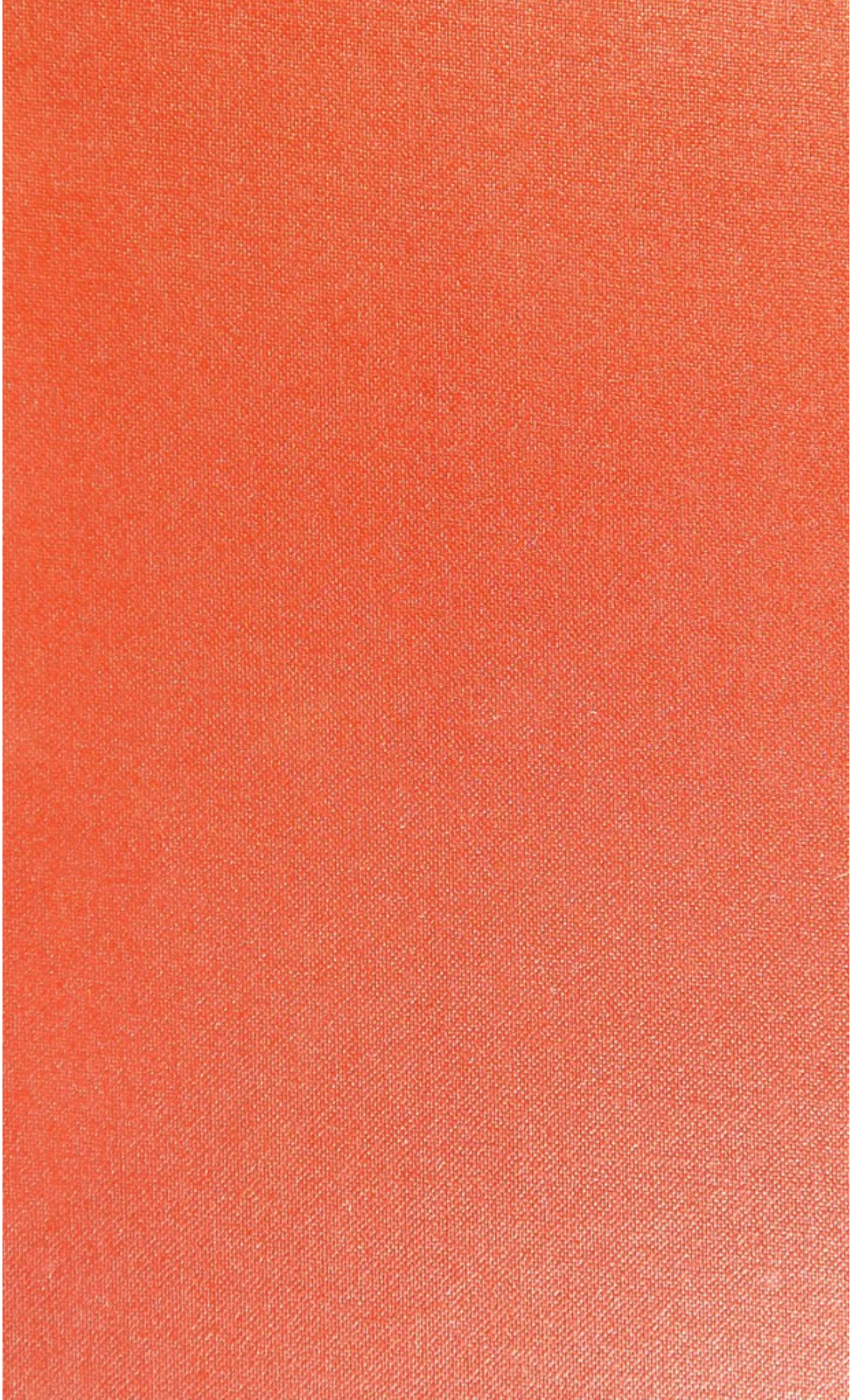
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THE ENDEMIC DISEASES

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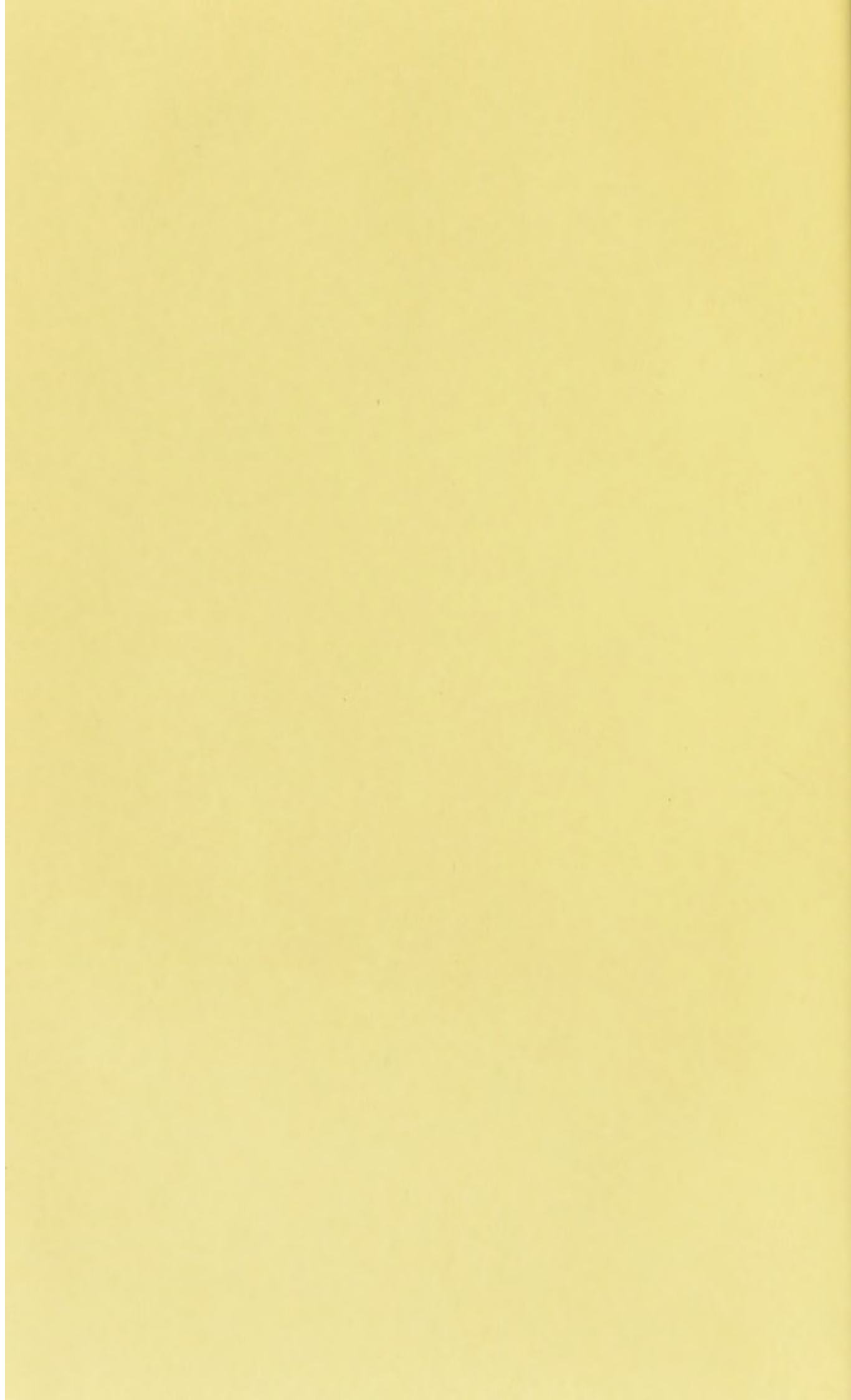
TROPICAL CLIMATES

WITH

THEIR TREATMENT.

BY

JOHN SULLIVAN, M.D.

MEMBER OF THE ROYAL COLLEGE OF PHYSICIANS OF LONDON, ETC. ETC.

To SIR GEORGE BURROWS, Bart.,

M.D., D.C.L., F.R.S.,

LATE PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS, LONDON,

PHYSICIAN IN ORDINARY TO THE QUEEN,

WHO IS REGARDED

BY EVERY MEMBER OF HIS PROFESSION WITH FEELINGS OF

ATTACHMENT AND RESPECT,

BY REASON OF HIS PUBLIC AND PRIVATE VIRTUES,

THIS TREATISE ON INTER-TROPICAL DISEASES

Is Dedicated

BY HIS HUMBLE AND DEVOTED SERVANT,

THE AUTHOR.
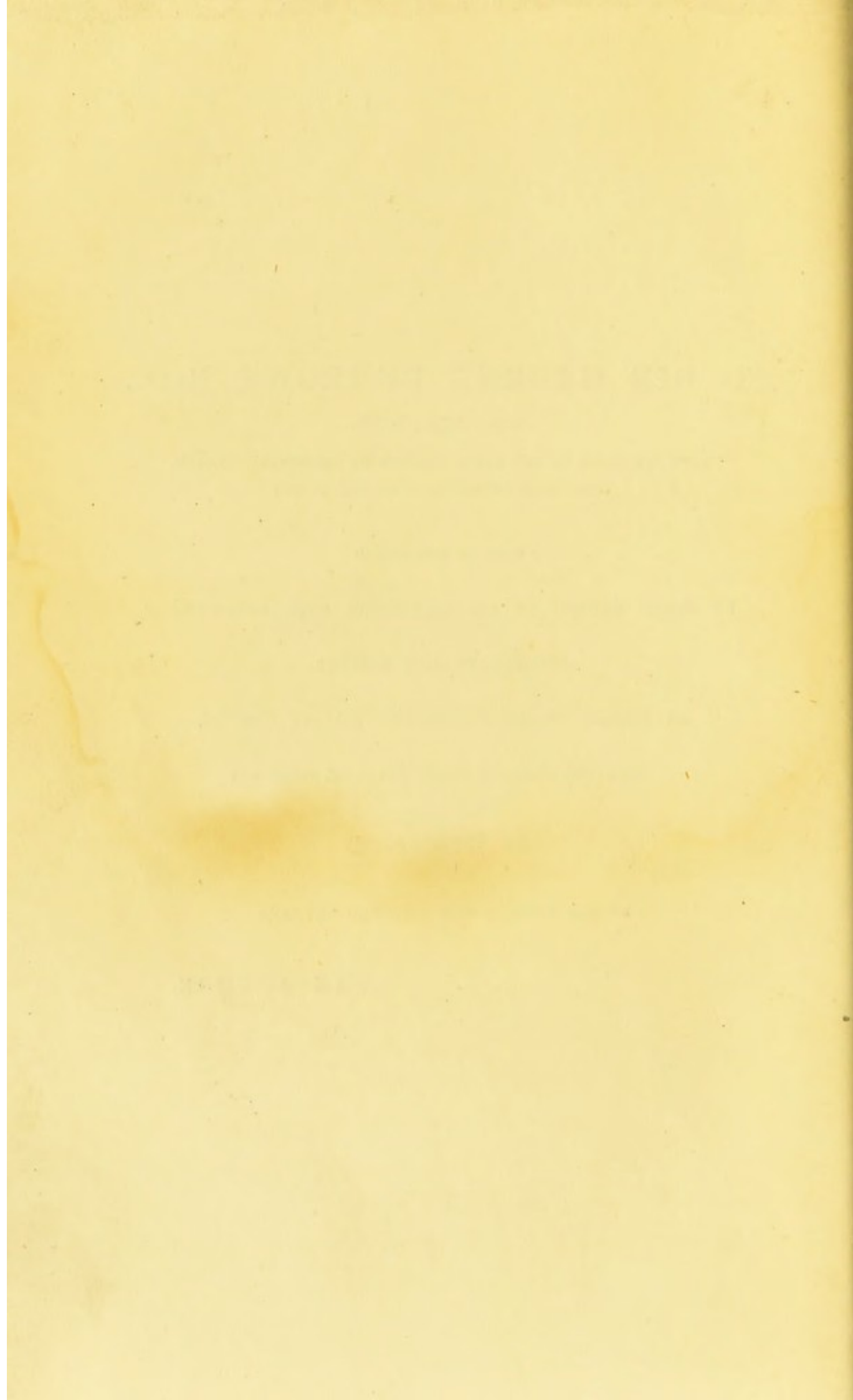
PREFACE.

THE following treatise is the result of patient study and observation, during a practice of many years in tropical climates.

These Endemic Diseases are not confined to the geographical limits of any particular region, but extend to the entire intertropical zone, both in the East and West Indies, with, perhaps, one solitary exception, but in a measure differing with the different races.

For the better illustration of my subject, I have carefully perused the writings of Johnson and Martin, Annesley, Morehead, Parkes, &c.; and have derived valuable information from those of Haspal, Laure, Saint-Vel, Corneilliac, &c. &c., on the diseases peculiar to the French Antilles.

A residence of some years in Havana, in Cuba, having brought me into communication with many eminent French, Spanish, and American physicians, I have carefully noted down the results of my correspondence with them.

If, after a perusal of these works in different

languages, I have contributed some facts worthy of interest—some details forgotten or overlooked by those who have written before me, I shall do no more than enlarge and add some new matter to a subject already so well discussed.

I have studied these diseases, not alone in the European, but also in the great variety of the tropical races. The pathology of a disease does not vary with the different character of the races. The morbid predisposition varies, but this does not depend so much on the influence of race as on the degree of acclimatisation, and the general conditions of hygiene.

I shall endeavour to describe these diseases with faithfulness, drawn from the experience of myself, as well as that of others, so as to form a useful compendium of facts for such as have not the opportunity of studying disease in the true endemic focus in the region of the tropics.

KEPPEL STREET,
 RUSSELL SQUARE,
  March, 1877.

CONTENTS.

ERRATA.

Page 73, line 5, *for* " How diagnose from bilious fever ?"
    read " How diagnose from yellow fever ?"

  ,, 169, line 11, *for* " carotid glands," *read* " parotid glands."

ERRATA.

Page 36, line 8, *for* " in one the selection," *read* " in the selection."

  „   39, line 26, *for* " fever," *read* " fevers."

  „   73, line 6, *for* " How diagnose from bilious fever ?" *read* " from yellow fever ?"

  „   74, line 3, *for* " New," *read* " Now."

  „ 150, line 4, *for* " enervation," *read* " innervation."

  „ 153, line 19, *for* " orgasm," *read* " organ."

  „ 169, line 11, *for* " carotid," *read* " parotid."

  „ 194, line 20, *for* " wells," *read* " walls."

  „ 197, line 11, *for* " the head," *read* " the body."

  „ 197, line 20, *for* " systematic," *read* " systemic."

  „ 211, line 22, leave out the two words " the last."

THE ENDEMIC DISEASES

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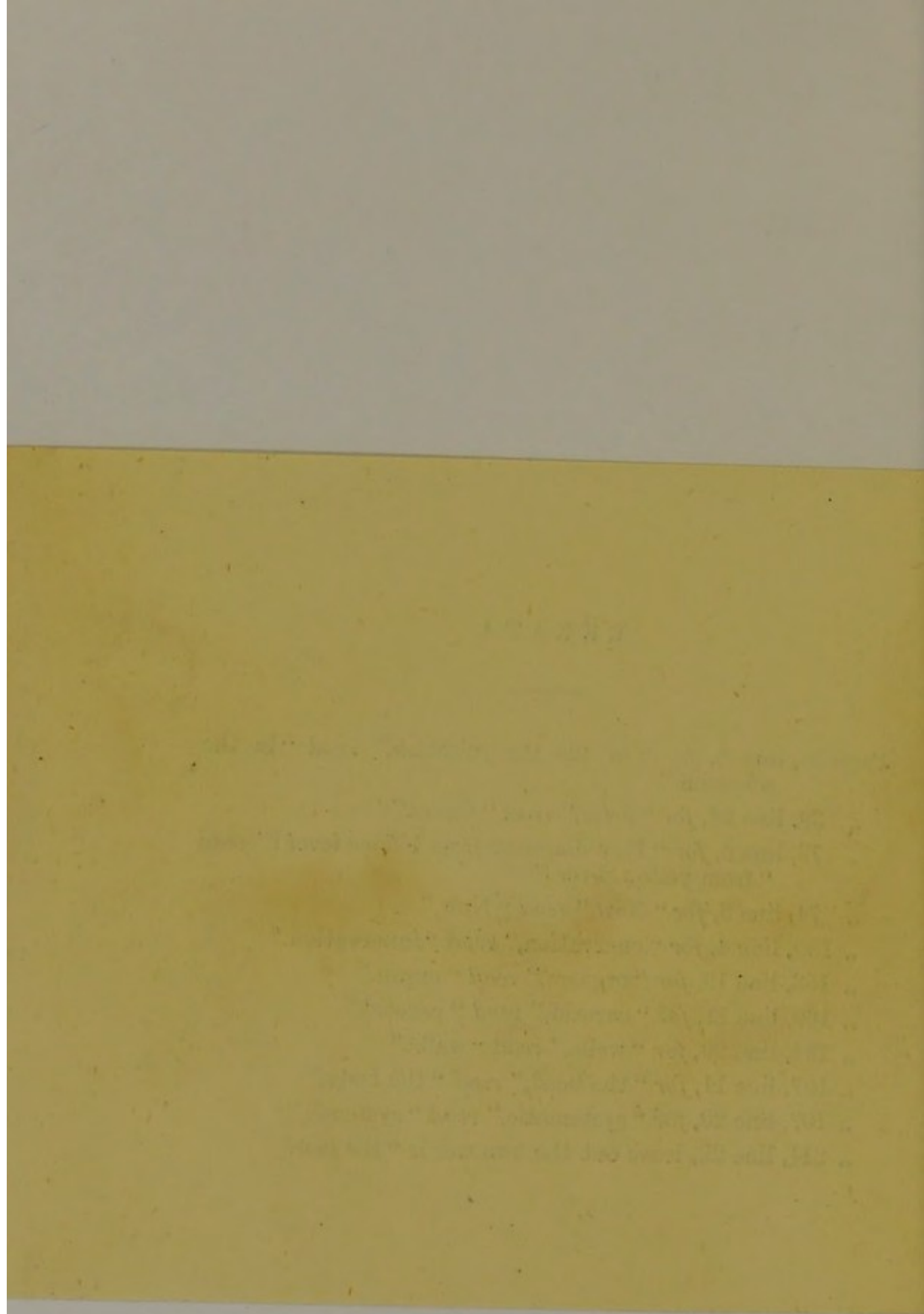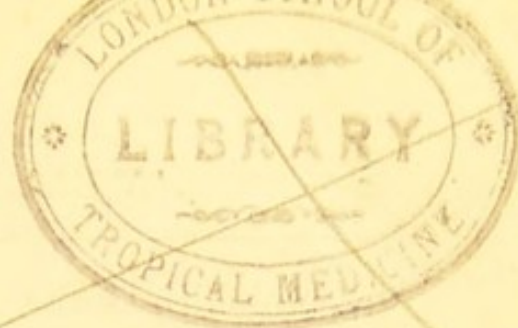
TROPICAL CLIMATES

ANÆMIA IN HOT CLIMATES

Is that condition of the blood in which there is a deficiency of the red corpuscles, and of the red colouring matter contained in them.

Life consists in the due and continued performance of certain functions and secretions. When well and duly performed, life is in health; but if imperfectly performed, then life is disturbed, and the health is bad.

Now all these functions and secretions which go to form life, depend for their performance on a proper supply of oxygen from the external air, by which the process of combustion is sustained, and the living machine kept going.

So that, in reality, life is but a process of oxidation and of combustion, and so long as the fuel supply is kept up, life goes on; but when this supply is deficient, or it altogether fails, then life becomes faint, languishes, or is extinguished.

Now the red corpuscles of the blood, like ants in

a molehill, some going loaded, others returning empty, are the true carriers of oxygen from the lungs, and when they have absorbed sufficient oxygen, convey it to be deposited even in the remotest tissues of the body, to maintain that combustion on which life depends.

Hence the importance to the well-being of animal life to maintain a due quantity of the red corpuscles in the blood by a proper supply of good air, healthy food, and exercise.

And when the process of combustion is kept up by an uninterrupted stream of oxygen from the external air through the lungs, then the muscular power is great; there is healthy secretion from the glands, and consequent healthy digestion; the function of respiration is active; the circulation of the blood free and unobstructed; the sensorium of the brain unimpaired, and then a man may be considered to be in the complete enjoyment of a " mens sana in corpore sano."

That condition of the blood known as anæmia is at the foundation of nearly all diseases in tropical climates. It constitutes a pathological state, often of great danger, amongst individuals of all races, sexes, and ages. It may appear under all shades and degrees, from a slight anæmia, not inconsistent with health, but rather of a conservative character, to one of a most profoundly dangerous tendency.

In hot climates the causes which produce an anæmic state of the blood are more varied and in-

tense. In the European who settles down in a tropical region, the physiological conditions which retained his blood in a normal state suited to a cold climate are broken; he is no longer in need of a blood so rich as before, of a respiration so active; he does not require to generate so large a quantity of caloric, so necessary in order to enable him to resist the effects of a climate more or less severe.

All he requires is to accommodate himself to his new climate. Hence all previous conditions of health, which, in a tropical climate, would now be a source of danger, become greatly modified.

The consequent changes effected in the functions of respiration and digestion tend to alter the composition of the blood; so that while the physiological action of the heart and lungs diminishes—and this fact explains why we meet with so few acute affections of these organs in hot climates—certain functions are increased to excess, as those of the liver and skin.

From this increase of the functional activity of the liver results the frequency of its lesions. From a check to the function of transpiration various morbid states originate which react rather upon the abdominal than upon the thoracic viscera.

The exaggerated flow of the secretions contributes to induce gradually a state of anæmia, which when it does not exceed a certain limit would appear to be rather beneficial, by allowing the orgasm the

better to accommodate itself to the influence of a tropical climate.

But soon these depressing influences would appear to favour the transition of a physiological state of anæmia to a condition which constitutes disease, and these influences when continued, maintain or exaggerate a condition which is a consequence of all diseases, whether chronic or acute, in hot climates.

If this state of anæmia is more frequent in the East Indian coolie and in the negro than in the European, notwithstanding their greater power of resisting the influences of a tropical climate, this must be attributed to his inferior social and hygienic condition, and to the inferiority of his diet, which affords but a poor supply of the red corpuscles of the blood.

Amongst the white races, the latter periods of childhood appear to be more disposed to anæmia than the earlier ones. In the tropics, the child is usually strong and healthy, although a little pale, his flesh is firm; but as the child grows up he is unable to resist external influences—he becomes anæmic.

The female sex of all races is more disposed than the male to anæmia. Chlorosis, with menorrhagia, is of frequent occurrence. All losses of blood from whatever sources they may arise, all intermittent or eruptive diseases, hepatic disease, dysentery, acute or chronic, and all severe endemic or epidemic diseases,

are most frequently succeeded by the anæmic condition in a greater or lesser degree.

Anæmia impresses a distinctive mark upon the countenance of the individual of every race.

The skin of the white man or the Creole takes upon it a pale yellowish colour.

In the negro and the East Indian, the dark skin loses its brilliancy and softness, it assumes a greenish tinge, and the infiltrated parts become semi-transparent; soon the skin begins to look a yellowish black, and the dirty white of the palms of the hands strongly contrasts with the colour of the surrounding integuments.

When anæmia is still more pronounced, the expression of the patient to whatever race he may belong is truly appalling. The mucous membranes are very pale, the conjunctiva bluish, the eyelids milk-white, the lips pale and without colour.

When the condition is still more exaggerated, the disturbance in the circulation becomes more marked; on auscultation a " bruit de soufflet" is heard extending to the carotids; strong cardiac pulsation is set up, as though the heart was hypertrophied; the pulsation is visible in the carotids; the pulse at the wrist from being rapid and compressible, becomes full and slow. Respiration from being oppressed, becomes short and painful, accompanied by sibilant rhonchus, and at the lower part of the chest by mucous rhonchus, owing to pulmonary œdema.

The patient complains of frontal headache, noises in ears, confused sounds, throbbing in the temples, a sense of suffocation on the least exertion, and frightful beatings of the heart.

Now all those varied symptoms, proceeding from a disturbance in the functions of circulation, respiration, and of the brain, are due to a deficiency of the red corpuscles of the blood, which can convey but a small supply of oxygen, and consequently the functions of the different organs are impaired and obstructed.

As a natural consequence of this deficient supply of oxygen from a deficiency in the red globules of the blood, the subject of an advanced anæmia, like a chlorotic girl, on making any undue exertion, especially upon walking up a hill, will feel a giddiness in the head, a buzzing noise in the ears, a partial indistinctness of vision; he will frequently stop to take breath, and he will press his hand against his heart, as though to keep down and restrain the violence of its beatings.

To this anæmic state of the blood must be ascribed the different kinds of accompanying dropsy. These cannot be attributed to mechanical obstacles, compression of the vessels, or to visceral tumours; for in most cases no one viscus is affected. The liver and spleen may be in a normal condition, although slightly hypertrophied.

The œdema and ascites are owing to excessive exudation of liquid through the coats of the blood-

vessels, and to a diminished absorption by the veins and lymphatics.

In health, when the red corpuscles of the blood are abundant and sufficient, when oxidation and combustion are duly maintained in every tissue of the body, the balance is sustained between exudation and absorption; but when this balance is destroyed, then fluid accumulates in different parts of the body, giving origin to the various kinds of dropsy.

All modern writers agree that absorption depends on the condition of the arteries, and the condition of the arteries depends on that of the vaso-motor nerves which supply them, whether for contraction or dilatation. If they act with energy then absorption is carried on with energy; if their action be weak, then the fluids accumulate from diminished absorption.

In a strong ruddy healthy subject the arteries are filled with blood. The vaso-motor nerves keep them in a state of tension, and thus they afford a support to the heart, and then the beatings of the heart are steady and regular.

But in the state of anæmia the arteries dilate rather than contract, the heart is unsupported, and from its irregular beatings proceed the sense of fainting, palpitation, flushings of the face, the feeling of terror and anxiety.

These constant obstructions to the circulation give rise to œdema, the face becomes swollen, espe-

cially the upper eyelid. The œdema which occupied the site of the malleoli soon becomes permanent, ascends, and invades the entire lower extremities.

The scrotum may also become infiltrated, and the umbilicus becomes distended, which in the negro is generally very prominent.

The epigastrium becomes stretched and tympanitic, the abdomen more or less ascitic, and sometimes there is effusion into the pleura.

If serous effusions are frequent, hæmorrhages are of rare occurrence in anæmia, a circumstance owing to the state of the blood, which does not allow local congestions to be formed; nevertheless, accidental hæmorrhages in such subjects are greatly to be dreaded, from the difficulty of stopping them, and because they greatly aggravate the condition of the patient.

In capital operations upon such subjects it is surprising what a number of ligatures are required.

The disorders of menstruation are intimately connected with this state of anæmia, such as menorrhagic chlorosis, a frequent consequence of bad and insufficient food to provide for the constant expenditure of the tissues, and an aggravated form of dyspepsia, arising from menorrhagia or from bleeding piles.

Menorrhagia, dysmenorrhœa, and amenorrhœa are often complicated with leucorrhœa, which aggravates all the disorders of the digestive organs, and consequently the chloro-anæmic condition.

When the symptoms of confirmed dyspepsia

become more pronounced the appetite falls off or entirely fails, the thirst is excessive, urine scanty, with thick sediment, bowels are constipated, alternating with a diarrhœa, which contributes to exhaust the patient. To these symptoms are often added nausea and pains more or less severe at the pit of the stomach. These pains are often accompanied with an extraordinary perversion of taste, and very frequent among the negro race.

In tropical as well as in temperate climates chloroanæmia is frequently associated with visceralgia, and determines those vicious and depraved longings of the appetite. Hence the gratification of a taste for earth, sand, coals, &c., aggravates the chloro-anæmic state, and produces a cachexia of the worst kind, with effusions in the serous and cellular tissues.

Earth appears to be the favoured substance; neither threats nor the fear of punishment will deter these unhappy creatures from gratifying this horrid taste.

I have known a young coolie rise from his death bed, drag himself along the ground, and scrape the earth with his nails, in order to gratify for the last time his disgusting craving.

Patients who have gradually passed through the different grades of anæmia fall at last into a state of marasmus. They become extremely feeble and emaciated : they are troubled with a dry cough, the skin becames harsh and dry ; perspiration, so active in the tropics, is suspended. They complain of intense headache, with stupor, wandering pains over

the chest and abdomen, formication in the soles of the feet, and a sensation of cold in the lower extremities.

These unfortunate beings are so sensitive to the impression of cold that you may see them in countries near to the equator drag themselves slowly along, and with difficulty lay themselves down to bask under the rays of a burning sun for hours together, perfectly immovable.

The face is swollen, the lower extremities œdematous ; ascites considerable; palpitation of the heart violent, and the least exertion produces dyspnœa.

Death is often the result of serous effusions into the pleura, or pericardium, or under the arachnoid membrane, or from serous effusion into the viscera, the consequence of colliquative diarrhœa or of pernicious fever.

The prognosis of an affection so varied in its forms and so alarming in its results is seldom favourable. The progress of anæmia is sometimes slow, at others rapid. When it succeeds to an hæmorrhage or to an acute disease the system may become restored to health, but when anæmia is chronic, and slow from its commencement, it seldom disappears, and may last for a lifetime.

When diarrhœa accompanies anæmia the ascites and other effusions will disappear for a time, to return when the diarrhœa ceases.

Anæmia goes hand in hand with malarial fever. Diarrhœa, so frequent in hot climates, follows in the

train. It is the last disturbing element in all chronic and acute diseases, and hastens the fatal termination.

In tropical regions all debilitating causes predispose to marsh fever, a fever always to be dreaded when complicated with other morbid states of the system.

The anæmic condition is a fit soil for the development of malaria in all its varied manifestations.

How distinguish between anæmia from general causes and that from malarial fever?

The symptoms are about the same, if we may except that in the ascites which is consequent upon malarial cachexia, paracentesis is never required with a view of affording relief, as would be the case in ascites consequent on anæmia from general causes.

In both cases it is to the changes in the composition of the blood that we must refer the effusions into the cellular tissues and serous cavities.

We must not confound the cachexia from anæmia with that which follows upon dysentery, either chronic or acute. That which distinguishes the later is the dryness of the tissues, the former the tendency to infiltrations and to serous effusions.

In dysenteric cachexia the abdomen, the anterior walls of which are very thin, assumes an empty form, which allows the anterior spinous processes to project, the hand to feel the vertebral column, and even to feel the pulsations of the aorta. Generally

there is no collection of fluid, but the malleoli may be slightly infiltrated.

Dysenteric cachexia differs from malarial cachexia, or from that from anæmia, in that it is a dry cachexia, and does not deposit serum under the skin.

The evidence to be derived from examination after death in cases of anæmia is both useful and instructive, as it confirms us in our opinion respecting the nature of the disease and of its treatment. We find serum effused in the cavities of the pleura and pericardium, and in the ventricles of the brain, which presents no kind of lesion. The lungs are shrunken, pale, almost white; tubercles may sometimes be traced in their upper part, and this may account for the hard dry cough which often exists in the advanced stages of anæmic cachexia.

The heart is pale, contracted, bathed in serum, and sometimes slightly hypertrophied, in proportion to the violence of the pulsations observed during life.

The cellular mucous and muscular tissues are pale, as if washed out. The peritoneum always contains a large quantity of serum. The stomach is soft and discoloured, the intestines pale and almost transparent. The liver is anæmic, often normal in size, but dry, yellowish, streaked like marble. The gall bladder is small and contracted, and the bile, which it contains in small quantity, is watery and of a clear yellow colour. This

appearance of the liver will vary according as the anæmia has been complicated with chronic dysentery or with malaria.

In the former case the liver is always diminished in size, and presents the character of chronic atrophy. In the latter case the liver and spleen are more or less enlarged.

The state of the blood is profoundly altered; it is watery and discoloured. That which we find in the bloodvessels resembles a dirty red coloured serum.

In the clot of anæmic blood we find the buffy coat. This is entirely owing to an excess in proportion of the fibrine over the red corpuscles, and does not at all imply a state of phlegmasia.

This diminution or deficiency of the red corpuscles in the blood is the true type of anæmia, the well-defined starting-point of a long series of morbid conditions.

There is one very serious result of the anæmic condition,—it is when the blood parts with its albumen, when it may be detected in the urine, instead of remaining in its normal combined state for the nourishment of the body.

In the healthy state of the body, the proportion of albumen in the blood is as 79 to 1000, which may be reduced as low as 55. Now in proportion as the albumen in the blood is diminished there is an equivalent increase of the salts in the water, a condition favourable for exosmosis. The water charged with saline matter, transudes more freely; as it

passes through the tissues it carries with it a portion of albumen.   Now this liquid is identical with the liquid of dropsical effusions.

Hence blood deficient in albumen creates a morbid tendency to a transudation of serum to form dropsy, and produces that anæmic condition, that starvation of the tissues, arising from the want of a proper supply of oxygen, through a deficiency of the red corpuscles in the blood, which diminish in quantity according as the albumen drains away into the urine.

When anæmia is rapidly declared, and albumen in the urine is one of the earliest symptoms, the case may be pronounced to be one of albuminuria. But when albumen in the urine is not a primary symptom during a tedious chronic case of anæmic cachexia, albumen in the urine may be considered as an effect rather than a cause of anæmia.

This anæmic condition if not cured may sometimes be relieved by therapeutic means, in spite of the depressing influence of climate.

The patient may possibly be restored by a judicious treatment to a state of anæmia compatible with a condition of health in a tropical climate, rarely, if ever, can the patient be carried beyond such a modified state of health.   Change to a temperate climate is our last and only resource, but we must not defer the change until a state of cachexia may have declared itself by serous effusions, which are often incurable, not to be affected by any treatment, however skilful.

MARSH MALARIAL FEVER.

THE influence of the poison of malaria in tropical climates is exercised with an energy unknown in the temperate zone.

Its manifestations are more sudden, more deep seated, and more dangerous. It is to this permanent influence and to the violence of its repeated attacks, that we must ascribe the unhealthiness of the torrid zone.

Marsh or malarial fever includes all those forms of pyrexia described by authors under the name of intermittent, remittent, continued bilious remittent, pernicious fever, &c.

It is generated by a specific telluric miasma. It consists of three distinct stages : 1. The stage of cold, or that of concentration or congestion. 2. That of heat and reaction. 3. That of sweating and of elimination, and is characterized by the type of intermittence.

The endemic character of malarial fever is one of locality, not an attribute of climate. This fever does not exist in all the localities of which a district may be composed ; some localities may be healthy, while others not far distant may

be the hot-beds of fever, and this difference may arise from the hydrogeological character of the soil peculiar to such localities.

In all regions, temperate as well as tropical, the old familiar classic marsh has been always considered as the type of the source and origin from which malaria is derived; but as this fever varies from simple intermittent to a fever of a pernicious type, so does the soil from whence it originates vary both in constitution and appearance from the old classic marsh, clothed with rank vegetation, to the barren soil, even to the sandy desert.

The more unhealthy localities, as in certain parts of Italy, Turkey, Greece, as well as in the regions of the tropics, are those which are situated near to the sea, in which there is an admixture of salt with fresh water. We know from sad experience how deadly is the nature of these fevers in hot climates in lands bordering upon estuaries where large rivers empty themselves into the sea. Whenever salt has been debarred from mixing with fresh water, fevers have been known to cease, and to return with the same violence so soon as the waters have become again mixed. When the salt is in excess, over the fresh water, then fevers abate, but if the quantity of the salt and fresh water be equally balanced, then fevers rage with great severity.

The lowlands along the coast are in hot climates the foci of malarial fever. There we find the land periodically inundated, heaps of decayed rubbish at

the mouth, and all along the borders of rivers and canals, and marsh vegetation rankly flourishing and marking out along the coast the extensive zone of endemic malaria.

Marsh fever prevails in the tropics all the year round, but with more intensity in some seasons than at others, especially during the last three months of the winter season. The second half of the year comprises the season of rains and heats, and is the period of floods, when the heat is greatest and evaporation from the earth's surface most powerful.

The elements of meteorology do not all play the same important part. Some, as atmospheric pressure and electricity, may have an influence, but there are others, as heat and moisture, which have a direct action in the production of fever and ague.

The physiological condition which they produce, and which causes a depression of all the forces of vital and organic reaction, constitutes a constant predisposition to fever.

By heat alone, however intense, without moisture the malarial element will never produce the endemic fever. The effect of an exaggerated heat is rather calculated to produce cerebral congestion or a sunstroke so fatal to Europeans.

A fall in the thermometer after a storm of rain during the night time, under the influence of a northeast wind, is one great source of marsh fever in the tropics.

In all malarial districts, when the sun rises and

causes evaporation, or if the soil of the earth be turned up, and placed in contact with the external air, then will marsh fever prevail.

Should we expose ourselves to the cool night air in a marshy locality we are certain to inhale the infection. The miasma is drawn out by evaporation, and when the soil cools down after sunset, the watery vapours become condensed under the form of a fog, which retains the malarial emanations suspended in the atmosphere. This fog, like a funeral pall, is visible in certain localities, as in the Pontine Marshes, and the Campana near Rome, and in certain regions near to the equator is thick enough to shut out the brilliancy of the stars, and woe be to the man who is not sheltered from its influence!

Moisture and heat during the winter solstice in the tropics are always accompanied by storms, and the electricity in the atmosphere must play an important part in the production of the miasma elaborated in the soil. Electricity interferes in all the chemical operations of composition and decomposition of bodies in general, and that particular action by which malaria is generated, is not likely to escape from its influence. It is probable that these heavy electric discharges possess some influence over the degree and the severity of these fevers, and in all diseases from blood poisoning at this period of the year in tropical climates.

I remember, when visiting the yellow fever wards in one of the principal " casas de salud" in Havana,

how appalling was the effect produced on the inmates of these wards by a sudden discharge of the electric fluid, or by a clap of thunder.

Patients, who previous to a thunderstorm were quiet and calm, some even in a state of convalescence, would suddenly start up and make an effort to rush from their beds, horrified and affrighted, fall back, then become rigid, convulsed, and expire in the act of vomiting black matter.

The winds, no doubt, bear an important part in disseminating these miasmatic vapours, conveying them away to distant localities, and thus they become the true carriers of disease and of death.

The winds may be healthy or unhealthy, according to their direction, or to the nature of the land or the soil they pass over before they arrive at the centres of population. In places surrounded by unhealthy marshes fever rages with every wind; the same wind may be healthy in one place and unhealthy in another, according as it becomes the carrier of malaria.

We have already considered the physical conditions of the soil and of the atmosphere which give rise to endemic marsh fever ; let us now consider what may be the true nature of the poison of malaria towards the production of which all these conditions concur.

Fever and ague have for ages been regarded as the product of a specific miasma or emanation from a paludinous soil, and the surrounding elements as the agents in its formation.

This morbid element cannot be appreciated by the senses, it evades all physical inquiry and all chemical analysis. The human system is the only field for its energy. It is by the series of disorders which it produces in that system, varied but constant, that we are enabled by induction to attribute its existence to marsh malaria.

Nevertheless we can explain most logically all the conditions under which these fevers are generated, as though the poison of malaria had an undisputed and material existence.

Many and varied are the theories respecting the nature and origin of the poison of malaria, founded more upon scientific theory than upon experience.

Some there are, but fortunately for the interests of true science and of the promoters of the rules of hygiene, they are very few, who ignore the very existence of marsh malaria, and who teach that sudden cold applied to an exhausted body is capable of creating a fever of an intermittent type in a malarial district independently of malaria. Now if sudden cold can produce such an effect in a malarial locality independent of malaria, surely it ought to produce the same result in a healthy non-malarial district, which it never does. Fever of an intermittent type always derives its origin from some miasma of infection, and when the poison is more than usually concentrated it assumes the remittent, continued, or pernicious form.

The theory that fever and ague derive their origin

solely from a marshy soil has undergone great modification. If we implicitly believe in this theory, how reconcile ourselves to the fact that intermittent fever is frequent in some sandy and even elevated districts where no marshes are to be found? In many healthy countries in Europe workmen employed in making cuttings through lands preparatory to laying down railroads, have been frequently seized with a dangerous form of malarial fever. We may probably find an explanation in the supposition that a chemical or an electro-chemical action can be produced by the contact of the hot moist air with the varied elements which are found combined in certain soils of the earth.

Fermentation may take place in the muddy bottoms which form the bases of marshes, the products of which are often appreciable by the senses, or to be recognised in the air by chemical reagents; but it is very certain that in comparatively healthy soils the upturning of which is sufficient to determine fever and ague, no such fermentation can take place.

We can believe with Michel Lévy, in his " Traité d'Hygiène pratique," that the organic matters and the salts which enter into the composition of a marshy soil placed in contact with moist and hot air highly charged with oxygen produce a spontaneous fermentation, in which the air would act the part of a ferment, producing a decomposition, the products of which would be in proportion to the elements brought into contact with the air.

Melier, in his " Rapport sur les Marais salants," writes as follows :—" We must remember that in tropical climates the focus of malaria lies nearly always along the sea coast. Insect and low animal life, which cannot exist in those saltish, brackish waters, perish, and this decayed matter decomposes the sulphates, which form part of the salts in sea water, producing sulphuretted hydrogen, and that in proportion to the quantity of the decomposed sulphates, so is the measure of the deleterious effect of the miasma from a paludinous soil."

This miasma he believes is composed of three elements—water, organic matter, and sulphates, one acting upon the other under the influence of a hot sun.

Now this theory, which introduces marine alluvia as one of the elements of which marsh miasma is composed, and which assimilates the operation of its elaboration to a catalytic fermentation in which the air, heat, and moisture act as ferments, appear to my mind both natural and plausible, which can be applied to the varied topography of malarial districts, and to the varied external and physical appearances of the foci of malaria, some covered with rank, others with no vegetation at all.

The vapour of malaria may emanate from a sandy, porous or stony soil, percolated by water supplied from neighbouring ravines or from distant hills. This I observed along the coast of Peru, where vegetation is but very scarce, and where intermittent fever is very

frequent. Beneath the sand, about three feet below the surface, you come upon marine alluvial shells, animal deposits, and decayed organic matter, covered over by a coating of sand, acted upon by a burning sun. I had observed the same appearance at a height of 1500 feet above the level of the sea.

We may therefore attempt to describe marsh malaria as the product of the reaction which takes place between the hydrogeological elements of the soil and the influence of a peculiar atmospheric condition, a product whose physical characters are unknown, but the material existence of which is proved by the fact of its being transported by the winds to a great distance from the original focus, and secondly, by the long period of incubation during which it lies latent in the system.

This long incubation appears to me a most striking evidence of the poison of malaria.

A man removes from a malarial locality, goes to sea, and no sooner does he arrive at the place of his destination than he is seized with fever and ague, probably for the first time in his life.

I knew a surgeon who had resided free from fever during a residence of six years in one of the most sickly stations of the East Indies, who died from repeated attacks of fever and ague after his return to Europe, and am acquainted with many instances of the crews of vessels which while at anchor in unhealthy ports had escaped the endemic

fever until a few days had elapsed after they had put to sea.

These are instances of the long incubation of malaria contracted in some endemic focus, and set into activity by some powerful accidental causes.

This malarial fever is intimately associated with an alteration in certain organs of the human body.

The spleen, under the influence of malaria, undergoes a state of hyperæmia, with congestion and increase of volume; there is seldom pain. The tissue may become hypertrophied; but in certain chronic cases, and in pernicious fevers, it may become softened, quaggy, and red.

Next to the spleen, the liver is perhaps the organ which suffers most from malarial miasma. There is, first, congestion, and increase of volume, with induration; but where the liver is softened, there is diminution of volume. In old chronic cases, in marsh cachexia, the liver assumes a variety of shades, the result rather of altered secretion than of disordered circulation.

We may often detect in large quantity the pigment of the blood, which may give occasion to dysentery and to intestinal hæmorrhages. Increase of volume and of consistence with congestion, and an anæmic discoloration, are the anatomical characters of the liver in the majority of cases of fever and ague.

In simple and recent cases of intermittent, the liver seldom undergoes any alteration. But after

repeated and severe attacks of fever, after frequent relapses, the liver gives evidence of a state of hyperæmia, to be recognised by the tension, pain, and swelling in the right hypochondrium.

Hence disordered function in that organ, followed by frequent evacuations of bile, upwards and downwards. When an access of fever and ague occurs, the sympathy between the stomach, intestines, and the liver will suffice to cause a flow of bile, or to impart to the fever the character of " gastric bilious fever."

It is to the disorder in the secretion of the liver, and to the passage into the blood of altered bile, that we must ascribe the origin of the " bilious, or hæmorrhagic bilious fever."

However, the bilious element which complicates the greater number of the fevers known as remittent is not an essential character of such fevers in tropical climates, any more than that remittent is the only type which distinguishes them.

Amongst the various lesions in the heart, liver, and spleen we find certain relations to exist.

The poison of malaria is absorbed into the blood, and the consequent alteration in the quality of the blood is not only antecedent to these lesions, but the cause of them. The same occurs in cholera and yellow fever.

In severe and repeated attacks of fever and ague there is a diminution in the red corpuscles, in the quantity of its albumen, without any increase of

the fibrine, a diminution of the salts, and an increase of the watery part of the blood.

Hence we can account for the anæmic discoloration of the skin, the loss of muscular power, the serous infiltrations, the tendency to hæmorrhages and extravasations of blood.

If specific emanations from the earth's surface produce specific effects upon special organs, that emanating from malaria must have certain organs marked out for its operation, more especially the liver and spleen; hence the alterations in the composition of the blood must precede all lesions in these organs.

If the spleen be the organ first attacked, this shows the elective affinity which marsh miasma has for the spleen. In all specific blood diseases the poison will attack the liver and the spleen, being the organs which pre-eminently elaborate and purify the blood.

In fevers attended with danger, and of long duration, the cold stage, or that of concentration, is often absent, or can only be detected by some slight lowering of the temperature of the skin and extremities.

But we shall suspect the presence of the cold stage by the pallor of the skin, the alteration of the features, the expression of which may serve to indicate the severity of the disease, especially if there be signs of prostration.

This form of cold stage is more to be dreaded

than that of a frank, well-developed nature. In fact, it is always a symptom of great danger and of frequent occurrence in pernicious fevers.

At other times the cold stage is extreme, and of long duration; but we must not confound this exaggerated form of cold stage with the algidity of febris algida, the most faithful expression of some of the most formidable forms of fever and ague. In the exaggerated cold stage the patient shivers, but the temperature of the skin never lowers the thermometer below the normal temperature of the body, while in febris algida the patient complains of a burning sensation internally, and the skin feels to the touch as cold as ice. It is important to bear this fact in mind when we are called to form a diagnosis in some grave fevers of malarial origin.

In such cases, scarcely has the cold stage set in when it is interrupted by the hot stage, and then returns again, alternating during a period of several hours. But if we go back to the first access of this fever, however grave and obscure, we shall discover that it began by a regular, well-defined cold stage, which characterises all intermittent fevers.

The hot stage, or that of reaction, often constitutes the only one, especially in old chronic fevers. It certainly is the stage which rarely if ever is absent. In slight intermittents, it may be almost imperceptible; whereas in continued fevers it may declare itself with great severity.

The sweating, or critical stage, that of elimination, also undergoes many alterations, at times being excessive, at others altogether absent. The two extremes are always inconvenient, as the feelings of cold consequent upon excessive sweating may induce algidity; while the absence of a profuse sweating which should mark the termination of a frank intermittent, compels us to modify our treatment in order to correct the irregularity.

In a word, the succession of the three stages must be considered as the symptomatic expression of the poison of malaria.

The cold stage being the period of congestion from arterial contraction, through nerve irritation; the hot stage, that of reaction with arterial dilatation; and the sweating stage, that of complete relaxation and elimination of the poison.

Certain peculiarities may change the order and regularity of the three stages, depending upon the nature and degree of the specific cause, or upon some secondary causes derived from the patient himself, causing one stage to be more exaggerated than another, or its suppression altogether. However, these modifications must never induce us to lose sight of the true nature of marsh fever, or to hesitate in our diagnosis.

The longer the duration of the paroxysm the greater the danger, and this long duration may transform intermittence into remittence, and remittence into continued.

Although each species of fever may be distinguished by some particular symptom peculiar to itself, nevertheless there are certain functional and organic disorders common to all species and types, which belong to the essential nature of the disease, and which constitute the pathological link which unites all the varieties of intermittent fever.

Innervation plays an important part in the phenomena peculiar to these diseases.

In some unhealthy localities a man may be killed by the poison of malaria in two or three hours; and if you examine the body you will find no material lesion capable of explaining the grave symptoms which have attended his death. We are therefore compelled to ascribe these violent perturbations to the action of a poison on the function of the nervous system.

That sudden death may be produced by a shock to the nervous system is a pathological fact, for in that system is centred the principle of life, and from thence may emanate the direct cause of death, although we are unable to detect in the nerve centres any functional or organic changes, sufficiently evident or constant, to enable us to refer them to a malarial origin.

The miasmatic discharge may kill, as may a discharge of electric fluid, through an afflux of nerve energy; but the matter known as miasma does not reach the nerves directly, as does the electric fluid.

It is only when it has been introduced or ab-

sorbed into the current of the circulation, that the disturbance in the nervous centres commences, which varies according to the idiosyncrasy of the individual, and which is consequent to, or the effect of, the poisoning of the blood.

In one patient the effect of miasma produces prostration, in another it is over-excitement, or increased muscular sensibility ; one man may be seized with delirium, another fall into a state of stupor. Some on exposure to the poison of malaria will be seized with some local neuralgic affection, or some general hyperæsthesia, while others will complain of no pain.

Now although these symptoms may indicate the profound impression made upon the nerve centres, calculated to produce a fever of a pernicious type, we must not, however, regard them as symptoms characteristic of malaria. *Calorification* also plays an important part in the pathology of fever and ague.

The phenomena of the alternations of heat and cold reproducing themselves periodically are the essential characters of the action of the poison of malaria.

From the simplest feeling of cold to the convulsive shivering, or to the icy cold of the most pronounced algidity, we ascend the entire scale of the morbid sensations derived from cold.

It is therefore of great importance to watch the symptoms afforded by the disorder of the heat-pro-

ducing powers, as being the essential characters of the endemics of hot climates, and to consider them as the direct effect of the blood-infecting poison, as happens with certain chemical poisons when introduced into the circulation.

What we have said only relates to the external temperature; for the sensations of cold and heat as expressed by the patient are not at all in relation with the thermometer employed as a means of diagnosis.

For, during the cold stage, it often rises from three to four degrees, and often it does not mark more than one degree of difference between the cold and the hot stage; and when the fever has passed away the thermometer goes down again. This periodical variation is characteristic of marsh intermittent fever. The disorders of calorification only affect sensations; they do not influence thermometrical variations. Often the physician perceives that the patient is cold when he complains of feeling intense heat: and when the patient shivers with cold, only a slight cold feeling, nay, even a warmth may be felt by the medical attendant.

In the endemic fevers of hot climates, the disorders of the centre of circulation have a relation to the greater or lesser degree of alteration in the blood, to the profound impression made on the nervous system, and upon the heat-producing powers.

When the fever has lasted for some time auscultation of the heart and large vessels will detect an

anæmiac "bruit de soufflet," which explains the altered state of the blood and the anatomical condition of the heart.

The organs of respiration may be affected in some malarial localities, giving rise to a form of pernicious pneumonia, or of pernicious pleuritic fever.

The organs of digestion suffer equally with the nervous system from the generalised action of malaria.

But we must not mistake the dry pasty tongue, the nausea, and even vomiting, which often occur in this fever, for symptoms of gastro-enteritis, since the symptoms are as ephemeral as is the access of fever, and disappear by the employment of remedies quite the opposite to such as are required for the treatment of enteritis. We often find intermittent fever complicated with symptoms of gastritis, simple or bilious. We may find pernicious fever take on the cardialgic, choleraic, or dysenteric form; all which symptoms take their rise in the digestive organs.

Apart from these influences, it is on account of the great sympathy existing between the stomach and the principal organic functions, that it expresses suffering in the greater number of fevers.

Periodicity or intermittence is the essential type of all marsh fevers, as a paroxysm with three stages is the pathological character.

But these stages and periods of intermittence

may become so modified as to alter the original type, and make one doubt whether it can be the same intermittent fever or not.

Now intermittence is the generic type, and if the periods vary, it is only a form of intermittence, and the deviations from these stated periods, known as remittent and continued, are only modifications, and do not constitute different types.

If we cannot explain the cause of malaria, we ought to direct our attention to the mode or form of intermittence, and to the modification it presents in different climates. The quotidian is the most frequent type, the tertian of less frequency, and the quartan still less. The other forms are more evident in old chronic cases and in marsh cachexia.

When a fever is often repeated it loses the regularity of its original type. The modified types, as the remittent, continued, &c., are not peculiar to certain species of marsh fever, as some authors on the diseases of India would make us believe; neither do they derive their origin from the absorption of an excessive quantity of the miasmatic poison. I am inclined to believe, from experience, that they owe their origin to the peculiar nature of the miasma, due to a particular soil and climate, and to the hygienic and physiological conditions to which the patient has been exposed, producing a difference in the type and severity of the symptoms.

A malarial may be complicated with a bilious fever, with dysentery, or some affection of the brain,

and will require in such case a mixed treatment, the treatment for dysentery being of no avail without the antiseptic quinine.

The types of fever may vary as well as its complications, but the nature of the fever is always the same. The same paludinous soil in most cases, the same cause of infection, same anatomical character, same enlargement of the spleen and liver, the same pathological phenomena, same paroxysms, same relapses, same cachexia, and finally the same specific treatment.

Johnson and Martin, in their joint work on the diseases of India, as well as others, considered remittent as the type of the endemic marsh fever of hot climates. I shall, however, treating upon this bilious fever, have occasion to show that it frequently happens that it does not assume the remittent type.

The same causes which promote the transformation of an intermittent into remittent, will transform the latter into continued.

If the stages of an intermittent be long continued, the short remittence which intervenes will disappear, and you will have the continued type; but this is as essentially a marsh fever as is an intermittent. If there be some fevers which have a tendency more than others to an alteration of type, as the bilious into remittent, febris algida into the continued form, we must not imagine that they are types peculiar to such fevers, since at their very

commencement they declare themselves as simple intermittents. During a long residence in tropical climates, I have never yet failed to trace back, by making the proper inquiries, a case of remittent or continued fever to its original intermittent type.

We must ever bear in mind the unity of the type in all malarial fevers, and that that type is intermittence. We must not confound the type of the disease with its essential nature, which under all forms is always the same : and in order to remove all doubts we must administer quinine, which is the touchstone in all such cases.

A gentleman who had resided as British Consul in Smyrna for many years, where marsh fever is very prevalent, and whose acquaintance I lately made in Malaga in Southern Spain, related to me the following interesting case, which may serve as an illustration :—

A lady of his acquaintance was suddenly struck down as in a fit of apoplexy. No sign of life remained during a period of eight hours, excepting a slight stertorous breathing. She looked pale and cadaverous.

The medical man in attendance, fortunately a man of great experience, treated the case as one of febris comatosa from malarial causes, and administered forty grains of quinine the first day, and thirty on the second day in divided doses. The lady recovered and is now living. This is but one type

of malaria; it was not apoplexy from congestion or inflammation, it was a case of malarial coma.

In like manner the remittent and continued types proceed from one and the same cause, and are not distinct fevers.

Climate has great influence in modifying the types and degree of the severity of these fevers, and in one the selection of the modes of treatment.

These endemic fevers are prone to relapse, and the simpler the type the greater the tendency.

When a case of pernicious fever recovers, it is generally followed by attacks of simple intermittent, which may be repeated, but the pernicious form does not repeat itself. While, on the other hand, we frequently see repeated attacks of intermittent terminate in pernicious fever.

If these relapses cannot be prevented by proper treatment, then the patient is likely to fall into a state of cachexia, which is the most advanced expression of marsh diathesis.

A relapse may occur beyond as well as within the pale of malarial influence. In the former case the seizure must not be considered as the direct effect of the miasma, but as the symptomatic manifestation of marsh diathesis.

This relapse may declare itself as a simple intermittent, or in a pernicious form. It is not necessarily similar to previous attacks, and this proves that the relapse originates from the very genius or

nature of malaria, and not from any particular type of fever.

A physician inexperienced in the varied forms which malarial fever assumes in hot climates may possibly mistake some of them for typhoid or gastro-enteritis, and other diseases of a similar nature; when life might have been spared had his experience allowed him to make a just diagnosis. Should the type become modified, we must be on our guard, always keeping in our mind the fact of the unity and identity of the origin of all malarial fevers.

If the type changes, we must regard the actual type as a modification only of the primary one. The judicious use of quinine is our great resource, not by administering it recklessly or without con-sideration. We must employ the auxiliary means first, and the specific treatment at the proper time.

The irregularity of the stages and the peculiarity of the symptoms may lead us into error.

If you are called to treat a case of coma when the cold stage is absent, do not pronounce the case to be one of inflammation of the brain. The ab-sence of the cold stage is not an uncommon occur-rence in the grave fevers of hot climates.

The same remark will apply to the hot stage. If you bleed, it is more than probable that the attack will degenerate into febris algida. We must always remember the antecedents of the patient and the nature of the locality, also the possible combination of malarial fever with every variety of

epidemic and sporadic disease. There are dysenteric and liver affections, complications of marsh fever, as adjuncts, or with the pre-existence of one or the other disease.

In such cases this is no more than a complication or association of two distinct etiological and pathological elements, influencing one another mutually; the one getting the upper hand of the other occasionally, but capable either of the two of being separated from the other, either spontaneously or by the treatment employed.

Marsh malaria has, above all others, the greatest affinity for other diseases. You might imagine that everybody who resides in a malarial district to be impregnated with the miasma, and that any cause whatever is sufficient to develop the fever, either simple or in combination with some other disease.

Malaria insinuates itself into every tissue, and marsh fever is ever ready to start up.

Marsh infection differs from all other known poisons of the blood by its long incubation, by its tendency to relapse, although far removed from the original focus; and this affords an evidence of its tedious and slow evolution, which may end in an incurable cachexia.

When this subtle and invisible element, the product of the action of heat, light, and moisture upon the organic matter contained in certain salts of the earth, is evolved by evaporation, and introduced into the human blood by any channel whatever, it com-

municates to that blood the destructive nature of its origin, tending towards dissolution and decay.

The direct action tends to the nervous system, especially the vaso-motor portion of the great sympathetic which presides over organic life.

This miasma first irritates the nerve extremities, producing contraction of the arteries and of the extreme capillaries and diminished heart action, and consequent concentration of blood towards internal organs, causing the first or cold stage, the most characteristic expression of the poison.

This nerve irritation, producing arterial contractility, is followed by exhaustion and dilatation, and consequent reaction or rush of blood, giving rise to the second stage, or that of reaction.

The third or sweating stage, is that of general relaxation, restoration of the secretions and elimination of the poison until the disturbance ceases, and a fresh charge of the poison is locally produced, and is carried into the blood.

Thus periodicity or intermittence is established. Now fever produced by the introduction of a septic poison—the product of the decay of animal as well as vegetable matter—is always of an intermittent type.

Fever produced by dissection wounds, by deposits of purulent matter, from tuberculosis, puerperal fever, &c., are, if not purely intermittent, always attended by marked exacerbations.

The fever produced by the absorption of malaria

is always intermittent. A long residence in tropical climates, and in some most unhealthy parts, as in the island of Cuba, enables me to assert with the most decided confidence that quinine is the most certain antiseptic and antidote yet known against blood-poisoning from whatever source it may arise. These different organic poisons, as Dr. B. Richardson has discovered, act by their power of liberating oxygen in excess, and quinine counteracts this power.

Hence we may deduce :—

1. Malaria, the product of certain atmospheric influences and conditions on the organic matter and salts of the soil in certain parts of the earth's surface, acts as a ferment in the blood, and promotes its dissolution. 2. The consequent fever is always intermittent. 3. Quinine is the most certain antidote.

I remember having read, in Braithwaite's excellent " Retrospect," an interesting account of a healthy young farmer who, on examining the carcase of one amongst many cows which had died from some contagious epidemic, unfortunately received a wound in one of his fingers. He was soon afterwards seized with cold shivering, followed by a fever of a typhoid character, so alarming that his life was despaired of by his medical attendants. However, as a last resource, ten grains of quinine were ordered to be administered every three hours. Great was their astonishment to find their patient free from all danger on the next day.

Here we see the admirable effect of quinine to counteract the effect of blood-poisoning from the absorption of decayed animal matter. It will prove equally valuable in the absorption of malarial emanations from decayed vegetable matter, under certain atmospheric conditions.

The fever in both cases is the offspring of a septic poison: therefore malaria is a septic poison, as proved by its effects, although not to be appreciated by the senses.

All the different types of intermittent, quotidian, tertian, &c., and all the modified types, as remittent, continued, &c., may be understood by a careful perusal of this section on marsh fever.

A section will be devoted to " Latent Malaria," a subject of some importance, as I am convinced that the dissolving influences of a malarious nature are to be met with in every region of the earth.

The bilious fever of the tropics requires a separate section to itself.

So do also pernicious fevers, which are in reality intermittent, accompanied by some rapid and violent change, or by the predominance of some symptoms dangerous to life, as algidity, excessive sweats, dysentery, coma, &c., and this section will include the forms febris algida and febris comatosa. And finally, the last section will be devoted to a description of " Cachexia Paludinosa."

Malaria does not affect all persons in a similar way. Some, but very few, may resist its influence;

others suffer from attacks of simple or complicated intermittent; while in others the poison remains dormant until some cause from without brings it into play, when intermittence will declare itself.

Some there are who, after having removed to a healthy climate, suffer periodically from intermittent fever.

Others, again, should they receive a wound, or suffer from some inflammatory affection, will reveal by the intermittence the malarial influence which lies dormant in the system. Others fall into a state of cachexia.

This prolonged incubation, this slow evolution, these manifestations far from the scene of the morbid cause, establish the existence of the poison of malaria, which, when introduced into the blood, gives origin to marsh malarial fever.

LATENT OR MASKED MALARIA.

In tropical regions where marsh fever is endemic, these masked fevers are of frequent occurrence.

They are but too well calculated to deceive the medical attendant, so variable are the symptoms, so changeable, and so capricious; sometimes accompanied with fever, at others fever may be altogether absent. They nevertheless derive their origin from a common cause, which can be traced to three intimately connected sources.

First, their intermission; second, the decided influence of quinine in all masked fevers; and thirdly, the frequent transformation of an access of masked fever into one of an active and violent nature.

It is in the very ease and rapidity of this change that the great danger from masked fever consists. Indeed, this may be followed by attacks of pernicious fever, and if repeated, and not traced to its true cause, may lead to death.

A body under the influence of malaria in a masked or latent form may be likened to a charged electric battery which communicates a shock to whatever body it may come in contact with.

The marsh poison introduced into the system may lie in wait in a masked form for a longer or shorter period, and although it may not manifest its presence as a frank intermittent, it will excite, complicate, and aggravate any disease to which the body from peculiar temperament, whether nervous or sanguineous, may be predisposed.

Hence we find in masked fever attacks of hysteria and neuralgia in the nervous, of hepatitis and phlegmasia in the sanguineous.

In districts where marsh fever is endemic, diseases may declare themselves, simple, uncomplicated, and independent of malaria.

But when they betray a tendency towards periodicity, or appear to yield to the administration of quinine, or pass into remittence, then we can no longer entertain a doubt respecting their malarial origin.

These masked fevers may affect every type, quotidian, tertian, quartan, &c., and sometimes they return periodically after a lapse of time far greater than that of intermittent fever—after an interval of three weeks, sometimes of a month; and when they do return, they are irregular.

The attacks may come on in the morning, the evening, or at night. Now whenever masked fever takes on the tertian or quartan type, we must apprehend great danger, and guard against the possibility of an attack of pernicious fever.

Sometimes some slight symptom indicative of its

malarial origin will develop itself in the course of the fever, as headache, intolerance of light, shivering, sense of cold and perspiration.

But it happens more frequently that no such indications present themselves. Then the diagnosis becomes obscure. Now quinine is the touchstone in such a case; it reveals the true nature of the disease, and in our uncertainty we had better take the safe side in case the malady be of the pernicious form; that is, an attack of intermittent accompanied by some prominent symptom dangerous to life.

Masked malarial fever, however varicoloured may be its form, manifests itself generally by some functional derangement, by a lesion in some organ or another, some hæmorrhage, or inflammation in some part.

It will sometimes take the form of a neuralgia, at others of a neurosis. A supraorbital or infra-orbital neuralgia, a dental neuralgia, are some of the many forms in which masked malaria is often disguised.

Should these pains occur in the night time, they must not be confounded with pains of a syphilitic origin. There is not a part of the human body in which a pain or nerve sensation may not be felt with more or less of periodicity, which can only be combated by the use of quinine.

In other cases we meet with wandering obscure pains, darting pains in the head, which will only yield to quinine.

In children you will sometimes find the voice becomes hoarse, or nearly lost, with a cough which comes on periodically. These attacks may often simulate, and be mistaken for hooping-cough.

Hiccough, coming on at certain hours, I have often noticed as a manifestation of masked malaria.

This fever in infants often assumes a convulsive form. In tropical climates convulsions in children are very frequent; they may be owing to worms, so common in the Antilles, to teething, or to some malarious influence.

Here we must be careful in making a proper diagnosis, as a mistake might be fatal to the life of the child, by administering quinine improperly, or by not giving it when required.

In women this fever may exist under the mask of hysteria. I have seen a case where a tertian ague was ushered in by violent fits of hysteria. The administration of quinine in large doses modified a third attack, and thus I was able to detect its malarial origin.

Or this fever may at times be manifested by some phlegmasia, or some periodical hæmorrhage, or by a lesion of some important organ.

Not many months ago I attended a sugar-boiler in Cuba who had been confined to his bed fourteen days when I first saw him. He complained of slight and intense pain on the instep of the right foot. He had already applied leeches, fomentations, anodyne liniments, &c., but to no purpose.

Having observed that the pain became greatly aggravated at a particular hour, and suspecting its malarial origin, I administered quinine, and all pain and swelling soon disappeared.

The eye may be attacked with violent inflammation and ecchymosis. Now if we observe that the symptoms become greatly aggravated at certain periods, and in a marshy district, we shall be enabled to arrive at the conclusion that the case is one of intermittent ophthalmia, and can only be cured by the use of quinine.

Blood in the urine will often betray malaria in a masked or latent form.

If we find that its return is periodical we must employ a febrifuge, or, in plain language, if we find that a tendency to decomposition of the blood is manifested by hæmaturia, we must make use of an antiseptic capable of counteracting that tendency.

Cases do sometimes occur where the diagnosis is very obscure ; we cannot well decide whether the periodical character of the attacks discloses a masked fever or a confirmed disease to which intermittence gives a deceitful colour.

About two years ago a Spanish physician related to me the case of a man, aged fifty, who had been troubled with periodical fits of hæmoptysis. He died from phthisis. This man had no constitutional or hereditary tendency to consumption. He had resided many years in a malarial district. It

is worthy of note that these attacks of hæmoptysis always returned periodically, and at one particular hour in the evening. I have reason to suspect that the paludinous influence produced congestion and some pulmonary lesion, that hæmorrhage was the consequence, and that this repeated effusion not corrected, seriously damaged the substance of the lung and laid the foundation of the disease from which he died. Unfortunately, the antiseptic and anti-periodic quinine had never been given to this man. I shall select from a great many cases a few more, as illustrating the extraordinary capriciousness with which masked malaria sometimes reveals itself in tropical regions, where marsh fever is endemic.

A lady recently confined complained to me of a slight swelling all over the bosom, with tumefaction of the breast. To this followed slight febrile attacks, which made me dread the formation of an abscess. In the afternoon a cold shivering came on, with strong symptoms of convulsions.

Under the influence of a large dose of quinine a simple regular attack of intermittent appeared on the following day. The swelling of the breast disappeared, and she continued to suckle her child.

A respectable Cuban creole complained that an abscess of the breast which had burst some two months before still continued open, and could not be healed. On inquiry I discovered that for many months she had been suffering from a slight tertian

ague. I treated the case as one of malarial intermittent fever. The abscess soon dried up, and completely healed.

A year has not elapsed since I was consulted by an American lady on a case of most severe pruritus of the vulva of a most distressing character, accompanied with loss of appetite, great anxiety, and a feeling of terror as night approached. The constitutional symptoms struck me as being more severe than could be expected from a local affection of such a nature.

I had tried without effect every known remedy. As the case was marked by intermittence, I administered quinine, and in two days, to my great surprise, both pain and itching disappeared.

Although masked malaria is described as varied and capricious in its manifestations, we must bear in mind that the nature and essential attributes of malaria never vary. The poison when introduced into the blood powerfully depresses the nervous system, and leads to congestion of internal organs.

The most complete expression of its effects is to be seen in the cold stage of intermittent, and, when still more intensified, in the algidity of pernicious fever. Consequently the varieties observed in the symptoms peculiar to masked fever must proceed from the temperament of the recipient of such poison.

Is it to be wondered that when an element of a

nature so subtle and pernicious as malaria should insinuate itself into a system so delicate and so admirably constructed, so complex, yet so simple in the harmony of all its component parts, as the system of the human body, great mischief and disorder should accrue throughout all the parts of which it is composed, that great alternations of excitement and depression should arise from the presence of a poison in a masked latent form, always tending towards decomposition and decay ?

The mode of the manifestations of its presence must therefore depend upon the temperament, sex, and constitution of the patient subject to its influence.

Therefore, when we say that the symptoms of masked malaria are varied and capricious, we mean that they are as varied as are the subjects to their influence varied in constitution and susceptibility.

Latent malaria always detects the weak spot in its victims, and develops the irritability of that spot, but with a marked periodicity and intermittence.

This masked fever requires a larger dose of quinine than does simple intermittent—a dose such as may be administered in pernicious fever. In hot climates, where malaria is endemic, we may take it for granted that any symptom, with or without pain, characterised by intermittence, ought always to excite the careful suspicion of the medical at-

tendant, who must always remember that slight febrile attacks are often followed by attacks of a pernicious nature, and that pernicious fever may rapidly, and when least expected, usurp the place of masked or latent malaria.

PERNICIOUS FEVER.

FEBRIS ALGIDA, AND FEBRIS COMATOSA.

IT may easily be imagined that the poison of malaria, in proportion to the degree of its intensity or destructive power to the susceptibility or the bodily condition of the recipient of such poison, may generate a fever which, from its tendency to paralyse all nerve-power, and to promote a dissolution of the elements of the blood, may fitly be denominated " pernicious fever."

No poison has ever introduced itself into the human system so capable of producing effects so varied, of assuming such questionable shapes, of wearing so many masks and disguises, as the poison of marsh malaria—effects which vary in degree from a slight depression of nerve-power to a partial extinction of sense—even to the complete destruction of life.

The poison of malaria will often lay concealed in the system, like a coiled up serpent, ready at any moment to dart its venom, to complicate and exaggerate any disease to which the body may be subject, if it do not completely control and subject

such body to its undivided influence ; or it will take upon it so many Protean forms that its victim will be thrown off his guard, and probably die from its masked effects. But under no form does malaria show itself with such formidable intensity as under the form of pernicious fever. This fever may appear under the algid or comatose form, with all their varied complications—febris algida being the more complete expression of the true nature of the poison—paralysing all nerve-power, and determining the blood to internal organs, and thus producing that intense algidity, as of death, while febris comatosa is marked by an especial malarial determination to the brain, producing an anæmic contraction of arteries, as in a fit of epilepsy.

It sometimes happens, while attending a case of intermittent fever, when we imagine that it is progressing favourably, with all due regularity, on a sudden we observe the symptoms to alter greatly for the worse. One or more of its stages may present themselves with great severity, complicating or placing in jeopardy one or more of the organs essential to life.

In the tropics pernicious fever may be seen in all its terrors, complicating the various types of intermittent, and tending to aggravate a variety of morbid states, which have no necessary connexion with the malarial poison.

The prognosis must depend on several conditions. Suppression of urine is an alarming symptom, but should the secretion be restored, an improvement is sure to follow. Convulsions, frequent in children, are perhaps next to black vomit the most dangerous symptom. When they make their appearance at the close of an attack of fever there is always danger to life. Vomiting of black matter is fatal to adults. I have seen children occasionally recover.

There are two symptoms which, when they occur in the course of an intermittent, have always excited my attention and alarm.

An acute pain may fix itself in the loins, like lumbago, or over the side, like an attack of pleurisy, or over the hip joint.

The second symptom, but of rare occurrence, is the vomiting of blue, not black, matter. It may occur in the adult who has suffered from marsh cachexia, or from chronic diarrhœa.

The first symptom, or the acute pain, appears to be a hyperæsthesia of a particular nerve, from defective nutrition, acted upon by an intensified form of the miasmatic poison in the blood, a morbid alteration of cutaneous sensibility in some part of the body.

Now, a poison capable of producing extreme sensibility, or hyperæsthesia, of the nerve of a part, is also capable of causing anæsthesia, or the death of

the nerve. Hence the danger attendant upon these sudden acute fixed pains, as indicating the strength of the poison and the feeble power of resistance in the patient.

Pernicious fever, the reverse of yellow fever, may repeat itself. All races suffer from it; old people die from it. I have seen children attacked by it almost imperceptibly, then vomit up a blackish fluid, followed by convulsions and death. In children, when fever is ushered in by general or partial convulsions, the symptom is generally fatal, as indicating a tendency to the same manifestation in every succeeding attack.

All chronic diseases in tropical climates, all deep-seated causes of debility, privation, and suffering, the emotions from grief, and anxiety, and alcoholism, predispose to attacks of pernicious fever — since malaria directly attacks nerve-power, and when this has been shattered by the above causes it becomes more sensitive to its influence.

The varieties of pernicious fever characterised by some violent predominant symptoms may be classed into two principal groups :—

Febris algida, comprising the fainting, dysenteric, and choleraic varieties.

Febris comatosa—the tetanic, lethargic, and convulsive.

Algid Pernicious Fever.

Algidity would appear to be the most faithful manifestation of the modus operandi of the poison of malaria on the living organism—perhaps the only pathological basis, upon which all other pernicious fever rest, so that it will sometimes appear in its simple form as a fatal termination of pernicious fever.

The progress of algidity is usually insidious, and often shows itself in the middle of an apparently simple attack of intermittent. The patient appears to be in his usual state of health. Presently the face turns pale, the features become sharpened, drawn in, the lips turn blue, the eyes hollow, the pupils dilated. The pallor and coldness gradually go on increasing, and cold, clammy sweats pervade the entire body. You might imagine you were gazing on a corpse. The hands and feet first turn cold, next the extremities. The abdomen alone preserves some heat. If you touch the skin it feels cold as marble, and yet the patient complains of a sensation of heat internally. The tongue is the last to become cold, and when the air expired is colder than that inspired the danger becomes imminent. The urine is often suppressed as algidity increases; the skin becomes more and more bathed

in a cold perspiration ; the heart beats slowly, and is scarcely audible ; the pulse thready and scarcely to be felt at the wrist. The intellect remains unimpaired ; the patient complains of no particular pain ; respiration, from being calm and slow, becomes anxious and rapid. To a calm succeeds a vague sense of uneasiness, which is soon replaced by a feeling of approaching death.

The most remarkable case of algid pernicious fever I ever witnessed was the following :—

In 1875 I was called to visit the wife of D. B. M., a well-known sugar planter in Cuba. She had been delivered of a child about two months before, at which time she complained of a slight chill and fever ; since then severe intermittent fever had set in.

I was greatly surprised on my arrival at the consternation and dismay depicted on the countenances of the patient's friends and attendants.

I decided upon taking a view of the patient unseen by her. She was seated in an arm-chair, the arms of which she firmly grasped with both hands, the body slightly inclined forwards, rigid, erect. The face was deadly pale ; the countenance expressive of anxiety and terror, mixed with a certain degree of sadness. She looked, as it were, on vacancy, and took no notice of those who surrounded her. On my entering the patient's

room, she directed an anxious, inquiring look towards me, as though conscious who I was, and desirous to be relieved. I took her hand, which, as well as the entire body, was bathed in a clammy, icy sweat. No pulse at wrist. She could only reply to my questions in a whisper, but a whisper deep, cold, and unearthly.

The heart's beat was strong, and even tumultuous, as though labouring hard to dislodge the mass of blood by which it was oppressed. The right heart communicated its impulse to the jugular veins, hence strong venous pulsation.

I found on examination considerable congestion and enlargement of the spleen, and induration of an atrophied liver. I ordered a hot mustard foot-bath, ten grains of calomel, with fifteen of quinine, to be immediately given, the dose to be repeated in one hour; frictions of quinine and brandy, two drachms to the pint, to be rubbed over the extremities and down the spine every half hour.

About four hours after my first visit the heat of the body returned, and the patient was enabled to lay down in her bed, which she had not been able to do during the last three weeks.

After the second dose I followed up the calomel and quinine in smaller doses, two grains of calomel to four of quinine every four hours.

I ordered besides, in order to promote the partially suspended secretion of urine, two table-

spoonfuls of a strong diuretic mixture every two hours, and placed over the loins some digitalis leaves wetted with vinegar (a custom peculiar to the country) ; after eight hours had elapsed considerable relief was obtained, and all the symptoms improved. The secretion of urine was restored, the circulation less impeded, and some sleep was procured. Algidity returned daily in the afternoon during three successive days, but in a far milder form, and of less duration, and finally the patient completely recovered.

This case I regard as very instructive. It is a complete manifestation of the effect of malaria on the human body.

It would seem that the miasmatic poison availed itself of this new inlet into the system through the medium of the raw and dilated surface of the vagina and uterus after delivery.

A medium through which, under similar circumstances, other septic poisons have been introduced, and with fatal effect into the system.

This intensified dose of the malarial poison would appear to have generated algid pernicious fever.

Large doses of quinine in this case proved most triumphantly its value, and hence its nature as an antiseptic.

The diagnosis is easy when pernicious fever is simple, but when complicated with dysentery, or with cholera, it is rather obscure. It is almost impossible to diagnose pernicious choleraic fever from

Asiatic cholera, especially when the two endemics exist alone and at the same time.

But between simple dysentery and pernicious dysenteric fever, the diagnosis is more easy, the stools are not so bloody, they are more abundant and liquid, and provoke less tenesmus.

The antecedents, attacks of fever, algidity, &c., make the diagnosis more easy.

We must not confound the fever of pernicious dysentery with that which accompanies simple or true dysentery, which is symptomatic; while the fever of pernicious dysentery being of malarial origin is independent, a foreign element superadded to the principal malady, which it aggravates and often renders mortal. This is an important fact worthy to be remembered in our practice in tropical climates. Hence in complicated dysentery all remedies directed to the cure of dysentery will prove useless, so long as we do not neutralize the foreign morbid element by large doses of an antiseptic.

The attack of febris algida consists of one long stage. The cold increases gradually with cold and clammy sweats, the voice falls to a whisper, the pulse falters, and finally ceases, and the patient dies in a swoon.

Should reaction take place, the pulse rallies, the heat returns gradually to the surface from the abdomen, radiates to the chest, and thence to the whole body. The state of algidity may last for

eight hours, or even longer; recovery is often insidious, and may be accompanied with symptoms of an ataxic or typhoid nature.

The mortality from febris algida is not so great as that from febris comatosa.

In this algid state the powers of absorption do not appear to be annihilated as in the cold stage of Asiatic cholera.

COMATOSE PERNICIOUS FEVER.

Insolation is occasionally a most powerful cause. A man who leaves a malarial locality and travels a long way exposed to a burning sun, is very subject to an attack of malarial apoplexy. The fit may seize him in the evening or after sunset, or even at night when in bed. Like other pernicious fevers, the comatose form especially attacks those who after a long residence in a malarial district remove to another free from malaria.

The comatose form is generally preceded by some derangement of the health, by two or three irregular attacks of fever, which may be trivial or scarcely perceptible.

The invasion of coma is violent, its progress rapid, and its stages of intense severity. If the patient be seized when standing, he falls down as if struck by lightning. If when lying down it comes on unperceived, only to be revealed by his stertorous breathing.

I have never known delirium or convulsions precede an attack of malarial coma.

I remember one patient who, having recovered, told me that he had experienced two or three days before the attack a creeping sensation up the back, with a sense of suffocation and constriction about the chest.

The cold stage is absent, but the hot stage is soon developed, and unlike the skin in febris algida, it is bathed in a hot perspiration—a frank intermittent is seldom observed. The fit may last from four or five hours to as many days. The characteristic symptoms are: loss of motion, sensation, and intelligence, with impaired function of respiration and circulation.

The patient answers peevishly, or in monosyllables; the pupils are insensible to light; some low murmurs of complaint may often be heard, indicating severe headache.

The frequent return of motion proves the intermittent character, when the symptoms generally improve; but in cases which end fatally, we may observe muscular contractions, tonic and clonic, and death closes the scene after one or two attacks of black vomit.

The diagnosis is not difficult. The antecedents and previous attacks of intermittent, the paludinous diathesis, the nature of the locality, and the absence of all plethoric symptoms will clear the way for a correct diagnosis. The only difficulty is to diagnose

between the apoplectic form of pernicious coma and true apoplexy. This latter occurs but rarely in the tropics, but may occur in strangers lately arrived.

We must be careful not to bleed in malarial apoplexy, as distinct from true apoplexy.

Bleeding would inevitably hasten the fatal end. By not interfering too hastily, by adopting the maxim " festina lente," so as to allow the disease to clear up, we may be enabled to form a just diagnosis.

Post-mortem examination reveals no inflammation of the brain or of its membranes, nor any lesions to which might be traced the severity of the symptoms. We may find, as in all fevers of a certain duration, the membranes, especially the pia mater, somewhat injected, the cerebral substance redder than natural, some serum effused in the ventricles ; and when black matter has been vomited, we may find the mucous membrane of the stomach of a yellowish tint, streaked with violet-coloured stains.

The almost impossibility of administering proper medicines adds to the danger of this form of pernicious fever. Quinine can with difficulty be introduced into the stomach by reason of spasm of the pharynx and œsophagus.

We must, therefore, have recourse to injections of the drug per rectum, to frictions in alcoholic solutions, or to subcutaneous injections, which are

easily applied, however severe may be the vomiting and difficulty of swallowing, or coma.

Mr. W. Moore, of Bombay, has tried the hypodermic method on a large scale. He declares that he has injected quinine successfully in one hundred or more cases of intermittent or remittent fevers. The drug must be used in solution, not in suspension.

The best time to inject is before the cold stage.

I cannot, from my own experience, bear witness to the great advantages to be derived from the subcutaneous method.

I have tried it eleven times, three times with certain beneficial results; the effect was always of shorter duration than when quinine was administered by any other method.

I would have injected more frequently had I not been deterred in my practice by the inconvenience from little accidents arising from the puncture made by the injecting syringe ; some swellings, and often superficial abscesses, which were looked upon, especially by my Spanish patients in Havanna, with a most ridiculous degree of anxiety.

For my part, I have trusted in the treatment of malarial coma more to revulsives, hot mustard foot-baths, blisters to the calves of the legs, strong injections of quinine per rectum, having previously administered a purgative enema, strong frictions of quinine, &c. It is seldom that this plan fails to

reveal the malarial origin of this coma. But in no case, however strong the indication may be, must we bleed ; a couple of leeches may be applied over the mastoid process.

When the tendency towards convalescence becomes established, should speech appear to be somewhat embarrassed, should we observe dulness of countenance or uncertainty in the gait, in such cases I have always derived advantage from the combination of calomel and quinine.

Let us consider, before we conclude, why the poison of malaria, in a pernicious or highly destructive form, produces intense cold—febris algida—in one case, and intense heat—febris comatosa—in the other.

The system of the great sympathetic presides over organic life ; it brings into intimate relation and into sympathetic harmony all, even the most distant, parts of the human body, and it is through its medium that all impressions and emotions, whether moral or physical, are conveyed, transmitted, and manifested.

When this system of nerve sympathy is impressed by the morbid influence of the miasmatic poison, independent of the brain, it exercises a stimulating action on the vaso-motor portion of the great sympathetic, producing arterial contraction even to the remote capillaries, the calibre of which is regulated by the sympathetic.

The hyperactivity of the vaso-motor nerves

causes first contraction; next follows arterial dilatation from exhaustion, and paralysis of the muscular coats.

And this contraction is so great through the irritation produced by the contact with marsh malaria that the controlling action of the vagus on the heart is insufficient. Hence the gradual stagnation and retrocession of blood from the extremities, the intense cold and cold sweats.

Still the intellect and the functions of the brain remain unimpaired; and thus is produced that form of malarial pernicious fever—febris algida.

But supposing that owing to certain conditions of the human body the poison, instead of acting immediately upon the sympathetic system of nerves, should determine violently to the brain, when the body is in the enjoyment of its natural heat, and in the performance of all its functions—in such a case the body is, as it were, stormed or taken by surprise.

The function of the brain presides over animal rather than organic life. It directs, does not perform, the function of the great sympathetic, through whose agency life and heat are carried on independently of the brain.

We know that animals are sometimes born with a great deficiency or imperfection of brain or cerebral matter, and nevertheless life and heat are carried on independently of the brain for a longer or shorter period of time.

When, therefore, the function of the brain is suddenly overpowered and paralysed by the baneful influence of malaria, we have loss of motion and sensation. But the organic functions continue to work on, and the heat of the body, even greater than natural, is kept up to the last, until the patient recovers from the fit or life becomes extinct. And this constitutes that form of malarial pernicious fever—febris comatosa.

THE BILIOUS FEVER OF THE TROPICS.

Of all endemic diseases in tropical climates bilious fever leads to most controversy.

I have never seen a case of true bilious fever which had not occurred in localities where malarial fevers were known to exist. I have seen it under other forms and types besides remittent. When bilious fever takes on the continued type, the bilious symptoms often do not declare themselves before the lapse of two or three days, during which brain symptoms predominate.

This bilious fever is always preceded by some slight attack of intermittent fever. There is no part of the world where the paludinous nature of endemic fever is more characteristic than in those deadly foci of malaria—the banks of the rivers Gambia, Sierra Leone, and the Ganges. If remittent be the most common type of bilious fever in these regions, it is not that remittent is the special type of such fevers, but because the intensity of the marsh poison seldom allows intermittence to develop itself in its original simplicity.

If quinine does not appear to possess that speedy effect it usually displays against intermittence in general, it is because the gravity of the symptoms and the complication of morbid elements in bilious fever require the preparatory employment of reme- dies calculated to simplify and restore the original character of the fever, and thus pave the way for the more certain and specific action of quinine.

Great difference of opinion exists respecting the true nature of this disease, especially in countries where malignant blood diseases, as yellow fever, &c., rage with great severity.

I will therefore, from my own experience, and supported by the opinion of eminent authors, foreign as well as British, endeavour to describe the distinc- tive marks and character of the bilious fever of the tropics.

This fever is met with on the coast of Africa, and in the East and West Indies. It is not, like yellow fever, peculiar to any particular region, but is found in various regions of the torrid zone, especially where endemics of malarial fever prevail in greatest severity.

Although the origin of the fever is the same in all cases, and in all places, nevertheless it presents certain modifications according to the climate in which it is developed. Along the coast of Africa the type is usually intermittent or remittent ; in the large Antilles, the type is frequently continued, with hæmorrhagic symptoms.

We frequently meet with this fever when grave epidemics prevail in low marshy districts. In order to diagnose it from all other morbid conditions which go under the name of bilious fever, we may describe it as a " state of pyrexia which, under any and every type, always exhibits an essential, and often the only symptom of the bilious condition— jaundice, vomiting, the characteristic stools and urine of a bilious attack—and when the symptoms become exaggerated, there are cerebral and hæmorrhagic symptoms, which may be attributed to an alteration of the blood through the bile."

Now we must not confound with this bilious fever cases of intermittent with a few slight bilious symptoms, nor cases of liver affection accompanied with fever and jaundice, nor of jaundice accompanied with slight access of fever, nor even of severe jaundice with fever.

True bilious fever is the result of the united efforts of two morbid elements—the bilious and the malarial—the former proceeding from the slow influence of climate upon the hepatic functions, impressing an especial seal upon the disease ; the latter may be detected by the condition of the spleen and by intermittence.

The new-comer is seldom attacked, the acclimatised and the Creoles are more subject to its influence, or patients slightly affected by cachexia, who have already suffered from frequent attacks of

intermittent, in whom the bilious element begins to show itself.

Jaundice appears from the onset, but it is not constant; it will diminish or increase with the exacerbations or relapses of fever.

Vomiting, which is also one of the earliest symptoms of bilious fever, from a yellow or bright green assumes a deeper hue. The urine is characteristic, differing from all other kinds of jaundiced urine, so frequent in other diseases of hot climates: it is of the colour of ink or of coffee grounds. This is not owing to the existence of bile alone, but also to the large proportion of the constituents of the blood in the urine.

The addition of nitric acid is immediately followed by a precipitate of albumen, and in proportion to the degree and intensity of the colour, and, consequently, of the amount of blood it contains, so is the amount of albumen. By the aid of the microscope we can detect the red globules of an irregular shape. The secretion of blood in the urine may be intermittent, like the fever, increasing as the fever increases, and diminishing or ceasing with the fever. As the fever returns, so does the blood in the urine.

In severe cases of bilious fever the quantity of bloody urine voided in twenty-four hours is below that in the normal state. In no case have I seen hæmaturia, either by its duration or by its quantity,

dangerous to life. In such cases the secretion of urine may be diminished or entirely suppressed.

According as the state of ataxia becomes developed so do the symptoms of this grave bilious fever vary. Respiration becomes deep, slow, and oppressed, accompanied by sighing. The pulse is hard, concentrated, and soon becomes small and frequent, varying from 100 to 120 ; racking pains are felt, especially over the loins; intense headache, increasing with each exacerbation of fever; thirst extreme ; the tongue, from moist, becomes rough, dry, dark, and discoloured from bile ; there is a great feeling of anxiety about the pit of the stomach, increased by any attempt to vomit; skin cold and clammy ; agitation increases, and delirium, more frequently of a slight, fugitive character, may increase to a state of violence. The features do not express suffering, but are altered and sharpened. The close of life is usually calm, as of convalescence, as sometimes occurs in yellow fever—a calm which heralds death. The patient dies suddenly, or falls into a state of coma, which ends with his life.

Now the fever of which we are treating may be mistaken for hepatitis, jaundice, or yellow fever. How diagnose ? In hepatitis the fever does not arise from malaria, it is symptomatic of some affection of the liver ; in hepatitis jaundice is not constant, and does not appear at the onset, while the jaundice of bilious fever is intense, and constitutes a primary symptom, accompanied with abundant bilious excre-

tions. Jaundice may be attended with hæmor-
rhage, but it never presents the essential character
of bilious fever. There is no pyrexia, although
there may be slight and irregular attacks of
fever.

How diagnose from bilious fever? Bilious fever
may exist during periods of epidemics of yellow
fever, or may exist in their absence. Yellow fever
attacks the non-acclimatised, especially Europeans.

It prevails along the coast, beyond the reach of
malarial influences, and may be conveyed from
centres of infection to localities very distant from
the original focus; whereas grave bilious fever is
found in the East Indies, and in other regions
where yellow fever is unknown, in localities essen-
tially marshy and far removed from the coast.

The character of yellow fever changes in different
epidemics, that of bilious fever never, although it
may be modified by locality, and to this locality it is
confined. Bilious fever not only attacks Europeans,
but also the natives and Creoles, and never deve-
lops itself except among those in whom hot climates
have roused up the predominance of hepatic affec-
tions.

Pains in the limbs, anxiety about the epigastrium,
bilious and black-streaked vomiting, may be ob-
served in the two diseases; but in the one vomiting
of bilious matter prevails, while in yellow fever
what is vomited is watery, greyish or black,
mixed with pure blood. In yellow fever blood in

the urine is of rare occurrence. Suppression of urine frequent.

New blood in the urine is the symptom which characterises the most dangerous form of bilious fever in the tropics. The external character of the two fevers is also very unlike from the commencement. The difference is as great as between red and yellow : the countenance in the first period of yellow fever is red, bloated, and excited, bordering on a colour of mahogany, while in bilious fever jaundice is visible from the onset.

In the second period of yellow fever, beneath the visibly injected conjunctiva and the red colour of the face there breaks out a clear yellow straw-coloured tinge, which spreads and extends over the skin.

The urine when tested gives no evidence of the presence of bile, and any albumen that may be detected does not proceed from any admixture of blood. The discoloration of the skin is owing to decomposition of the blood, as may be observed in all the pernicious fevers of hot climates; while in bilious fever the tinge of the skin, which passes from a saffron to a colour of yellow ochre, proceeds from bilious suffusion.

It sometimes happens in cases of convalescence in yellow fever that true jaundice may succeed to that state caused by decomposition of the blood. Here we may be apt to confound bilious

with yellow fever, but if we attend to the duration, progress, and difference in the preceding symptoms we shall soon be enabled to clear up our diagnosis.

I have thus dwelt with some minuteness upon the distinction between the two fevers, as they are frequently the subject of a great waste of words, and a fertile source of learned discord among medical men in countries where yellow and bilious fever prevail. The prognosis of bilious fever must be given with caution, as it may become complicated with some pernicious symptom, ataxic, algid, or comatose. The danger would appear to depend more upon the influence of malaria than upon that of the bile. If the intermissions or the remissions be frank the prognosis is favourable.

The continued type is the most dangerous. Persistent vomiting, violent delirium, suppression of urine, and frequent hiccough are signs of great danger. Seldom does a first attack of bilious fever prove fatal. It only tends to increase the preceding debility, develop marsh cachexia, and dispose to relapses.

Unlike what occurs in complete yellow fever, an attack of bilious fever does not convey an immunity against successive attacks.

In this fever the liver, spleen, and kidneys undergo a marked alteration. The spleen increases in volume, consistence, and weight, is of a violet

colour, is rather swollen than hypertrophied. Its parenchyma is gorged with black blood, like lees of wine.

Nevertheless, it is a remarkable fact that in the tropics we seldom meet with spleens of such an enormous size (known as ague cakes in the fens of Lincolnshire) as we do in temperate climates.

The liver does not present the alterations, the anæmic appearance, the pale yellow which it does in yellow fever. It is swollen, as in intermittent fever, gorged with bile and blood, of a reddish-brown colour.

If an incision be made into its substance, a fluid like dark blood, oily from its admixture with bile, will ooze from it. If its consistence appears to be augmented, its cohesion appears to be diminished. It is friable, more easily broken than torn.

The difference in the condition of the liver in bilious and in yellow fever, after death—the two diseases having many symptoms in common, but which derive their origin from two entirely different causes—is a subject of great interest to an inquiring mind, the former being the product of malaria, the latter never. Hence quinine, so useful in the treatment of bilious, is injurious in that of yellow fever. The kidneys are always found in a state of hyperæmia; there are patches of ecchymosis in the bladder. It is to this state of the kidneys that we must attribute the blood in the urine. The same relation exists between the state of

the kidneys and hæmaturia as between cause and effect.

This blood in the urine can always be traced to congestion of the kidneys. This congestion may amount to a degree of bloody infiltration, or of capillary apoplexy. There is generally an increase of weight and size in both kidneys; colour—red, brown, marbled, and ecchymosed. They undergo a characteristic local disorganisation. The ureters are empty. The mucous membrane, as well as that of the bladder, is but little altered.

Hence we may conclude that blood in the urine in bilious fever proceeds from the apoplectic condition of the kidneys. The contents of the chest and abdomen present but little change. However, there is one characteristic worthy of notice: the deep yellow tinge which penetrates the white tissues, principally by imbibition. The brain and its membranes, the serous membranes of the ventricles and pericardium, the internal lining of the large vessels, the pleura and its membranes, all assume the coloration of jaundice.

Now let us consider what is the nature of this grave bilious fever of the tropics. We have on one side a malarial origin, active, all-powerful, continuing to exert its influence after all bilious symptoms have disappeared; and on the other, the bilious element communicating to the disease its characteristic appearance. To which of these two elements can we refer the dangerous symptoms usually

observed in the course of a grave bilious fever? Are the coma, hæmorrhage, hæmatemesis, and blood in the urine connected with the jaundice, or are they determined by the septicæmia engendered by marsh malaria?

We meet with hæmorrhagic symptoms in yellow fever as well as in the pernicious forms of marsh fever in the tropics. Here, then, we have evidence of two distinct poisons producing similar effects— the poison of malaria and the poison of yellow fever, which cannot be referred to bilious causes.

Again, in certain morbid conditions, which have no connexion with malaria, in grave cases of jaundice, we have coma and hæmorrhages.

Might we not, therefore, attribute the morbid effects in bilious fever to a concurrence of two causes, acting simultaneously in the same sense? I am inclined to believe that in bilious fever the malarial element prevails over every other, exerting its influence over its etiology, symptoms, progress, treatment, &c., and to this influence must be ascribed the most formidable symptoms of the disease. Of course to jaundice and blood in the urine must be set down other grave symptoms, but the two must be considered as symptomatic effects rather than as morbid aggravating causes.

The malarial element must act, but in an unequal degree, upon the spleen, the liver, and kidneys.

It will act in a less degree upon the spleen, but with more intensity upon the hepatic apparatus,

causing a hyperæmia, which will produce jaundice and other bilious symptoms.

The general or local congestion of the kidneys, the infiltration of blood, causing capillary apoplexy, will cause a hæmorrhage characteristic of the hæmaturia in bilious fever.

Now, the specific nature of this fever will imply a specific treatment, an essential indication which quinine alone can fulfil.

A secondary indication, although a very important one, results from the bilious symptoms. Hence, in practice, evacuants are most useful in combination with quinine. The order in which these agents must be applied will, of course, depend on the more or less prominence of various symptoms.

Ipecacuanha as an emetic is extremely valuable in bilious fever. After the exhibition of this drug the green, bilious vomitings and stools become less abundant, and soon take a yellow colour; the urine, from being bilious and bloody, becomes modified, clear, and less frequent.

I have found ipecacuanha to calm wonderfully the sense of uneasiness and vomiting. It ought to be administered at the onset of a hot stage. It is also valuable in the continued form.

Of course, tartar emetic must not be thought of. Its use may expose the patient to some serious accident, by increasing the tendency to a state of ataxia, which is always to be dreaded in this fever.

Neutral salts and calomel are often administered

with advantage. The treatment I have found most successful beyond all others is the combination of calomel and quinine, which united fulfil all the indications of treatment—a combination especially useful when the remissions are irregular and of short duration. Indeed, in certain dangerous forms I have found this combination my only resource.

Irritability of the stomach often interferes with the due administration of medicines of any kind. In extreme cases we must apply a blister, covering the epigastrium and two-thirds of the anterior region of the liver.

The good effect may be kept up by sprinkling over the hollow of the epigastrium a little morphia night and morning.

If the fever be a frank intermittent, give quinine after the attack. If remittent wait for a remission. Quinine with opium is more easily retained in the stomach; but should it not be tolerated in any form, we must endeavour to produce its absorption by the rectum or by any other channel or mode of absorption, especially should a tendency to pernicious fever declare itself.

I will conclude by expressing the conviction, that if there be any, and I believe they are not a few, who entertain doubts respecting the connexion of this bilious fever with marsh malaria, who believe it to be the product of great heat, with hepatic disorder only; if in the treatment of this fever they will but adopt the use of the antiseptic quinine,

with judgment, patience, and discretion, administering it occasionally alone, or in combination—keeping in view any complications that may arise—they will be induced to alter their preconceived opinions, and arrive at the conclusion,—" that the sum of malarial as well as hepatic causes, goes to build up and constitute the ' bilious fever of the tropics.' "

MARSH DIATHESIS AND MARSH CACHEXIA.

WE generally understand by the term cachexia that profound alteration in the process of nutrition consequent upon a chronic tedious disease, and presenting characters peculiar to that disease.

Now although marsh cachexia is a chronic disease, still it is not always a consequence of acute attacks of marsh fever; indeed it may precede any invasion of fever.

Cachexia is the most advanced and deep-seated manifestation of marsh diathesis, which may be described as a state of anæmia of malarial origin, marked by discoloration of the skin and of the mucous membranes, various dropsical effusions, and divers nervous phenomena, all which symptoms are due to a great increase of the fluid constituents of the blood, to a loss of its albumen, and to a deficiency of the red globules, which act as carriers of oxygen to the different tissues of the body. Although a man may reside many years in a malarial district, yet he derives by his long residence no immunity against the attacks of malaria, to which he may fall a victim when

least expected; he may resist the poison, but he can never get used to it, or superior to its influence. Sooner or later, the snake-like influences of malaria will wind round him like a shroud.

When the body, by long exposure, has become saturated by the miasma of malaria, we may infer the existence of a specific diathesis or disposition, which forms an essential, and often a permanent, part of the constitution of that body.

This influence may betray itself by certain outward and visible signs, or may remain latent for a long time, when its presence may be detected, should any morbid condition bring it into play.

Now this diathesis, capable of modifying all accidental diseases, is a transitory non-contagious state, incapable of being transmitted from parent to child. Once established, its influence may display itself in a great variety of forms, simple or complicated. The inhabitants of low marshy localities afford many examples of this impaludation, beginning with intermittent, and ending with cachexia. So long as a man resides in a malarious district he may occasionally suffer from some slight attack of fever; and yet the same man, who had fancied himself proof against the influence of malaria, no sooner has he removed to or resided a few days in a healthy locality, than he may be seized with an attack of pernicious fever! This influence has taken a slow but sure hold of his system; it does not readily let it go: "*hæret lethalis*

arundo." So long as he resides in a tropical climate it seldom leaves him; on the contrary, it assumes a more aggravated and persistent form.

Change of climate is our last resource in such cases. Even then this malarial influence does not leave him all at once. I remember the case of a young lieutenant who, after his return to Europe to recover from an attack of tertian ague, suffered the first year, once in every two months, from a fever of the same type, which finally disappeared.

Another friend of mine, soon after his return, was seized with a violent attack of intermittent, which with difficulty yielded to quinine after he had resided six months in Europe: these attacks returned occasionally when determined by any accidental cause.

It is worthy of remark, that the original type of the fever is nearly always preserved after the patient's arrival in Europe. I was acquainted with a lady whose fever in India had been characterised by an exaggerated and dangerous cold stage, who after a few years' residence in England was seized every four months with a fever of precisely the same type. An impression from cold may wake up this marsh diathesis, and an attack of intermittent will follow—a burn, a wound, some surgical operation may become complicated with intermittent fever; and this cannot be considered as symptomatic nor as hectic, but rather the product of latent malaria; or a man may be seized with an attack of angina or bronchitis, and the accompanying fever

will be of too violent a nature to be set down as symptomatic of such a disease. Nor will the part affected heal, nor will the complication disappear, until an antiseptic, to neutralise this malarial influence, be administered.

This man will suffer from no particular lesion; he will be anæmic, discoloured, with slight infiltrations in the hands, feet, and face; the liver may be enlarged, the spleen rather hypertrophied; such are the symptomatic lesions of this diathesis. The nearer the approach to a state of cachexia, the more marked will be the alterations.

It is time alone, aided by change of climate and the proper rules of hygiene, which can modify, and finally cure this diathesis.

By a change of climate we obtain some important objects; a removal of the pathological cause of this diathesis; of the special cause, the malaria; and of the general cause, the depressing influence of a hot climate. And lastly, we obtain the counteracting action of the tonic influence of a temperate climate. Tonics, as quinine and iron, may aid in the restoration to health, and to the rebuilding anew of the patient; a labour of slow growth, opposed to the slow and deep-seated influences of malaria. Cachexia is the most complete and ultimate form of marsh diathesis. It is a condition greatly to be dreaded; one which, above all others, imperils all European establishments in the unhealthy regions of the torrid zone.

Marsh cachexia must be distinguished from cachexia from general causes. The former is an anæmia from a special cause; the general character of the two anæmias is about the same—same discoloration of skin and mucous membranes, infiltration of hands and face, serous effusions in the serous cavities; same dyspnœa, pulsation of carotids, proceeding from a deficiency of the red corpuscles of the blood.

In the tropics, marsh cachexia, and that from general causes, are not the only affections which are liable to be confounded from a similarity of symptoms.

We have seen in the preceding section how bilious and yellow fever are liable to be confounded, although the two affections are entirely distinct.

A man who, after a long residence in a malarial district, where animal and vegetable life spring rapidly into existence and to activity, to be as speedily followed by death and decay, who has constantly breathed an atmosphere charged with the invisible and subtle products of decomposed matter all around him, products which by their septic nature frequently alter the character of his blood, and paralyse his vital functions; when this man has become the subject of a confirmed marsh cachexia, he becomes an object of wonder as well as pity. He moves slowly along, pale, anæmic, and emaciated; his face is straw-coloured, livid, drawn in ; the expression is that of languor and sadness; the eyes half

closed; the eyelids swollen; the conjunctiva is bluish; he is sensibly affected by the least change in the weather; pale as a ghost, he will offer you his hand, the contact of which imparts the sensation of a burning heat, and yet he is not sensible of it. He is troubled with vertigoes, strange illusions, and a sense of suffocation; he has no appetite, and cannot rest at night. The muscles of the body appear as dried up; the legs are knock-kneed; the belly is prominent, or concave, swelled out at the sides; you may observe different shades of jaundice where any lesion of the liver exists. When the tissues assume the transparency of wax, when the lips have lost all their outline and merge into that of the surrounding skin, and take upon them a hue of a dirty white, this is an appearance which corresponds with the most advanced stage of marsh cachexia.

All these appalling symptoms must be referred to disordered innervation, calorification, and imperfect oxidation of the tissues.

Life, in the subject of advanced cachexia, may be compared to the fitful glimmering of the flame of an expiring lamp ill supplied with oil, which so soon as the little supply is exhausted, faintly dies away and flickers into darkness.

When fever seizes such a subject, the symptoms are alarming, and the pulse becomes rapid.

I have seen cases where the impulse of the heart quickened respiration to so great a degree as to produce a sense of suffocation, without exciting

the least sweating, or any red effusion into the capillaries.

Cases have been known in which bursts of heat and congestion have produced death with the rapidity of lightning.

Such patients frequently suffer from diarrhœa, which when abundant may remove œdema and serous effusions. We may find on percussion over the abdomen considerable enlargement of the liver and spleen, which may disappear after copious evacuations. If these enlargements were constant, it would be easy to diagnose this cachexia from that arising from general causes, but these distinctive characters are often absent ; we are therefore obliged to trace the disease to its true source, so as to guard against confounding the two cachexias from a similarity of symptoms.

In the cachectic, malaria is latent ; the subject of marsh cachexia dies from syncope, not from apoplexy. In autopsy we find serum effused in the arachnoid and the ventricles of the brain, in the pericardium, pleura, and peritoneum. The heart and lungs and all the tissues appear shrunk and discoloured, drowned as it were in the serum of the blood. The state of hydræmia succeeds to a deficiency in the red globules, and is characterised by a tendency to dropsies before and after death. Quinine has but little effect upon cachexia ; however, attacks of fever must be combated by small doses of quinine.

This plan must be followed up, even should the patient remove to a temperate climate, where dangerous symptoms may present themselves even after a residence of one or two years.

The influence of climate, the tonic effects of winter, the regular succession of seasons, will aid materially the combined action of hygiene and of the specific treatment.

I have seldom found arsenic of value in the fevers of tropical climates, and when any complication from diarrhœa existed, I have found its employment positively injurious.

But the judicious use of quinine cannot be dispensed with in these fevers; it is a powerful antiseptic, antagonistic to that decomposition of the blood which the introduction of a septic poison tends to produce. Quinine, according to the experiments of Bintz, exerts a direct influence over the white corpuscles of the blood and the pus cells, limiting their number and their movements. Quinine restrains the dilatations of the bloodvessels, and as an antiseptic it exerts a paralysing, or in large doses, a destructive influence on microzomes; hence we can understand how quinine favours the cohesion, septicæmia the dissolution of bodies.

We occasionally meet with cases of chronic intermittent fever, in which little if any benefit is derived from the use of quinine.

In such cases the bromides, and occasionally strychnia, are very efficacious, especially in cases

of enlarged spleen, accompanied with great sensibility and nervous excitement.

The bromides exert over nervous matter a directly sedative influence, especially in intermittence, when the repeated attacks are more the result of a morbid habit than of malarial influence.

In a valuable paper on the " antipyretic action of quinine," Dr. Allbutt, of Leeds, writes as follows :—
" In typhoid fever I have used quinine for fifteen years. I soon extended the use of the drug from that to all febrile states . . . speaking generally, I have found quinine to be a very powerful antipyretic in septic fevers. . . . Turning from this free estimate of the value of the drug in septic and hectic states to its effects in specific febrile states, I speak with less confidence," &c.

Such is the result of the experience of an eminently practical physician on the effects of quinine; he has found it useful in all fevers of a septic origin. Why has it not done him equally good service in the specific fevers ? If quinine be antipyretic, why has it not checked the specific fever ?

It is therefore evident that the virtues of quinine depend upon its antiseptic properties; hence its value in all fevers of a septic origin.

A septic poison produces fever : that fever is periodic or intermittent. Quinine cures the fever; consequently quinine is primarily and essentially antiseptic, and secondarily and indirectly antipyretic and antiperiodic.

Now in no fever does the use of quinine produce more admirable results than in fever and ague produced by exposure to marsh malaria, because it is capable of counteracting the poison which gives rise to that fever.

If quinine acts so effectually in all fevers of a septic origin, but in a still more marked manner in marsh fever, this only proves that malarial fever derives its origin more especially from a septic poison, and this undisputed fact appears to my mind a complete reply to those writers who, in opposition to the laws of hygiene and true science, ignore the existence of the poison of malaria, and who assert that the so-called malarial diseases are not due to a specific poison, but to alternations of heat and cold in an exhausted body.

Surely these writers must admit that many emanations proceed from the earth, acting as poisons on the blood in various ways, each having its peculiar affinity for some particular tissue of the body.

The effects of malaria are greatly modified by climate. In temperate climates the dissolving tendency is manifested by enlargements of the spleen, by the consequent anæmic condition of the blood, and by serous effusions in the cavities of the body.

While in hot climates, through the action of great heat and other disturbing agencies, the action of the same poison determines more to the liver than to the spleen, and produces a more rapid and

complete dissolution of the elements of the blood, as evinced by hæmorrhages from the stomach, bowels, kidneys, and other outlets of the body, giving rise to the various forms of the bilious and pernicious fevers, which in their exaggerated form are unknown in the temperate zone.

Life is a continual battle between two antagonistic principles; the one tending towards cohesion, the other towards dissolution and decay. Now when an organic poison is introduced into a system so complex as that of man, we can imagine the disorder and violent change that must ensue—an excess of oxygen is liberated, great heat is evolved, the cohesion of the tissues and of the elements of the blood is destroyed, and like a ferment, a new element will be formed, destructive to life, unless the action of the poison be neutralised by a specific antiseptic.

Amongst the most valuable may be reckoned, besides quinine, carbolic and sulphurous acids, the sulphites and the carbolates.

A long and continued exposure to the influence of the poison of malaria can alone be capable of creating that peculiar condition of the human body known as " marsh diathesis and marsh cachexia."

DYSENTERY, ACUTE AND CHRONIC.

The transition from the study of marsh intermittent fever to that of dysentery is both natural and easy, as the two diseases are frequently met with in the same or in neighbouring localities under the same meteorological conditions.

Dysentery and intermittent fever may exist separately or conjointly, and although the two are products of specific emanations from the soil, distinct in their cause as well as in their effects, they nevertheless coincide and co-operate at certain periods of the year.

The endemic of hot climates is distinct from the sporadic dysentery of temperate climates.

The former is a general or constitutional disease, the effect of a poisonous infection due to locality, and is localised by a specific lesion in the large intestine. This local affection may become, if not arrested, a gangrenous inflammation, and produce the destruction and elimination, in form of eschars, of one or more of the coats of the lower portion of the large intestine.

Diarrhœa is the first or premonitory stage of dysentery. The evacuation of matter — viscid,

membranous, and bloody, is an indication of the second and confirmed stage; while putrid and gangrenous evacuations characterise the worst forms of dysentery.

The diarrhœic form is one of its most frequent manifestations, with an absence of tenesmus and blood in the stools; contrary to the preconceived opinions of some authors, who uphold the distinction between the endemic diarrhœa and dysentery of hot climates, who teach that the former may last for years, whereas the latter comes on rapidly, and is always attended with tenesmus and bloody flux.

And yet these authors admit that it is difficult to make an anatomical distinction between the two, and that as regards the treatment, there is but little or no difference. In the endemic focus of dysentery we meet with a greater number of cases in the diarrhœic form, and the stools are not characteristic of a different disease, since they often pass into sanguineous and gangrenous dysentery. It is therefore evident that we cannot separate the two forms of intestinal flux, which must be considered as two degrees of the same disease, generated from the same cause, and which pass from one into another.

We find in tropical climates, as well as in Europe, cases of nervous and asthenic diarrhœa—diarrhœa peculiar to infancy and old age, diarrhœa symptomatic of some fevers and of organic disease, which

we must not confound with dysenteric diarrhœa, from which they differ both in their march and in their specific cause.

There are other diseases besides dysentery which are characterised by blood in the stools; cases of intestinal hæmorrhage. But they are not an endemic disease, but are accidental, common in the East and West Indies. They are never attended with colic or tenesmus, but are symptomatic of a congested liver.

Dysentery is a specific colitis, distinguished by colic, tormina, and tenesmus; by evacuations, mucous or muco-sanguineous, and sometimes bloody matter, with or without fever.

We have been enabled to discover what is the type of malarial fever, and the peculiarities of the soil in which it is generated; but we are unable to identify the nature of the soil peculiar to endemic dysentery, although the two diseases frequently prevail in the same locality. When dysentery is not complicated with malaria, it rages more frequently in elevated regions of volcanic origin, than in those marshy districts along the seacoast and borders of rivers, the hotbeds of endemic malaria.

From the earliest ages the distinction between epidemic and endemic disease has been well understood. Hippocrates says: "Si ex loci natura et situ morbi oriantur, illorum causa perennis manet, semperque adsunt, dicuntur endemici, si autem quodam tempore tantum, regionem pervadunt vocantur epidemici."

Now the soil can only exert its influence through the emanations which rise from its surface, and to the causes of infection, superadded to the miasma from a special locality, dysentery owes its endemic nature, or that speciality which distinguishes it from the epidemic dysentery of temperate climates.

We sometimes see a patient who is suffering from dysenteric diarrhœa and marsh fever at the same time. It is not easy to decide which is the primary factor of this condition. In such cases quinine is the touchstone, and it will frequently cure both the dysentery and the malarial fever.

Now this cause of a special miasma is intimately connected with atmospheric conditions, an elevated temperature, moisture, electricity — a condition which exists in the season of rains and storms, and which produces those physiological modifications in the human organism, causing in one man fever and ague, in another dysentery.

Amongst the accidental causes of dysentery in warm climates may be reckoned—sudden changes of temperature, the cold night air in the rainy season in the tropics; and we know from experience that lands through which rivers pass favour this variation of temperature. Mental emotions, excesses and errors in diet, the most trivial circumstance, a sudden chill, a current of fresh air, may impress on the body a sensation quite sufficient to give rise to a sympathetic reaction from the disorder in the capil-

lary secretion, or the secretion of the skin, upon the analogous function of the mucous membrane of the great intestine, and thus produce an attack of dysentery.

A draught of cold water, when the body is heated, has a physiological action analogous to that which occurs from a sudden check to transpiration and the impression of cold. As to the quality of the water, I am of opinion that it possesses but a very modified influence in the development of the disease.

I have visited the crews of five different vessels, some of whom were suffering from dysentery, and these vessels had been supplied with water from different sources—two from the cistern water of New York, one from spring water, and two from the river water of a tropical country, and yet some of the crew in each of these five vessels were equally affected. The fact is, many may be the predisposing causes, but the endemic cause only is capable, independently of all other causes, of generating dysentery. There are many who doubt whether dysentery be contagious. Cullen, Pringle, Lind, and others consider that its contagious nature is beyond question, and, from the experience I have of the disease, I am inclined to believe it to be contagious.

Sporadic or epidemic dysentery may appear in any climate, originating from some accidental causes, but it differs greatly from the endemic form.

The endemic dysentery of hot climates may de-

clare itself in a variety of ways. In some cases, the local symptoms are most conspicuous at first; in others, the general or constitutional, as heat, thirst, and slight fever, which are soon succeeded by colicky pains and other characteristic symptoms. At other times it assumes the slight diarrhœic form, and, after an interval of a few hours, it may pass into the acute stage, and often when the endemic is raging the patient is taken by surprise, and is seized with a dangerous and acute form.

The symptoms are peculiar, and do not resemble those of any other disease, as the lesion is confined to the lower part of the large intestine. Other portions of the intestinal canal participate, to an unequal degree, in the morbid condition of the rectum.

Pains are felt in the course of the colon, more acute in the left iliac fossa; they are intermittent, or constant, and increased on pressure.

The desire to evacuate is attended with an acute, cutting, and excruciating pain—a sensation of twisting of the intestine—" tormina."

With this constant desire to evacuate there is a feeling of burning, radiating from the anus to the rectum. These sensations provoke the desire to bear down, followed by no excrement, or by a small quantity, which brings little or no relief to the patient's suffering. At the moment of defecation, he feels an excruciating pain in the anus—" tenes-

mus"—usually referred to the passage of a specific irritating matter.

This tenesmus does not depend on a spasmodic stricture of the sphincter ani, for in some cases the anus, instead of being contracted, is dilated and funnel-shaped. These painful sensations must be referred to an acute inflammation of the mucous membrane of the rectum.

The stools consist of glairy mucus, in flakes, or in the form of balls, of a slight yellow, or are transparent and colourless. They may be compared to the spawn of the frog, or to grease in a half-fluid state, or to the sputa of pneumonia, tinged with blood. The mucus may be tinged with blood, or blood may be found in abundance at the bottom of the vessel.

This may contain thin flakes of epithelium, exfoliations of mucous membrane, false membranes, which the patient compares to grains of boiled rice which have burst, or the scrapings of the intestine. These stools may be repeated one hundred times in twenty-four hours, and although each evacuation may be trifling in amount, the total may contain several pounds of matter.

Soon the flux becomes red, and contains fragments of altered and macerated mucous membrane, resembling the flesh of muscle boiled down, an appearance which generally indicates the termination of inflammation in gangrene. When gangrene has extended to the mucous membrane of the rectum,

the stools contain a brownish matter, clots of blood, sphacelated mucous membrane, and pus, which are horribly fœtid.

The small intestines partake, to a certain extent, by way of continuity, of the inflamed state of the large intestine, as proved by vomiting and nausea.

I have frequently observed the intense feelings of hunger in the course of this disease, which must be attributed more to the perversion of the normal sensibility of the nerves of digestion than to the want of food.

The tongue is usually red and parched.

The liver is always secondarily affected in acute dysentery. The symptoms often pass unnoticed, owing to the intensity of the disease; but when it is chronic the liver symptoms become a subject of great alarm, and though not suspected during life, have frequently been detected after death.

Fever, which is generally absent, may be symptomatic of an abscess of the liver, or may depend on the influence of malaria.

The strength gradually gives way; in moments of repose the patient lies on his back; the features express fear and anxiety, moral and physical prostration; during a paroxysm he bends forwards the chest on the abdomen, doubles himself up, sends forth plaintive cries; the eyes are dim and hollow, and to emaciation succeeds a straw-coloured tinge of the skin, leaden or earthy, symptoms which indi-

cate the profound impression made on the blood by the endemic poison.

In the coloured race the hue of the skin becomes clearer and brighter than natural.

In the tropics the mode of its exhibition is always the same. There may be certain shades of difference, due to the predominance of particular symptoms or of special complications.

Hence, to divide dysentery into different kinds, as in Europe, would be arbitrary. In practice we only meet with the following conditions dependent on the degree and the severity of the symptoms :—

1st. Slight diarrhœic dysentery.

2nd. Subacute sanguineous dysentery.

3rd. The acute with gangrene.

4th. Chronic dysentery.

These are degrees of the same disease, capable the one of passing into the other, all presenting the same complications.

The first form may exist during many months, the persistence being due to some morbific principle which survives the cause, and is kept up by it.

It often happens that all our endeavours to cure this form may be baffled, from the continued influence of the endemic cause. Should the patient not remove far from the seat of this cause, he may fall into a state of cachexia, or into the second form, " the subacute sanguineous dysentery."

It is the same disease; it has merely passed from the diarrhœic to the subacute form.

Convalescence in this form does not become well established, and oscillates between recovery and relapse.

We seldom meet with, in the tropics, the complications to be met with on board a ship, in camps, prisons, &c., such as rheumatism, scurvy, &c.; the only complications we find are malarial fever, hepatitis, and occasionally typhus.

The complication of the liver may be more or less serious, according as it may consist in simple hyperæmia, in an inflammation more or less deep-seated, or in abscess, and yet these lesions may pass unperceived during life; but it more frequently happens that fever, pain, increased sensibility, and augmented volume reveal the complications of the liver. There may be cases in which the liver affection ceases to be a complication, but is converted into the principal and most dangerous affection, the dysentery becoming of secondary consideration.

This liver complication is more frequent among Europeans, and in all cases of post-mortem from dysentery it is found to be more or less altered, even in the Creoles, but in a far less degree.

This form may leave behind a condition which can only be improved by removal to a temperate climate, or may end or pass into " the acute form with gangrene."

This acute form is not so frequent as the two pre-

ceding ones. There is more fever, more agitation. In a few hours life may be placed in jeopardy from hæmorrhage, when the consequent tormina and tenesmus do not allow one moment's repose.

The duration of this form may vary from two to ten days. The intense fever in some, ataxia in others, rectal hæmorrhage in many, will account to some extent for the rapid and fatal results.

Although continuity is the usual type, this form may sometimes be impressed by the malarial influences of intermittence, which impress or modify almost every disease in the East or West Indies; hence in our treatment we must take advantage of this periodicity.

Recovery, should it occur, must be very protracted and tedious. Should the symptoms return, and threaten a fatal termination, marked alteration will take place in the function of innervation, calorification, and in the expression of the features.

The skin, as in cholera and febris algida, becomes cold, icy, and cyanosed. The circulation and respiration become more embarrassed, and the patient expires without a sigh.

The symptoms of gangrene impart to acute dysentery a special character. Repeated evacuations, attended with such intense pain, exhaust the patient and determine attacks of syncope.

The concentrated rapidity of the pulse, the feelings of cold, and the expression of the face, afford an index of the dreadful sufferings of the patient.

One of the most intolerable symptoms is tenesmus of the bladder, with almost total suppression of urine, and the darting pain radiating along the cord to the testicle.

Should there be no sign of improvement, then the patient becomes more and more exhausted, the stools liquid, and horribly fetid, like the washings of dead flesh, in which are suspended flakes of mucous membrane. The separation of these membranes may be indicated by tenesmus of the bladder and marked dysuria. Sometimes portions of the muscular coat come away with the fibres, sw ollen and of a grey colour.

It is surprising how a human being can live after having thrown off these immense flakes of intestine, and yet I have witnessed two such cases recover, and many authenticated cases of recovery are on record.

Should gangrene continue to extend, the pains in the abdomen suddenly cease altogether; it becomes insensible to the touch, the skin is bathed in an icy sweat; yet the intellect remains unclouded, and the patient, who no longer feels pain, fancies he is on the way towards recovery.

The poor sufferer lies on his back, smiles a sickly smile probably a few moments previous to his death. I have witnessed the death scene of three who had succumbed to gangrenous dysentery, two of whom flattered themselves with the hope of recovery to the last.

The third was a young engineer, who would not be deceived, although pain had entirely ceased. After having thanked me for my kind consideration he made all his final arrangements, bid farewell to all his friends with as much calm presence of mind as though he was preparing for a long voyage—alas! to that bourne from which no traveller returns. He then fell back exhausted, and died.

Chronic Dysentery

Is that condition towards which all the other forms tend. The mortality from an epidemic of yellow fever is greater in the West Indies than from chronic dysentery, but the great mortality from the latter arises from its persistence and its frequent relapses.

The chronic form is rather the consequence of a succession of relapses than of slow and gradual continuity, and we are enabled to diagnose this chronic state only by the change which has operated in the individual, and by the peculiarity of the symptoms when the system is no longer capable of resisting the superior influence of the endemic cause.

Some individuals possess great powers of resistance, while others are soon prostrated, and fall into the chronic state. Diarrhœa makes its appearance, and soon becomes permanently established, especially at night-time.

Should the chronic have succeeded in a short time to the acute form, we may expect to find

blood occasionally in the motions; but if it be the consequence of frequent relapses, the stools will be yellow, greyish, or slate-coloured.

This cachexia once confirmed, the patient wastes away to a skeleton, his skin literally cleaves to his bones, and he discloses on his face the wrinkles caused by muscular contraction from intense suffering. The body is bent forwards, the gait unsteady, and the abdomen appears flattened and empty.

This cachexia is a dry one, differing entirely from marsh cachexia, in which the liver and spleen are congested, and ascites and serous effusions are present.

Such a patient may expire from exhaustion, or may relapse into the acute form, and die from gangrene, or some typhoid complication.

In post-mortem cases of chronic dysentery of long duration, attended with frequent relapses, we find the mucous membrane of the large intestine thickened, of a lardaceous brown-coloured consistence, like scirrhus, especially towards the rectum, which is greyish or slate coloured. The different coats of the intestine are hypertrophied, the thickening of the coats in some portions is greater, harder, and more resisting than in others; there is, therefore, in some parts a loss of dilating power, and a narrowing of the calibre of the intestine.

By continuity the mucous membrane of the stomach and small intestines is vascular, arborescent,

tumefied, and softened. We frequently meet with small sacs, each containing a little abscess; hence the purulent focus becomes multiplied and hence the presence of pus in the stools; although in the absence of such abscesses the secretion from the inflamed mucous membrane will cause purulent evacuations.

When a relapse of dysentery occurs, then a fresh crop of ulcers will spring up.

In chronic dysentery we find a very important characteristic alteration in the liver. Instead of hypertrophy, with induration or softening of tissue, we find atrophy, of a yellow fawn colour, an alteration which resembles cirrhosis.

Any ascites that may exist no doubt depends on the condition of the liver, but the œdema of the face is rather to be referred to the profound alteration in the blood.

In fact, the endemic dysentery of hot climates determines one of the most formidable kinds of cachexia.

Amongst the many formidable diseases which a physician meets with in his practice in hot climates, chronic diarrhœic dysentery is one of the most frequent, and which gives him most trouble and annoyance.

Any disturbance in the functions of the skin capable of arresting transpiration, instead of reacting upon the bronchial and pulmonary mucous mem-

brane, as in Europe, will act rather upon the intestines, and there will result an exaggerated state of the intestinal secretion.

Chronic dysenteric diarrhœa is essentially apyretic. Seldom does hectic declare itself, even at the close, and when complicated with malaria, dysentery is generally fatal.

A relapse may be brought on by any imprudence, such as over-fatigue, any moral reaction, or by any cause which may be traced to those influences which may have produced the disease and which still continue to exist.

Hence it is that this condition will resist all methods of treatment, and is that form of dysentery which is most fatal, not alone in localities in which it has been developed, but also in healthy localities, whither the patient may have removed for the benefit of his health. If patients whose circumstances will admit of their removal to a healthy climate succumb to the slow influence of the disease, how sad must the fate of those patients be who cannot change their place of abode, but remain to undergo in all its permanent activity the baneful influence of tropical climates!

The diagnosis is simple. Dysentery possesses a specific character which cannot be mistaken. In no other disease do we observe the characteristic pains, tenesmus, tormina, and the specific stools.

Acute endemic dysentery might be confounded with pernicious dysenteric fever, or with intestinal

hæmorrhage dependent on congestion or hyperæmia of the liver. The dysentery of persistent malarial fever is intermittent, the stools are more watery, abundant, and are less, if at all, accompanied with tenesmus and tormina. The manner of its invasion and algidity establish the diagnosis between it and acute dysentery. I have frequently observed that the intestinal flux disappears as algidity progresses. When dysentery prevails as an epidemic no case can be regarded as mild, for the mild dysentery of to-day may become intensely severe on the morrow, either from some prominent symptom or some alarming complication. The great mortality from dysentery is due to the inevitable tendency to relapse, and to its transformation into the chronic form.

In the dysentery of temperate climates we meet with divers lesions differing in their nature and extent, but in the endemic form of hot climates we always find the same anatomical character, varying only in extent and intensity, but never in its nature.

Ulceration of the rectum and lower intestine is its anatomical character, as ulceration of Peyer's glands is that of typhoid fever.

Lastly, ulceration, gangrene, putridity and sphacelus constitute the lesions in dysentery, and are confined to the great intestine, and this localization defines the disease.

The liver, next to the great intestine, is the organ

most frequently altered; it is generally hypertrophied in acute dysentery, whereas in the chronic form, when its functions are more and more impaired, it becomes atrophied and of variable consistence.

Let us now consider what is the *treatment* which experience has proved to be the most successful.

There is no disease for the cure of which so many drugs and nostrums have been recommended as in dysentery. This variety in the treatment may be accounted for as the result of the varied conditions under which the disease is developed, the difference in the cause, and the variety in the symptoms which dysentery presents in the temperate zone. But we have now to consider the endemic dysentery of the tropics, which, as it is more uniform and constant in its symptoms and its lesions, so does it require a more certain, yet more decided treatment than in temperate climates.

I will, therefore, say a few words concerning the principal remedies which have been employed, and then detail the nature of the treatment which I have found most appropriate.

We may confidently assert that taking into consideration the symptoms of endemic dysentery, as well as its anatomical lesions, it is not a true phlegmasia of the parts affected, and the anti-phlogistic treatment formerly recommended was based on the belief in the doctrine of true inflammation.

The reaction that takes place in an attack of

dysentery is attended with but little activity. More frequently we find a depression of the vital powers from the beginning. The period of true inflammation, if it does exist, must be a very short one. Some of our military surgeons in India have availed themselves with great skill and success of this short period of congestion. After a copious bleeding, they have administered large and repeated doses of Dover's powder with good effect, but these patients were strong and healthy young men, lately arrived in India, and who had not been long exposed to the endemic cause.

Amongst the tropical races and old European residents even local bleeding must be used with great caution.

The use of topical emollients internally and externally, as baths, injections, liniments, albuminous drinks, &c., are valuable auxiliaries in the treatment.

I consider that the use of opium has been too highly extolled ; its narcotic effect is calculated to favour the stagnation of the blood and congestion of the parts affected, and consequently to aggravate instead of to relieve inflammation. Opium tends to depress the vital powers, and depression is a special character of the disease; for by retarding the action of the circulation, opium favours the tendency to gangrene.

Sometimes small doses may be useful in the absence of congestion, but this drug is better suited

to the epidemics of temperate than to the endemic dysentery of hot climates.

Tonics and astringents may be useful at the proper time, but as a general rule they are dangerous.

The employment of a remedy calculated to exaggerate the force of reaction and contraction in the part affected is to my mind as injudicious as it would be to depress too much the vital powers.

Opiates and astringents must therefore be employed with caution.

If we consider the pathological as well as the anatomical character of the disease, the plan of treatment by evacuants would appear to be the most rational. A special irritation has settled in the mucous membrane of the lower part of the great intestine. The first effect is to draw towards it an afflux of fluids, blood and serum, in order to determine in that locality a congestion of the mucous follicles.

Now such evacuants as emetics, purgatives, &c., act by setting up a counter-current to that congestion, acting at a distance from the focus of the congested fluids, and causing a derivation therefrom, so as to modify and arrest the lesions of the rectum.

The abundance of fluids produced by evacuants determine to the mucous lining of the digestive tube and often to the skin, and the fluids supplied by the different glands, especially the liver, are calculated by their derivative effect and by their peculiar

mode of counter-irritation to modify the pathological function and the anatomical alteration of the large intestine.

Hence we must consider emetics and purgatives, properly combined with remedies calculated to combat any complication which might counteract their effect, not only as material evacuants, but as modifiers of the vital and organic functions.

There is a general treatment for dysentery very popular in tropical climates, especially in the West Indies, useful in every form of the disease, acute or chronic. It consists in the judicious employment of ipecacuanha, manna, and sometimes calomel and opium.

I will not risk any theory respecting the *modus operandi* of ipecacuanha; I only know that it cures dysentery. It is not necessary that it should act as an emetic; it acts best when absorbed.

The properties of ipecacuanha are so defined, its effects are so certain, that I go so far as to assert that ipecacuanha is to dysentery what quinine is to malarial fever.

In the mild diarrhœic form of dysentery begin the treatment by mixing one ounce of manna in a tumbler of rice or milk and water, a wineglassful to be taken every hour, and throw up night andmorning an injection of starch and laudanum.

After the employment of the purgative for two or three days the stools will probably become modified, and alternate with stools of a bilious character.

The manna acts like the neutral salts in the epidemic dysentery of temperate climates. After the lapse of two or three days ipecacuanha is administered. Over two drachms of bruised ipecacuanha pour four or six wineglassfuls of hot water and allow it to digest for twelve hours. In the morning the patient should take a wineglassful every half hour. On the first morning vomiting is excited with a little tepid water. On the following day the same quantity of boiling water is added to the already bruised ipecacuanha. The same plan is continued during five successive mornings. Generally no more vomiting is experienced after the third or fourth day.

Should ipecacuanha not produce the desired effect, and should the stools not lose their specific character, it will be advisable to have recourse again to manna in rice or milk and water. I have tried many kinds of purgatives, but I give the preference to manna. I consider it as a kind of specific purgative in the endemic dysentery of the tropics.

Should the symptoms present a still greater degree of intensity, give a large dose of calomel and opium, and continue in modified doses if necessary. Should the stools become improved, we may again return to the manna mixture. The motions from calomel are green, those from manna are yellow.

If called to see a patient with acute dysentery in the night-time, you had better order cupping or

leeching over the most sensitive part of the abdomen, and on the following day order the ipecacuanha as directed, and at night-time give a dose of calomel and opium, as used to be ordered by Annesley in India. Continue the plan of treatment for a few days and you may probably save the patient.

The action of calomel is invaluable in epidemic dysentery; it is an admirable substitute occasionally for ipecacuanha; but we must carefully guard against salivation, which might prove dangerous to life.

Relapses of dysentery require a similar treatment, proportioned to the severity of the relapse: in some cases we rely upon ipecacuanha, in others upon manna. When acute symptoms have subsided, and extreme debility prevailed, I have often used the prescribed quantity of bruised ipecacuanha in Madeira wine instead of water, thus adding a tonic to the specific action of the ipecacuanha. In those forms of dysentery which would not yield to the infusion of ipecacuanha I have employed the decoction, which by some is considered more energetic; or the powdered ipecacuanha may be boiled down in water during five minutes, and taken with the addition of a little anodyne syrup, every hour diminishing the dose in case of vomiting.

The effects of ipecacuanha are often surprisingly speedy and efficacious. The dysenteric stools soon alter their specific character and consistency.

But in case the motions continue to retain their

specific character, when they are composed of blood and mucus with tormina and tenesmus, then our hope rests in the use of calomel and opium.

But calomel can only be used as a purgative; its alterative action cannot be other than injurious in a disease in which consecutive anæmia is so marked and so difficult to combat, by reason of the depressing influence of climate.

We must never by means of opium endeavour to cut short the dysenteric flux. We shall only meet with disappointment. The symptoms may be suspended, but will return with greater intensity. In the complication of typhoid fever, all active treatment is out of the question; it must be attacked by revulsives, sinapisms and blisters externally, and a judicious use of tonics, wine, broth, &c. The complication of malarial fever requires a very careful and active treatment. We must not resort to quinine on the very first attacks of fever, which after all might be only symptomatic; but should these attacks be repeated in an insidious form tending towards pernicious fever, we must attack the foreign element which aggravates the principal disease.

All treatment directed to the cure of dysentery will be useless so long as the complication exists; hence, under those circumstances, quinine administered judiciously will often cure the dysentery and the fever at one and the same time.

The complication of the liver often renders the

dysentery of secondary importance, and so long as there is only congestion, evacuants may be associated with local bleeding over the right hypochondrium.

But when inflammation threatens suppuration, we must direct our active treatment not to the dysentery, but to the liver. The sudden suppression of the evacuations is a very grave symptom, which we must endeavour to prevent by mild purgatives of manna or castor oil. We must moderate, not suppress, the dysenteric motions, and direct our principal treatment to the affection of the liver.

In chronic dysentery we must not attend so much to the treatment of the local lesion as to that of the system in general.

Attention to diet is as essential in chronic dysentery as in typhoid fever. The stomach and small intestines seldom participate in the local affection, hence the appetite is often excessive, and the slightest irregularity in diet might lead to a fatal relapse.

Albuminous and protein substances are the foods best suited to chronic dysentery, as they leave but little residuum behind for excretion.

The general and hygienic treatment in chronic dysentery will depend upon the judgment and experience of the medical attendant.

A removal from the endemic focus is absolutely necessary. A sea voyage might prove very beneficial, and should the patient have to encounter the rigours of a European winter they are preferable

to the heats of summer, which in England are often more difficult to support than the heat of the tropics.

I have tried the iodine injections recommended by French physicians in the West Indies, but with a very partial success. You first clean out the intestine with some emollient injection; after having administered the iodine injection, you throw up one of laudanum and water, should the iodine produce any colicky pains. We can understand how iodine may be capable of modifying by its antiseptic properties the products of decomposition, and promote the cicatrisation of ulcers in the rectum.

The injection which I have found most useful is the nitrate of silver. Its topical action is more active than that of any vegetable astringent. In gangrenous and purulent dysentery it modifies the diseased surfaces, and soon alters the nature and aspect of the excretions.

Dr. Castellane, of Vera Cruz, recommended the following formula, which I have often found very useful: equal quantities of chloride of sodium and nitrate of silver were mixed in gum water, taking care to dissolve the salts separately, and only to mix them just before giving the injection, fifteen grains of the nitrate in an ounce of water. In three cases I have seen, after the use of this injection, the blood in the stools, accompanied with tormina and tenesmus ceased to appear, and bile made its appearance.

This I believe to have been the once famous

injection used by Dr. Bliss in St. Jago, in Chili, in chronic dysentery, and is recommended by Spanish physicians in Havana, and by such French physicians in the West Indies as Laure, Saint Vel, &c.

The following was the favourite remedy which I recommended to be given to the negroes on the sugar estates in Cuba—thirty grains of powdered ipecacuanha to be divided into six pills, one to be given every hour.

Large doses of the sub-nitrate of bismuth I have found very useful; its action is absorbent, disinfectant, and anti-catarrhal, and dries up the putrid excretions from the ulcerated intestine.

I remember having read an article in the *Lancet*, written by Dr. Ferrier, of King's College, entitled "How to Cure a Cold in the Head," in which he recommends sniffing up large quantities of powdered bismuth mixed with powdered gum. I have no doubt the remedy is as valuable as it is scientific, owing to its absorbent and anti-catarrhal properties, on the same principle as it acts in chronic dysentery.

When all plans have failed, I have put the patient on a diet of milk. A prolonged residence in the country, on a milk diet, might often conduce to a complete cure, if the influences which had caused the disease did not constantly tend towards a relapse.

Change of climate is often our last resource. Patients of a sanguine temperament, whose constitutions have not been seriously broken down, derive

most benefit from a short residence in a temperate climate.

But the greater number require a residence of two years, as necessary to remove the profound impression produced on the system by a long residence in tropical climates. Some, more especially the aged and cachectic, have little to hope from any change. As it was with them in the tropics, so it will be in Europe. They drag on a precarious existence for months and years, relapse, decline, and finally succumb to the influence of a melancholy cachexia. Patients who have recruited their health by a change of climate should aspire, when they return to the focus of endemic dysentery, to be no longer the subjects of anæmia, and to preserve the benefit they have derived from change of climate as long as possible, by strict attention to the rules of the most rigid hygiene.

DISEASES OF THE LIVER.

IT appears to me very appropriate that a section upon the dysentery of tropical climates should be succeeded by another upon diseases of the liver, with which dysentery entertains an endemic affinity, and is intimately associated as cause and effect.

If we except that bilious condition which is no more than a disorder of secretion superadded, either as an essential or a secondary element to endemic fevers, or that state of fatty liver peculiar to yellow fever, or the condition of hyperæmia or hepatitis, diseases of the liver are very rare in hot climates. A fact which tends to prove that liver disease, as it is seen in Europe, has no connexion with the endemic condition of the liver, or with that modified type of inflammation which is peculiar to it in the tropics.

An organ like the liver, so essential to the process of digestion and nutrition, and for the purification of the blood, must necessarily suffer materially when constantly exposed to causes tending to a decomposition of such blood, and to impair the forces of nutrition, as marsh fever, yellow fever, and dysentery.

In the tropics, the mark of unity and simplicity

stamps the entire pathology of disease. To this law diseases of the liver offer no exception, although they are not very diversified; nevertheless, such as do exist are characterised by their violence as well as their frequency.

In practice we daily fall in with the same uniform diseases of the liver—hyperæmia, hepatitis (simple or suppurative), hypertrophy, consequent upon marsh fever, or atrophy, consequent upon chronic dysentery.

It is not my intention to enter into a minute description of these endemic diseases of the liver, so well described by many authors, Annesley, Morehead, &c., in the East Indies.

I will merely attempt to throw more light on some interesting points connected with these diseases.

We cannot fail to have observed that jaundice is a frequent, although not a necessary or an essential complication of the different lesions of the parenchyma of the liver. Although jaundice may characterise certain malarial fevers, special in some degree to certain localities, so much so as to give to those fevers the designation of bilious, remittent, ictero-hæmorrhagic, &c., nevertheless, idiopathic jaundice is not more frequent in the tropical than in the temperate climates. Diseases of the liver occur at any period of life, but more especially in young men, and in men of middle age. Hyperæmia and hepatitis are the most frequent. However, we

do not meet with such cases in our practice so frequently as we do of intermittent fever and dysentery.

We are less frequently called to attend cases of liver disease which, although it may attack people of every race, falls with especial severity upon Europeans.

Hyperæmia of the liver appears to consist in an exaggerated condition of the function of that organ, under the influence of a constantly elevated temperature. Hyperæmia may occur simple and uncomplicated, or it is complicated with marsh fever and dysentery. Great heat is an active, but not an indispensable cause; severe congestion may take place in the height of winter in cold climates, nevertheless the influence of heat is real and permanent. Simple or uncomplicated hyperæmia may be either acute or chronic. When acute, it may acquire with great rapidity an alarming intensity, and give occasion to profound alterations in the texture of that organ. The liver becomes gorged with black blood, the excretory ducts are clogged with bile, and extravasations of blood, exudations of serum beneath the peritoneal coat, lead to softening of its substance.

These changes are precisely such as take place in the spleen from exposure to malaria.

When hyperæmia has become chronic it creeps on insidiously, and almost unperceived, and to our great surprise we detect its existence, sooner or

later, by the formation of a circumscribed collection of purulent matter.

The fact is, as we shall have occasion to observe farther on, the liver is an insensible and passive organ in many chronic affections. It may be suffering from lesions of the gravest nature, and yet give occasion to but slight inflammatory reaction in the system. I agree with many physicians of experience in the East Indies, that the frequency of hepatic affections in the tropics does not depend so much upon great heat as upon the malarial influence in a marshy soil.

A remarkable instance in proof of this assertion occurs to my memory at this moment.

The French consul of a very important seaport town in Cuba resided in a beautiful country-seat at the distance of one mile from the town, whither he walked every day to and fro. He was a man of great intelligence, of very regular and temperate habits, and never complained of ill-health. Others in his district had frequently suffered from marsh fever, but, strange to say, this gentleman never suffered from fever of any kind, of any pain or swelling over the region of the liver, never had an attack of dysentery, and yet this man died from the worst form of suppurative hepatitis I ever witnessed.

However, alterations in the liver and spleen are not constant in intermittent fever. Alterations of the spleen are more marked and more frequent in

bad marshy localities, in which fever ends in cachexia; still, in a great many cases, autopsy reveals but slight lesions of the spleen, and these enormous " ague cakes," so frequent in the marshy districts of temperate climates, are seldom seen in the tropics. The variations of volume we observe in the spleen are connected with a variety of phenomena which may be observed successively in the course of a disease. The hyperæmia of the spleen may diminish or disappear after a severe attack of diarrhœa or an abundant diuresis.

Congestion of the spleen often tends to softening. In relapses of fever, in confirmed cachexia, the hypertrophied gland often acquires large dimensions, and becomes hard, while in other cases the spleen is atrophied, contracted, and often reduced to the size of a small tongue.

The alterations of the spleen are not so deep-seated as those of the liver from exposure to malarial causes and influences in hot climates, nevertheless there exists a striking analogy between the lesions and alterations both of the liver and spleen.

In severe fevers the liver becomes congested and enlarged. To congestion succeeds hypertrophy and induration.

Softening is not so frequent, and coincides with diminution of volume. In fevers of short duration the colour of the tissue of the liver undergoes no change, but so soon as it becomes hypertrophied it becomes pale and anæmic. In marsh cachexia, if

there be no complication of dysentery, the liver is fatty, dense, and diminished in size. A section looks dry, marbled, of a pale yellow.

In other cases the liver is enlarged and hypertrophied. The patient becomes slightly jaundiced, and presents, besides, the peculiar tinge common to marsh cachexia.

There is no distinctive or especial character peculiar to congestion of the liver from malarial causes.

The frequent repetition of this congestion may produce hypertrophy, but it never gives rise to the formation of an abscess in the substance of the gland.

This is a characteristic difference between simple hyperæmia from malarial causes and that hyperæmia which is associated with dysentery.

In yellow fever the specific condition of the blood gives rise to anatomical lesions different from those produced by intermittent fever. The liver at the onset is congested, but never suffers any change in volume. It becomes anæmic, yellow, and pale, and its cells are frequently filled with pearly drops like grease. The alterations of the liver vary greatly according as they are associated with dysentery in an acute or a chronic form. In the first case the progress is rapid, in the second slow and gradual.

Europeans suffer more than Creoles from the hepatic complications from dysentery. These generally consist in a simple congestion, often followed by acute inflammation, with or without suppuration.

This congestion is often unperceived. It may probably be obscured by the dysentery, or it may not give rise to symptoms of reaction by which its presence may be known or detected.

In post-mortem cases from dysentery the spleen may be intact, but the tissue of the liver is softened, swollen, gorged with black blood, which flows on being cut into.

These appearances, with or without suppuration, most frequently accompany endemic dysentery.

But in chronic dysentery, with diarrhœa, the alteration of the liver is neither constant nor invariably the same; instead of hypertrophy with softening or induration of the tissue, we meet with atrophy. In a few cases of chronic dysentery the liver may be slightly hypertrophied, but atrophy, with change of colour and variable tissue consistence, is the most frequent lesion.

The liver is shrunk, its envelope greyish and wrinkled. On cutting through the parenchyma is brown, and devoid to all appearance of lobules; it is hard. Never does the scalpel met with that cartilaginous hardness as in cases of genuine cirrhosis.

I have never seen a case of cirrhosis in the tropics, and I believe it to be of rare occurrence.

The liver appears to have lost all its functional activity, and thus gradually to have arrived at a state of atrophy. Long exposure to malarial influences would seem to produce the same effect on its tissue as indulgence in alcoholic drinks ; in fact, the gin-

drinker's liver is a counterpart of its condition in marsh cachexia and chronic dysentery.

Hyperæmia of the liver is the starting-point for all consequent alterations of texture, and precedes the formation of pseudoplasms. This hyperæmia, congestion, or increase of volume is very common in hot climates, and may be to a certain extent compatible with the conditions of health.

It may exist independent of, or complicated with, dysentery or marsh fever. The alterations which indicate this condition seldom present themselves singly without some complication arising from one or another of these causes—without some lesion of another organ, as of the kidneys, spleen, &c.

There may be some difficulty in liver diseases of old standing in tracing the cause of certain alterations in its tissue, whether they be owing to influences of climate, to malaria, or to dysentery, or even to alcoholism, since all these influences may be found united in the same individual. Frequent attacks of congestion of the liver do not of necessity end in hepatitis.

We are frequently consulted in cases of this nature. A man after great fatigue, or some excess, or without any evident cause, complains of pain in the right side, with a sense of uneasiness extending up to the right shoulder and increased on pressure.

The liver appears congested; he complains of no fever; there may be headache or some dyspepsia.

This man most probably has suffered on former occasions from slight marsh fever or dysentery.

Such patients may be cured in a few days by the observance of a proper diet, rest in bed, the use of baths, emollient cooling drinks, as cocoa-nut water, which contains a large quantity of nitre, and some slight purgative. In some cases it may be necessary to apply a few leeches to the anus, or cupping over the liver.

HEPATITIS

Is a special liver disease, deriving its origin from a local cause, from some element of infection, a miasma which would appear to be almost identical with the local cause which generates dysentery.

The two diseases frequently occur in the same place, and in the same person. The one depending on, and mutually influencing the other. The same conditions under which the two diseases are developed prove the affinity that exists between them.

However, the relation that exists between them, although frequent, is not a necessary one, as there are localities where dysentery is endemic, and yet hepatitis is not present, or is only accidental, while there are others where hepatitis exists independent of dysentery.

Hence we may conclude that the two diseases, although they may be connected by one endemic origin, must be regarded as distinct pathological expressions of the same cause.

The repeated attacks of hepatitis being more intensified in certain localities than in others, as we observe along the coasts of Africa and in certain parts of India, and its tendency to relapses, impart to it the character of an endemic. It has been supposed that

hepatitis is a probable consequence of dysentery; that the inflammation is propagated by continuity from the ulcerated intestinal mucous membrane to the substance of the liver, through the medium of the radicles of the venæ portæ; however, facts do not confirm this theory. The opinion of Annesley that hepatitis in the East Indies is generally anterior to dysentery has been confirmed by Morehead, who has described nineteen cases of liver abscess without previous disease of the intestine, and seven followed by secondary dysentery.

He considers with respect to hepatic abscesses which are occasionally met with coincident with dysentery in hot climates, that the cachexia consequent upon a long residence in these regions is capable of being the determining cause of hepatitis. But there are many who will differ from Mr. Morehead on this point.

That a continued heat in a tropical climate must have a marked but not an essential influence we cannot doubt; but do we not sometimes meet with cases of hepatitis in temperate regions, even in the depth of winter?

Both in the East and West Indies, cases of abscess of the liver occur in Negroes, Creoles, and even Europeans, who have never betrayed the least sign of cachexia, and many who have suffered from the worst form of cachexia consequent upon marsh fever and dysentery, have never suffered from hepatitis, or from hepatic abscess.

Increase of volume, softening, and a dark brick-dust colour are the usual characters and anatomical signs of hepatitis. The stomach, contrary to what might be expected from its proximity, is but slightly, if at all, affected, while the condition of the large intestine is such as might be expected from the affinity which exists endemically and pathologically between dysentery and hepatitis. All who have practised medicine in the tropics must agree with Annesley that the appearance of the red papillæ projecting from the grey-coated tongue, which soon becomes brown, or of a red brick-dust colour, is highly diagnostic of the incipient stage of hepatitis. Whenever I had observed, especially in the coloured race, the vivid red of the border of the tongue extend over the entire surface, I have suspected with good reason the existence of hepatitis.

The acute stage sets in with fever. An acute pain is felt at one particular spot over the region of the liver, or at some distance from it, so acute and lancinating, that it will compel the patient, while his breathing is anxious and interrupted, to draw himself up in a heap on his right side, to gather himself as it were around the seat of pain, so as to relax the muscles which by their tension might press upon the liver. He inclines his body forwards, and to the right, while he bends his right thigh upwards.

He has a hard dry cough, and yet auscultation

gives no sign of any affection of the lungs or of the pleura.

The countenance expresses pain, is red and excited; acute and constant fever sets in, pulse 120; skin hot and dry; respiration so painful that he diminishes to the utmost the contraction of the respiratory muscles, so that the right intercostals no longer act, and the right side appears dilated and immovable, while the left contracts with great energy.

The stomach and organs of digestion sympathise with this condition. There are nausea and bilious vomiting. If there be no intestinal disease, there will be constipation.

Should dysentery have preceded the attack of inflamed liver, then will the evacuations peculiar to dysentery cease on a sudden.

On the third or fourth day the fever may decline and the symptoms improve, and probably the dysenteric evacuations return as at first. About the same time jaundice may appear, spreading from the conjunctiva over the entire body.

It frequently happens that there are one or two exacerbations in the twenty-four hours, and the disease will terminate in resolution or in abscess.

The improvement is seldom of long continuance. Chronic hepatitis will succeed sooner or later; there will remain a feeling of weight and tension on the right side. The patient will feel occasionally on inspiration a dull pain with a dry cough. Jaundice

will appear at intervals, or remain constant, faint, yet visible. The patient grows pale, and œdematous diarrhœa will alternate with constipation, and an abscess will form when least expected.

The fever which ushers in hepatitis is, in nine cases out of ten, marked by cold shivering and *hot sweats,* while the fever of suppuration is characterised by *cold sweats.* This is an important fact for our diagnosis.

When the pain is felt at a distance from the affected part, it is said to be sympathetic.

The most important of sympathetic pains is that of the right shoulder, from the connexion between the branches of the subclavian and phrenic nerve, and this pain exists in hepatitis in the proportion of one to six. It most frequently indicates inflammation of the convex side of the liver. It usually lasts for a few days, and produces a feeling of tension, and is sometimes very excruciating on moving the shoulders. If resolution take place, this pain will disappear; if suppuration occur, it will become intermittent.

We must carefully observe the state of the pulse in all cases of hepatitis; it is the measure of the duration and intensity of the inflammation, and so long as it remains full and strong to 140, we must persevere in our antiphlogistic treatment. When it loses its force, conjointly with an improvement in the symptoms, then we may hope for resolution; but should the pulse become small, rapid, and inter-

mittent, especially should cold shivering come on, then we may be certain that pus has formed.

If we find the patient jaundiced, we may suspect that some deep-seated part of the liver is affected. In most patients there is a straw-coloured tinge of the skin, and a hectic flush of the cheek, as suppuration advances. When dysentery precedes hepatitis, then the liver affection becomes a complication; both are different effects of the same endemic cause; it is not a coincidence, but an intimate connexion. During the course of an attack of hepatitis, an abundant diarrhœa or bloody flux will often suspend all the hepatitic symptoms; and when hepatitis is intense the dysenteric flux ceases.

When dysentery is accompanied with gangrene, should any previous affection of the liver have existed, the gangrene is sure to extend to the liver.

Suppuration, so frequent in hepatitis with dysentery, is not so common in the West as in the East Indies.

Morehead calculates the mortality is as fourteen to a hundred. I have seen cases of well-marked hepatitis recover, and have known persons who, after having discharged the contents of an abscess of the liver through the lungs, enjoyed a tolerable state of health. A physician (Dr. Barrington) who had practised many years in St. Jago, the capital of Chili, assured me that the evacuation of an abscess

by the lungs was a frequent occurrence in that country.

Suppurating hepatitis may last a long time; but should gangrene supervene, or inflammation determine any violent general or local symptom, death may occur on the eighth or ninth day.

Should the collection of pus have been formed without having given rise to any violent reaction, especially if the abscess become encysted, many months, even years, might elapse before it point externally, or occasion the death of the patient.

Should an abscess burst externally, we can only hope for a cure on the condition that it had occasioned no lesion of importance. Opening through the bronchial tubes is the most frequent mode of discharge, and that which, as well as opening into the intestines, offers the best chance of recovery.

There are patients with hepatic abscess who, having experienced certain local and general improvement, flatter themselves that they are in a fair way of recovery, while they are suffering from abscess, incapable of absorption, encysted, or lying dormant until some occasional exciting cause inflames the abscess.

More frequently, the abscess is slowly pointing externally, either through the walls of the thorax or abdomen, or into some neighbouring organ or cavity.

It has been a subject of doubt whether an abscess of the liver be capable of absorption.

Nevertheless such absorption has been proved and well authenticated, not alone during life, but also by examination of the body after death.

I once attended a Spanish officer in the custom-house of Havana, who presented in succession all the symptoms of the most decided suppurative hepatitis. Pain over the liver, in right shoulder, fever, jaundice, &c.; the liver extended beyond the false ribs, and displayed a pasty appearance of the most prominent tissues, as when a collection of matter begins to point; there was even an obscure sense of fluctuation. I had twice applied the Vienna paste, at an interval of three days, over the centre of what appeared to be a tumour. When I had decided upon applying the paste for the third time, I observed a diminution of volume in the liver.

I deferred the application of the paste, observing that the tumour was gradually disappearing; nothing that had passed by the stools gave any indication that the pus had passed by the intestines.

I administered a few doses of calomel, and some mercurial friction over the side, and the man recovered, and enjoyed comparatively good health.

I treated a mulatto woman, under the same circumstances, in a nearly similar manner. I applied the caustic potash three times a week during a fortnight, administered iodide of potash internally, and all the symptoms disappeared. However, these are very exceptional cases.

On examining the liver in suppurative hepatitis

of hot climates, we find that it is studded over with a cluster of little abscesses, especially over the large lobe covered by the peritoneal lining, but the purulent focus is more deep seated. The endemic infection has tainted the entire substance of the gland, which from a state of hyperæmia and congestion has passed into that of suppurative inflammation.

It is, therefore, not to be wondered at that relapses of abscess of the liver do occur so frequently. Thus we can understand how a patient, after having to all appearances recovered from an abscess which has been emptied by an operation, or by its bursting through some natural outlet, is always exposed to a fresh attack from the development of some fresh abscess.

I knew two Europeans who had been apparently cured from the effects of suppurative hepatitis, fall victims to newly-formed abscesses some years afterwards.

I have seen livers which appeared like shells, or sacs, filled with a fœtid pus; but generally a large abscess has a spheroid form enclosed in a dense and firm cyst.

In the incipient stage of hepatitis the liver, in the parts affected, is of a reddish-yellow tinge. The redness disappears towards the edges, and becomes of a dark fawn colour.

The parenchyma in the diseased part is soft and friable; the process of suppuration appears to follow

the lobular division of the liver, according to the observations of Stokes, Andral, &c.; but we seldom if ever have an opportunity of seeing an abscess in process of formation.

The cyst separates the abscess from the neighbouring parts. Later it may serve the purpose of absorption. When the walls of the cyst approximate under favourable circumstances, it may become converted into a solid, callous rind, and there remains a cheesy, calcareous residue. In the place of the abscess we find a cicatrised depression in the substance of the gland.

Hepatitis may terminate, but rarely, in gangrene. This is generally the consequence of the introduction into the blood of a septic poison, which reproduces itself in the liver, just as happens in the lungs when, in consequence of phlebitis, gangrenous infection declares itself.

Budd mentions a case where, in consequence of mortification of the toes, gangrene appeared in the lungs, spleen, and liver.

It is not by coming in contact with the air alone that the tissue of the liver becomes gangrenous, since gangrene is more frequent in liver abscesses which have had no communication with the external air, or which had never been opened.

Hepatitis determines in other neighbouring parts lesions of a more or less serious character, which involve the peritoneum, the intestinal canal, the pleura, and the lungs.

In the peritoneum we often meet with adhesions, more or less extensive, which do not always prevent the opening of an abscess into the serous cavity.

The small intestine is frequently altered in its lower third. It is highly vascular, ecchymosed, and sometimes ulcerated patches are visible.

In the large intestine, on the contrary, deep-seated ulceration nearly always precedes fatal abscess of the liver. In twenty-nine cases of abscesses of the liver, Annesley found that twenty were owing to ulceration of the large intestine.

We can thus understand the strict relation that exists in hot climates between endemic dysentery and hepatitis.

Dr. Begnier, of New Orleans, communicated to me some time ago the result of forty-two cases of post-mortem examination on liver abscess performed by him during a practice of many years in that city.

Nine times death occurred before the abscess burst or was opened; seven times the pus had penetrated into the neighbouring organs, or into the cavities which had a direct relation with the abscess; three times into the pleura; five times through the lungs and bronchial tubes; once into the stomach; four times into the large intestine; twice into the peritoneum; four times into the cellular tissue of the abdomen, and seven times the abscess had been opened by the bistoury, and never once burst externally.

Whenever attacks of fever of an intermittent

malarial type occur in a tropical region, we must carefully examine the condition of the liver, as hyperæmia is the starting-point of all alterations in that organ. It is of great importance to form a just diagnosis before we adopt the proper treatment of hepatitis, which is either medical or surgical.

The former is simple, and consists in local bleeding and tartar emetic. General bleeding must be avoided, since it tends to increase the tendency to anæmia, and because the frank character of true inflammation does not exist, or is greatly modified in tropical climates.

The liver is not only an organ of secretion, but also of circulation; and when we consider its great vascularity, and the rapidity with which inflammation is developed in its substance, our first step should be to evacuate a considerable quantity of this circulating blood, which passes through it, and the quantity to be removed will depend on the nature of the case, and on the constitution of the patient.

In hot climates the lung performs its function slowly, and is not often morbidly affected; but the liver acts with energy although frequently disordered.

In hepatitis—one of the phlegmasia of the torrid zone—the phlegmonous element is not genuine; the uncertainty of being able to prevent the formation of pus, must compel us to hesitate before we bleed.

The consequence of which might render convalescence more tedious, or aggravate that state of cachexia and adynamia which suppuration of the liver is sure to produce.

However, local bleeding, especially when applied to the anus, is often of great advantage. A few leeches over the liver may relieve pain ; emollient poultices, mercurial ointment, and general baths are useful whether inflammation tends to resolution or to suppuration.

Mild purgatives, manna, castor oil, &c., are valuable in the first stage of hepatitis.

Tartar emetic will act as a substitute both for general and for local bleeding. Tolerance is soon established, and followed by resolution. The tartar emetic plan is far superior to the mercurial, especially when the affection of the liver has no connexion with dysentery.

But in the treatment of this disease no general rule can be laid down. It must be modified, according to circumstances, to the stage of the disease, the constitution of the patient, and the nature of its complication.

If there be any malarial complication we must administer quinine in large doses.

If local bleeding be required we must be entirely guided by the tension and hardness of the pulse.

We must employ tartar emetic as a counter-stimulant and sedative, and while we endeavour to attain the tolerance of the drug, carefully to avoid

its emetic action, as vomiting as well as excessive purging might prove dangerous. Calomel must not be given until inflammation has subsided, and then combined with opium. The tartar emetic is to be given after local bleeding has been employed. If these means be not effectual to check inflammation, should the pain still continue, and respiration embarrassed, apply a large blister to the side, should there be no symptom of suppuration.

In such cases rub in the mercurial and belladonna ointment, which favours absorption.

The blister must be employed with discretion. It may be too stimulating at the onset, and useless when the abscess is forming. If, in spite of all the means adopted, cold shivering and cold sweats indicate suppuration, we must change our plan of treatment. We must confine ourselves to combat the general symptoms and the complications, watch over the progress of suppuration, and direct our attention to the direction towards which the abscess tends to point.

As to the surgical treatment of an abscess of the liver; as to the most approved method to be adopted to enable us to detect its presence, its situation, whether it be deep-seated or superficial; the diagnosis we should form from the nature and site of pain, whether it be local or sympathetic; how to decide whether adhesions have formed, the direction towards which the abscess may point, and, finally, what are the rules which should guide a surgeon in

the opening of an abscess of the liver—I must refer the reader to some of our best works on surgery.

Dr. Cameron, encouraged by the practice of Murray and Halkett, in India, does not hesitate to plunge a trocar deep into the substance of the liver, not only in cases where an abscess is certain to exist, but also where its existence is only suspected.

He assures us that when on exploration no matter has been found, no accident has ever resulted from the puncture, and even a diminution in the size of the liver has been the consequence of the operation.

He contends that the patient is infinitely less exposed to danger from the operation than by allowing time to the abscess to destroy the substance of the liver before it points, or by allowing hectic fever to consume his strength.

He simply thrust a middle sized trocar into the point of the abscess nearest to the integuments.

Dr. Cameron quotes several cases in which the plan has been entirely successful.

Dr. Templeton has frequently explored the liver with a long needle, or with a fine trocar : he has never met with any unfavourable result, even in cases where no pus was found to exist.

On the other hand, Dr. McLean never met with but one fortunate case after puncture. He declares that sooner or later the tissues surrounding the spot punctured, mortified, and death was the result.

It is difficult to comprehend how a plan of treating surgically an abscess of the liver so successful

in the hands of one man should prove so unlucky in the hands of another. If the principle which directs us to puncture an hepatic tumour, whether it contain pus or not, be a sound one, its application should be general; and when its application is not attended with success, this frequently arises from some unfavourable condition of the patient to be operated on, owing to some accidental, local, or constitutional causes, especially in tropical climates. I recommended to some colleagues in Havana Mr. Henry Smith's plan of operating in piles, as eminently suited to tropical climates, as it avoided hæmorrhage.

The operation was successfully performed three times by one Spanish surgeon, but in the hands of another the operation proved fatal. The fact is, the patient, an infirm, cachectic old man, should never have been operated on at all.

I would advise all who are not possessed of sufficient self-confidence, and who are not certain of their diagnosis, to apply over the suspected site of the abscess the caustic potash, or the Vienna paste, instead of having recourse to the knife.

JAUNDICE.

DIFFERENT KINDS.

THE consideration of diseases of the liver in tropical climates naturally leads to that of a disease which arises from the presence of the elements of the bile—viz., to that of icterus or jaundice.

If the essential character of jaundice consist in a deposit of bile in the urine, then is the term "*icterus*" very inappropriate, as it is frequently employed to designate diseases in which the elements of the bile do not exist, and every discoloration of the skin consequent upon some morbid state of the system, and thus it serves to confound many distinct pathological conditions, and to assimilate certain well-defined diseases of hot climates with others of an entirely opposite character in temperate ones.

Europeans imagine that the tropical races, and those who have long resided amongst them, must be swarthy and jaundiced, owing to a modified state of the biliary functions. No doubt the condition of the liver, modified by climate, must have a certain influence, but we must attribute to great

heat and solar light the various transitions of shades of colour which we observe in those races when in health.

We shall, therefore, pass in review some of the different morbid conditions of the body under which jaundice, either true or apparent, declares itself.

Endemic malaria first produces a state of hyperæmia, or of active congestion of the liver; next hypertrophy, with induration. To this state may succeed acute atrophy, with softening, as a consequence of frequent relapses of fever, and of long duration. When the liver becomes pale, discoloured, and anæmic, albumen is detected, not bile, in the urine. The function of the liver is arrested. This marsh cachexia produces a discoloration of the skin, and alterations in the liver similar to those produced from the same causes in the spleen. In some cachectic patients from malarial causes we meet with cases of true jaundice, as detected by nitric acid in the urine, but in most cases the jaundiced hue of the skin is independent of all bilious suffusion.

The cachexia consequent upon chronic dysentery is one of a special character — a dry cachexia —by which it may be distinguished from marsh cachexia. The skin is harsh, wrinkled, and scaly. In the white man it assumes a dirty yellow, similar to what is observed in cirrhosis. The alteration in the liver is characteristic; it is atrophied.

Hyperæmia or congestion of the liver is frequent

in hot climates, may be independent of endemic disease, and when due to the influence of climate may determine a hypertrophy of this organ, with or without jaundice, slight or permanent, transitory or persistent, not incompatible to a certain extent with the conditions of health.

There are many acute and chronic diseases accompanied by jaundice; and even in temperate climates we meet with fevers from purulent infection, some affections of the brain, and in lead poisoning, with intense jaundice, and nevertheless the urine treated with nitric acid gives no evidence of the presence of bile.

If we attribute the jaundice to the presence of bile in such cases, then must the colouring-matter of the bile have undergone such modifications as to render it incapable of being acted on by nitric acid.

We must remember that the liver is not alone an organ of secretion, but also of sanguification and of depuration of the blood. Its functions are intimately connected with the maintenance of animal heat and of the nutrition of the blood and the tissues.

Now when the liver is exposed to the varied, exaggerated, and destructive influences which are constant in tropical climates, affecting its circulation, its consistence, its substance, and its enervation, we must expect as a natural effect that its secreting powers will be greatly diminished and

impaired, if not altogether arrested. We must also bear in mind that all the constituents of the bile are not produced or generated by or in the liver itself; there are some that exist or are generated previously in the blood, hence when the secretion of the bile is arrested the biliary products of the liver are deficient, while such as should be excreted will accumulate in the blood, as their excretion is impeded.

Hence biliverdine accumulates in the blood, and the serum of the blood becomes saturated with the pigment. The skin becomes jaundiced, of a deep yellow, the urine becomes saffron-coloured, from the elimination of the colouring matter through the kidneys ; and this jaundice, peculiar to the grave fevers of hot climates, to various grades of inter-mittent and yellow fever, is independent of the presence of the acid constituents of the bile.

The urine affords a bile pigment, but no bile acid reaction.

When the urine in yellow fever is treated with nitric acid it gives no green reaction ; but should a favourable change take place in the second period, and the function of the liver is restored, then to renal icterus would succeed a true bilious icterus, and then nitric acid will produce the desired re-action.

The bilious remittent fever of hot climates is accompanied by true jaundice. The urine, which is often black as ink, or a strong infusion of coffee,

owes its colour to the presence of blood as well as bile; hence the addition of nitric acid produces a greenish tinge and a precipitate of albumen. Jaundice from enervation or suppression of bile in the liver, from obstruction or obliteration of the hepatic or choledic ducts are to be met with as frequently in hot as in cold climates. I have seen gall-stones frequently pass away in the coloured as well as the white race.

Having passed in review a few of the principal diseases of which jaundice is symptomatic, let us now consider jaundice as an independent idiopathic affection.

Jaundice in the Negro, however intense, shows with difficulty on the skin, which becomes of a dirty green colour.

In the Mulatto, the skin, which is naturally yellow, becomes of an orange colour; in both the jaundice is more visible on the palms of the hands and the soles of the feet. In the conjunctiva it is still more manifest, the yellow strongly contrasting with the swarthy skin.

It might be supposed that in climates which impress on the hepatic gland an increased activity, where the pathological conditions impart to disease a malignant character, uncomplicated jaundice would be more frequent, and yet this is far from being the case.

Grave jaundice is not ushered in by fever, or by any severe symptoms. One of its first symp-

toms from the very onset is true jaundice. The urine, which is seldom suppressed, always contains a large quantity of bile, and is detected by nitric acid. The alteration of the liver, diminished size and weight, arises from the destruction of the hepatic cells; the parenchyma shrinks, and the capsule of Glisson becomes opaque and shrivelled, like a sac too large for its contents.

If in the course of this disease we detect any alteration in the size and consistence of the liver, this must be referred to diffuse hepatitis. But when the inflammatory process, if not arrested, proceeds by rapid progression to cell destruction, then atrophy of the liver succeeds.

Grave jaundice, according to the opinion of some eminent writers, consists in diffuse hepatitis and acute atrophy of the liver. This hepatic lesion, however, is of secondary importance, as may be observed in certain cases of malignant typhoid jaundice, in which the liver is intact. The dangerous nervous symptoms, which cannot be explained by the state of the brain, or of its membranes, must be referred to the alteration which has taken place in the composition of the blood, although nerve influence, or enervation, may have great influence over the secretion of a gland, either by increasing, or by diminishing, or arresting the secretion altogether.

This alteration in the blood cannot be accounted for by any change in the liver or kidneys, nor is it

the consequence of biliary intoxication, nor from any hepatic lesion, but rather from a sudden arrest of the blood depurating functions of the liver.

The liver is not only a bile-secreting organ, but also a blood-depurating organ, which latter function cannot be arrested by external or internal causes, without seriously damaging the composition of the blood, and, through this, the function of the nervous system.

It is worthy of remark, that an alteration in the composition of the blood is common to nearly all diseases, which tend to produce a lesion in the texture of the liver. Jaundice, hepatitis, yellow fever, intermittent fevers, are characterised by a tendency towards dissolution of the elements of the blood and to hæmorrhage.

It is not, therefore, the special disease, it is the liver, or its disordered function, which is the cause of hæmorrhage in all blood diseases.

I believe that icterus gravis has more influence over the blood-producing and purifying, than over the bile-secreting functions of the liver, and that the part which this latter performs in this change in the composition of the blood, may be proved by the many diseases which owe their origin to it.

Dr. Budd considers that the nervous phenomena consequent upon an attack of grave jaundice, are to be attributed in great part to a lesion in the liver, the cellular elements of which become dis-

sociated, and, when reabsorbed, go to increase the alteration of the blood.

Let us suppose a case of grave jaundice, in which no destruction of the hepatic cells had taken place; the kidneys had undergone no change, where no signs of acute atrophy are perceptible. In such cases, where we can detect no such alterations after death, we must seek for the cause of the disease outside of, not in, the liver. It is, therefore, probable that in the case of typhoid jaundice, which invades suddenly, with all the signs of moral and physical prostration, from the moment of its invasion, that some morbific agent from without, or generated within the system, first attacks the nervous system, and through that the entire system.

But this poison may prostrate the patient so suddenly, that he may sink, without presenting any alteration in the liver or any other orgasm.

We must, therefore, conclude that cellular destruction is not in all cases the cause of the primary poisoning of the blood.

Now these primary disturbances, this great sudden depression of the nervous system, are characteristic not alone of typhoid jaundice, or icterus gravis, but of cholera, yellow, bilious, remittent, and hæmorrhagic fevers, &c. There exists, so far as symptoms and local causes are concerned, a certain analogy between these diseases and icterus gravis.

The morbific poison appears to derive its origin from the same local and hygienic conditions in all these diseases. Filthy, unhealthy localities, under the influence of great heat and moisture, may possibly develop this element, in the same manner as typhus is generated by overcrowding.

Certain atmospheric and local conditions have an active influence in the production of jaundice, as well as of bilious and of yellow fever, &c.

It is difficult, in any other way, to account for these epidemics of grave jaundice, than by admitting the existence of these influences—which in one year may produce, under the dominion of new local causes, an epidemic of yellow fever; and may give rise, in the next, to an epidemic of icterus gravis.

The admirable description of disease given by Sydenham, and the treatment so well adapted to his time, could scarcely be applicable in our day.

The diseases he so admirably described are not different, but their type becomes altered, owing to a change in our meteorological and social condition, from an improved condition of land cultivation, and an improved system of hygiene.

A Danish physician, who had practised many years in the island of St. Thomas, in the West Indies, once told me, that the type of yellow fever yearly underwent a change; that the calomel treatment, so useful in one epidemic, was injurious in the next, the type always varying, owing to some unaccountable local and atmospheric changes.

YELLOW FEVER.

A RESIDENCE of some years in Havana, that endemic focus of that terrible disease, enables me to describe it faithfully, in all its varied phases and stages.

My first acquaintance with yellow fever shall ever be associated with unpleasant recollections. For, with the view of gaining some practical knowledge of it, I attached myself, soon after my arrival, to one of the principal " Casas de salud," in Havana, for a fixed stipulated time. But before the time agreed upon had elapsed, I was desirous, owing to the fatigue and inconvenience attendant upon an early attendance at this hospital, to relieve myself from my duties, to which the authorities would not consent, so I was compelled to act the part in Molière's play of the " Médecin malgré lui." Yellow fever is endemic in the large Antilles, Cuba, Havana, New Orleans, the Coast of Florida, and Mexico, and prevails occasionally as an epidemic in the smaller Antilles, Jamaica, St. Thomas, Martinico, &c.

When yellow fever has invaded these islands, under conditions favourable to its development, it

rages with great severity, and is particularly fatal to Europeans.

While, under unfavourable conditions, during periods of immunity, we may sometimes see patients who have come from the endemic focus, die from yellow fever, still, it does not extend its ravages, except in very rare instances.

Yellow fever is a specific infectious disease, capable of reproducing itself, with the same character and intensity as in the endemic focus itself. It has two distinct stages—the one of reaction against the infectious poison, the other of depression, of ataxia, simulating nervous hæmorrhagic and putrid fevers, and this stage constitutes the pathological character of the disease.

It differs completely from marsh malaria, which is endemic in all parts of the globe, while the endemic focus of yellow fever is confined to certain localities.

Marsh fever is concentrated in one focus ; yellow fever radiates far and wide. It is imported or conveyed by man, by the clothes he wears, merchandise, or trading vessels. It creates for itself a new focus of infection far from the original one.

Such is not the case with malarial fever, although in some localities and in some epidemics it may take on the type of yellow fever, of jaundice, &c., a complication of marsh fever which is particularly fatal to infants, to Negroes, Mulattoes, and the Creoles, but does not affect European in ports, nor

such as are setttled down in large towns. Although the two diseases may lead to some confusion from the similarity in the symptoms, still they are always to be distinguished one from the other by their effects.

Yellow fever in its complete form never attacks the same individual twice, while marsh fever creates the disposition to fresh attacks, and determining a special cachexia, which yellow fever never does.

Yellow fever prevails along the sea coast, at the mouths of large rivers where they empty themselves into the sea. Does it emanate from some organic source near to the sea? Yet there are many tropical regions—as in India—where the conditions favourable to the production of yellow fever exist, and where the disease is unknown.

Yellow fever, like cholera, must have for its origin a special miasma, unknown to us in its essence and the conditions of its birth. Where it is endemic, heat tends to develop it with greater intensity; as in the winter season, which, in Cuba, extends from July to October—the season of rains and of storms, when the conditions of heat and moisture are at their maximum, and the hot oppressive southern winds frequently alternate with those from the east.

The combined action of the meteorological elements, heat, moisture, electricity, atmospheric pressure, &c., probably predispose to the disease by the atony and languor they impress upon the

organism, or possibly all collectively and directly combine to develop the disease.

It would appear, however, that great heat has no decided influence in its development, since we find that in the West Indies yellow fever often rages in the cool season between the months of November and February.

I have known very fatal cases to occur in the cool months. Indeed, it is generally believed in Cuba that yellow fever in the cool months is more dangerous than at any other season of the year.

The hot south and west winds, in the winter season in the West Indies, appear to possess a fatal influence, not alone in the production, but also in the extension, of yellow fever. So soon as these winds begin to blow, the aspect of the yellow fever wards, at least, those with which I was connected in Havana, began to change, and became more sombre and sad.

All improvement ceases, convalescence is arrested, and all the symptoms become aggravated.

The influence of electricity was also injurious to the patients in the wards during these frightful epidemics. Whoever has had any experience in yellow fever must have noticed that patients, not only in the second grave stage, but also those who had bordered on convalescence, and who had reached the seventh day of the disease, pass suddenly during a thunderstorm into a state of imminent danger.

So soon as the thunderclap became audible, delirium and black vomit set in, symptoms of ataxia soon followed, and death took place with frightful rapidity.

Insolation is as frequent a cause of yellow as it is of intermittent fever. Excesses in diet, indulgence in alcohol, venery, the emotions from fear and sorrow, have great influence in the production of the disease. Nevertheless, many who live lives of temperance and of sobriety often fall victims. Europeans lately arrived are greatly exposed. Troops in garrison and the crews of men-of-war and of merchant vessels suffer most severely; in fact, yellow fever commits greater ravages in the harbour than on shore.

But the predisposing cause is especially the want of acclimitization. The longer a European resides in the West Indies, the greater will be his chance to escape the disease; although the modifications which the influence of climate slowly impress on the economy do no more insure an immunity than do the pathological conditions undergone by patients who have suffered from fever, or from dysentery, insure them from fresh attacks of these diseases.

Immunity against an attack of yellow fever is absolute only upon one condition: that the new comer had already suffered from a previous attack of the disease.

Should this condition not have been fulfilled,

you may see on every fresh break-out of an epidemic Europeans fall victims to the disease, although they may have resided there for many years.

I knew an instance of a Spaniard having been carried off by yellow fever after a residence of sixteen years in Havana.

The Creoles are not so frequently attacked, owing, probably, to the fact that they are impregnated with the principle to which the endemic owes its existence. Nevertheless, when yellow fever appears as an epidemic, and that accidentally and at long intervals, the natives are attacked as well as the Europeans, and all classes of the population are exposed to its ravages.

How is yellow fever transmitted? It may be communicated, as we have said, by merchandise. An infected vessel, loaded or in ballast, contains in its timbers all the elements of the disease, capable of reproducing it wherever the vessel may cast anchor, supposing the population predisposed by those general and special conditions by which the disease is evolved.

Hence the necessity of adopting severe sanitary precautionary measures.

In the year 1872 there was not a single case of yellow fever in the port of Matanzas, in Cuba, when a vessel just arrived from Pensacola, U.S., an infected port, cast anchor in the harbour; three days after that another vessel hove alongside to take in a part of her cargo; two days after the cargo

had been stowed away, three of the sailors were seized with yellow fever, which communicated to the entire crew of twelve men, all of whom died, excepting the captain and two men. An English schooner laid at anchor to the leeward of the first-mentioned barque from Pensacola; twenty-four hours afterwards she sailed for New York; in her passage, yellow fever broke out, and she lost five of her crew.

We know from experience that a vessel cannot be attacked by yellow fever in the open sea in the latitude of an infected port unless it has had communication with that port. Hence the absolute necessity, during an epidemic, of completely isolating the vessels in the harbour. The most effectual plan is to put to sea at once—a plan which all our naval commanders are ordered to follow, on the very first appearance of yellow fever wherever they may be stationed.

The British flying squadron, composed of six ships of war, arrived in the port of Havana from Jamaica, April, 1874; four hours afterwards, on being informed that yellow fever had broken out, the commander issued orders that the squadron should immediately sail north.

The invasion of yellow fever is rarely sudden. The patient complains of lassitude and of a feeling of discomfort. He is sad and anxious, and desires to retire and be alone. (I have sometimes compared this state to that of a dog suffering from

M

hydrophobia; he sneaks into a corner and is snappish.) The patient loses all taste for food; he feels darting and fugitive pains in the head, bursts of heat, and a feeling of constriction about the temples.

These premonitory symptoms may continue for some days, when the patient may be suddenly seized, usually during the night, and the first stage of yellow fever, that of reaction against the poison, becomes established.

The pulse is full, regular, and bounding; thirst generally extreme. The mucous membrane of the cheeks, gums, and pharynx are of a vivid red.

The tongue has a red border, moist, coated with a thick greyish coating, brown and dry in the middle.

He complains of a violent, even furious headache. The temples feel as though compressed by a band of iron. The movements of the eyeball are painful, and the orbit is the seat of an acute, deep-seated pain.

He soon feels pains shooting down the dorsal and lumbar spine, the pains from the loins, which are constant and severe, radiate towards the hypogastrium and abdomen.

In this condition I have often seen sailors walk for a distance of one mile from the port of Havana to the hospital; they looked bloated and excited, but not intoxicated; stupid, anxious, and dejected.

In this first stage the face, from being pale and bathed in perspiration, becomes animated and puffy.

The cheeks take the tint of a clear mahogany. The eyes are moist, watery, and shining, and very sensitive to light. The conjunctiva red and injected. The countenance expressive of great stupor and dejection, especially if the patient be full-blooded. He complains of pains in the limbs and the joints; painful contraction in the legs and feet ; he often shudders and feels nausea ; the skin may be bathed in perspiration, yet the temperature is not modified.

There is great congestion in the lower intestine. The anus is often surrounded with a rose-coloured ring, the result of bloody infiltration. In grave cases the redness is persistent, and we often find the part excoriated. The abdomen is soft, without pain, but the epigastrium is painful on pressure, the seat of great discomfort and anxiety.

Constipation is the rule; the urine is generally limpid, and passed with a sensation of burning. These different symptoms, which are by no means constant in the first stage of excitement, may continue about three days. In the second stage, the symptoms are those of prostration and ataxia. This period is usually preceded by a remission. The headache, pains in the limbs, bones, joints and epigastrium are relieved, the fever abates, the skin becomes soft and warm, and sleep returns.

These symptoms may announce convalescence, but they are often insidious, and the calm which succeeds during eight or ten hours, reckoning from

the third to the fourth day, may deceive the physician as well as the patient.

The face from animated becomes pale and yellow; the mahogany colour of the cheeks changes to a deep brown. The finely injected conjunctiva becomes of a deep yellow. The jaundiced hue of the face spreads over the neck and limbs, the chest, and the entire body. This characteristic change of colour is more marked on the fifth day.

This yellow hue of the skin is seldom of a deep yellow; it is sometimes straw-coloured—a shade I have always regarded as a fatal omen.

Should this yellow tinge not betray itself during life, it is certain after death; after passing through many gradations of shade it will blend at last with stains of a violet colour. This yellow suffusion is always accompanied with a slow irregular depressed pulse; the artery feels more elastic, as though distended by a gaseous fluid.

As the stage of prostration advances, the intense pain of the head, of the eyeballs, the pains over the loins and in the joints become more supportable.

The tongue is greyish and parched; the lips are dry, brownish; the gums and teeth are black or smoke-coloured.

The mucous membranes of the cheeks and gums are excoriated, so that from the edges of the tongue blood oozes out. The breath is fetid, the belly is soft and indolent, slightly meteorized, and there is often hyperæsthesia of the skin.

Pain in the epigastrium is almost invariably present, and the patient will scarcely bear the weight of the bed-clothes; this pain precedes and accompanies the act of vomiting.

What is vomited consists of the fluids imbibed, mixed more or less with bile; it soon becomes grey, streaked with brown black matter. This black vomit occasionally alternates with pure blood. A patient may vomit thirty or forty times in the twenty-four hours, or he may die without having once vomited, but the black specific matter will always be found in the stomach. The bowels may be obstinately confined, and in some cases the stools are composed of dark matter mixed with blood.

This black vomit is the product of hæmorrhage from the mucous membrane of the stomach, varying in consistence according to the nature of the ingredients with which it is mixed.

This passive hæmorrhage may ooze from the surface of all the mucous membranes, in the cellular and muscular tissue, and from the skin. The slightest solution of continuity may give rise to a considerable and even uncontrollable loss of blood.

Hæmorrhage may proceed from the tongue, stripped of its epithelium from the gums, cheeks, and pharynx.

Epistaxis may sometimes prove fatal. Patients have been known to have lost two quarts of blood by exudation from the tongue alone, and as much by the nose, and yet to have recovered.

The mucous membrane of the stomach is the principal conduit open for the exhalation of blood. Black vomit is the product of this, more or less modified by the acids of the stomach, by the nature of the liquid imbibed. I have seen a sailor vomit up three quarts of pure blood.

The mucous membrane of the large intestine also affords an abundant exudation of blood. The motions are black, like coffee grounds, and very fetid, and are sometimes accompanied by tormina and tenesmus, as in dysentery.

Patients who suffer from hæmorrhage by the rectum have such an expression of countenance as we observe in algid pernicious fever. The eyes are sunk and hollow, face pinched in, pulse filiform, skin bathed in an icy, clammy sweat, the breath is cold, and life hangs on a thread. Blood may exude from the surface of the vagina and uterus, but blood never oozes from the kidneys. In this latter character yellow fever differs from bilious remittent, in which blood in the urine is an essential element.

Blood is often infiltrated into the cellular tissue, or into the very substance of the muscles. These effusions are preceded or attended by a feeling of constriction and uneasiness, followed by an acute pain in the spot where ecchymosis is about to take place. As infiltration increases, so does the size of the limb, and the temperature lowers. The distended skin is shining and acutely sensitive; in some cases incisions may be required.

Petechiæ are always observed over the limbs, trunk, and especially the chest. We sometimes observe large rose-coloured warts, irregular in shape, over the yellow skin, or dark blotches. These must be attributed to decomposition and stagnation of the blood in the capillaries.

Besides the tendency to hæmorrhage and to the extension of yellow suffusion, the presence of albumen in the urine forms another important character of this stage of yellow fever. This albumen in the urine has no connection with any lesion of the kidneys, which are found in a healthy state, as in cholera and other grave endemics, but is to be attributed to decomposition of the blood.

Suppression of urine may be observed in yellow fever as well as cholera, but less frequently in the former. Should it occur at the onset in yellow fever, the symptom is fatal.

Brain symptoms of the nerve centres are not frequent, but may appear at the close of the second stage. They are in no way connected with fever. These nerve symptoms assume a variety of forms. The delirium of the patient may be of a gay, or sad, or of a furious character.

They usually declare themselves at night, and may be constant or intermittent. The patient, if not strictly guarded, may jump out of the window. I have known a case where a sailor escaped from his ward and threw himself into a well of water.

Or there may be stupor, or coma may precede or

follow delirium ; convulsions may be a last compli-
cation, with hiccup and subsultus tendinum.

In some cases the sensibility of the skin is so
exquisite, that even a contact with the bed-clothes
will excite pitiful cries. Some will cry out at inter-
vals for two or three days before death; they can-
not explain their sufferings, although in the full
possession of their senses. Many of those symp-
toms depend on the character or constitution of the
patient.

I have observed a great difference in the manner
of invasion, and in the type of yellow fever, in the
inhabitants of the north and south of Europe—
between the Englishman and the Spaniard.

Side by side with these dangerous cases, we are
occasionally called to attend some very mild cases.
So much so, that we almost hesitate to regard them
as a form of yellow fever. This is an incomplete
form and liable to relapse, the period of fever or
of reaction being the only one that has attracted
our notice, owing to the mildness of the symptoms.
When a rapid succession of dangerous symptoms
takes place, this appears to constitute only one
period or stage. But, generally speaking, we are
enabled by the protracted evolution and greater
regularity of the disease, to recognise a second
stage, distinct from the first, and between these two
stages there exists a remission or suspension of the
phenomena of the disease, which is but a truce of a
very short duration.

Yellow fever, when complete, when it passes through its two stages, usually lasts from four to nine days; death after the eleventh or thirteenth day is the exception.

In this last case there are usually some complications of a typhoid character, or of any disease that might at the time prevail as an epidemic, such as dysentery or marsh fever.

The disease may be prolonged beyond the twentieth day, when the patient is often carried off by abscess of the carotid glands, gangrenous abscess, or bed sores.

Mild or incomplete yellow fever, or what may be called the fever of acclimitization, may last two or three days only. But in these grave fulminating cases, when the patient dies as it were in harness in a few hours, there always has existed some latent affection which the patient has disregarded.

Those sudden and violent deaths from yellow fever usually occur in strong, robust, hard-working men.

I once saw an American sailor vomit black matter as he walked to the hospital, where he died some hours afterwards. This man, who had worked to the last, had overlooked the first symptoms, and gave in when it was too late.

The mode of death differs in different cases. Sometimes the patient dies in a state of painful anxiety. In others he experiences a deceitful calm or improvement, the calm preceding death. Another

will expire after a black vomit, his intellect remaining unclouded to the last. Many have a presentiment of death, and die with perfect resignation.

Young men are sometimes a prey to exhausting illusions, or to a furious delirium ; while in other cases convulsions succeed to black vomit and the scene closes.

Death from syncope is often preceded by that deceitful remission, which I have mentioned, between the first and second stages. This deceitful improvement may occur after a sound sleep, and death may follow or be determined by the patient attempting to get out of bed and dress himself.

There are patients who last a long time, although blood is constantly oozing from the mucous membranes, or through the denuded skin, and who keep counting without the least ray of hope, and with an unclouded intellect, the hours of their protracted agony.

Death from asphyxia is a frequent termination. The face becomes tinged, the veins of the neck swell out, the breath is cold, loud tracheal succeeds to mucous râle, and motion and sensation become extinct.

In this stage I have seen patients try to rise from their beds, fall back, become rigid, and die in the act of vomiting black matter, or while battling with the attendant who endeavours to keep him down.

" It is an awful sight to witness the agony, accom-

panied by screams extorted by pain and suffering ; to hear the incoherent words and the mutterings of delirium ; to see the patients with their faces yellow, pinched in, and smeared with blood and black matter; their eyes red, blearing, and haggard ; their bodies and their linen soiled with the blood from hæmorrhages ; to see them jump out of their beds, roll themselves upon the ground, twist themselves into frightful contortions, still preserving their senses in the midst of all these disorders of the body, while in vain do they call upon the medical attendant to relieve them from their suffering."

Such is the picture, true to nature, painted by Cornilliac, of the dying scene of many patients from yellow fever; and such I have many times beheld, in the wards devoted to yellow fever patients, in one of the principal " Casas de salud" in Havana.

Is yellow fever subject to relapse ? There are many who believe in the possibility of such. I am of opinion, that in those who have passed through a mild and incomplete attack, relapses may occur, but not in those cases in which the disease has been complete in its two stages.

I am convinced, from experience, that yellow fever, which has not passed through its two periods, does not preserve against an attack in a grave and dangerous form, and that the complete form is never followed by a relapse.

The prognosis is very unfavourable. In mild

cases, the mortality is as one to three; in the complete form, is as seventy to a hundred.

When the pulse is quick and irregular at the onset, the tongue tremulous, respiration anxious; when the appearance of the yellow tinge comes on suddenly, and black vomit and hæmorrhages take place; when we detect albumen in the urine, or when the urine is suppressed; when there are early symptoms of coma and ataxia, sighing, hiccup, or general convulsions; and especially when that dreadful remission, or general calm at the close of the first period, makes its appearance, then the prognosis is bad, and the danger imminent.

However, we must be cautious in forming a prognosis. A patient may, to all appearance, be seized in a mild form, yet die suddenly, while another, with the most alarming symptoms of hæmorrhage and black vomit, will recover. Neither must we be deluded by false hopes, in the absence of black vomit.

In the year 1872 I casually paid a visit of etiquette to the accomplished wife of the late American consul, who resided at some short distance from the city of Havana. I found the lady, who had lately arrived, seated at a window, which overlooked some fields bounded by an extensive wood. She looked pale and anxious, complained of chill, and of experiencing a sensation which she had never felt before, a wild, yet sad presentiment of some impending calamity. I requested her to

retire immediately, and seek repose in her bed, from which she never rose again. She died from ataxic yellow fever of the worst type, four days afterwards,—hæmorrhage having taken place from all the outlets of the body, excepting from the mouth,—even previous to death, owing to a complete dissolution of the blood.

There is one symptom, which I have always considered of great value, to enable us to form a just prognosis, and such as present the symptom seldom die from yellow fever. It is the appearance of a true jaundice, differing altogether from the peculiar suffusion which the patient had previously presented. True jaundice is diagnosed from the primary tinge, by its deeper colour, and this coincides with an improvement in all the symptoms, and marks the beginning of convalescence.

There exists in yellow fever one kind of jaundice, constant and characteristic, which appears from the beginning, showing itself in the body after death, and coinciding with a remarkable relaxation of the capillary circulation. This is the specific jaundice from which the disease derives its name; it is a non-choleraic jaundice, and in the second period, it becomes of a pale straw colour, an appearance of great danger. Neither does the serum of the blood, nor the urine, reveal the presence of bile.

The second jaundice is choleraic, and is easily re-

cognised by chemical tests; so soon as this form of jaundice declares itself, the skin becomes moist, of the colour of yellow ochre, the urine saffron-coloured, staining the linen, and gives a green precipitate with nitric acid; this green precipitate continues during convalescence.

The diagnosis is of great importance for medical men who practise in countries where yellow fever is endemic or sporadic.

It may be confounded with pernicious malarial fever, or with bilious, remittent, hæmorrhagic, or with grave pernicious jaundice.

Although the symptoms of marsh pernicious fever may be identical, and easily mistaken, especially when the two diseases prevail at the same time, still we must bear in mind, that intermittence is a well-marked type, while the fever of febris icteroides is essentially continued. These grave bilious fevers are generally remittent, or pseudo-continued, but we are always able to trace intermittence from the commencement.

Appearances after Death.

Cadaveric rigidity. Yellow tinge intensified after death; face swollen, as though asphyxied, oozing of black blood from mouth and nasal fossa, or from any accidental wounds.

Cranium.—Dura mater and that of the spine, as well as the neurilemma of the spinal marrow, are

tinged yellow; the various cavities are filled and engorged with dark blood.

Pericardium, as well as the other fibrous tissues, yellow; heart pale, thin, and soft; left ventricle empty; right heart filled with black clotted blood.

Lungs healthy. Trachea and bronchia filled with a bloody mucus.

Stomach always contains black coffee-coloured matter, although the patient may not have vomited. The coats of the stomach are covered with a coating like soot mixed with mucus. The mucous membrane is pale or brown, and ecchymosed.

Intestines.—The mucous membranes are smeared with black matter. Blood has exuded through the small intestines, mixed with black matter, bile, and mucus.

This black matter, liquid in the stomach, becomes thicker as it descends, so that it adheres to the lower part of the ileum, like melted pitch. The large intestine contains a black fluid matter, very fetid.

Liver. — The alterations are very important. The colour is characteristic in yellow fever; it assumes a pale yellow tinge, like coffee with milk, or a dark orange colour, interspersed with violet-coloured stains. The colour of the parenchyma may be deeper, of the colour of mustard flour. It is friable and easily torn; if cut into, blood flows only from the large vessels. There is fatty degeneration, as in phthisis. The hepatic cells are

pale, and filled with drops of fat, and between the interstices of these cells are found fat globules.

The preservation of these cells, although faded and wasted, is an important fact, to enable us to diagnose between yellow fever and bilious remittence, in which the hepatic cells tend to disappear altogether.

The *gall-bladder* contains a pitchy bile.

The *spleen* and *pancreas* are not affected.

The *kidneys* are but little altered ; the tissue is anæmic, and may be atrophied or hypertrophied.

The *blood* is profoundly altered ; it is black, and does not coagulate, nor does it assume a red hue when drawn, especially in the second stage. The serum affords no evidence of bile. The important lesion in yellow fever is decomposition of the blood. This alteration is not consecutive, as in marsh fever, but is primary, or at least follows speedily upon the action of the poison on the system.

To this decomposition of the blood we must attribute the characteristic yellow tinge and the hæmorrhage from the various mucous membranes.

Black vomit is only an exudation of blood from the mucous membrane of the stomach.

There would appear to exist some analogy between the alteration of the blood produced by the poison of yellow fever and that determined by the bite of a serpent. The two poisons produce a yellow suffusion and a tendency to vomiting and to hæmorrhages.

Febris icteroides is a specific poison, caused by some unknown morbid agent, and hæmorrhage is an indication of the septic alteration in the blood, and the measure of the intensity of the poison.

Treatment.—It would be useless to enumerate the various plans of treating this disease, as varied as our notions respecting the nature of its cause.

It appears to me that to treat symptoms according to the different characters they assume in different epidemics, and at different periods of these epidemics, is the most judicious and rational plan.

We must avoid all systems of treatment, and rather consider the condition of the patient under the disease, than the disease itself.

Quinine, so essential in grave bilious fevers, is of no advantage in yellow fever, and as a preventive it is equally useless.

Bleeding might appear indicated when you see a patient suffering from asphyxia, with eyes injected and face bloated, but the plan is attended with danger. The application of leeches may give occasion to fresh hæmorrhage, and in case of black vomit with pain in the epigastrium is worse than useless. The same remark will apply to acids, astringents, antispasmodics, &c.

Emetics can only tend to encourage or determine black vomit. However, ipecacuanha might be occasionally indicated. Gentle purgatives, as citrate of magnesia, castor oil, &c., act as derivatives in

sanguineous congestion, and calm nerve excitement.

Baths, cold or tepid, occasionally produce excellent effects in patients suffering from delirium and ataxia. The pains in the head and bones diminish, and the secretion of urine, often suppressed, is restored. The cold water cure, if it does not greatly modify the severity of the disease, at least retards the severity of the nervous symptoms.

Dr. Begnier of New Orleans was very emphatic in his praise of medicated water baths. He placed a mattress in a bath suited to the patient's feelings, and allowed him to remain in a recumbent position during four hours at a time; the same plan to be renewed whenever the grave symptoms returned.

In tropical regions, where disease, though violent and quickly developed, is simple and well-defined, the country people place great faith in the use of certain herbs and nostrums, which, from observation and experience, they have found most efficacious, and such remedies, tested by long experience, have often recommended themselves, and been adopted by science. The peasantry in the island of Cuba employ, in the first stage of yellow fever, the following popular plan of treatment :—

To a wineglassful of olive oil they add a little common salt and some lemon juice. The dose is to be repeated every half hour, until a pint or more of the oil has been consumed.

I have never been able to obtain an explanation about the *modus operandi* of this compound.

Still, the combination may be considered not unscientific. The large quantity of oil acts as an emollient application to the mucous membrane of the stomach, to which the poison is most frequently directed. It acts as a gentle aperient, and should the stomach be foul or overloaded, the mixture may act as a gentle emetic, while the capillaries, distended by the act of vomiting, will be soothed by contact with some of the remaining oil. The common salt and lemon juice are valuable as antiseptics. This remedy has been generally adopted in Cuba, and I believe it does as little harm, and perhaps more good than many of the famed nostrums for yellow fever.

It had been with me, during my residence in Cuba, a matter of interest to discover, through every medium possible, especially masters of vessels, their several opinions—what each one had done, or might be inclined to do, in the case of yellow fever breaking out suddenly on board any of their vessels, when no medical aid could be procured.

I well remember the opinion of an old captain, who traded between Rio Janeiro and Havana for more than twenty years. During an epidemic of yellow fever, he seldom lost a sailor.

He placed the patient's legs in hot water up to the knees, containing one half pound of mustard flour. At the same time he administered a vapour

bath by placing a spirit lamp under a chair with an orifice in the seat. He next ordered the sick man to be well wrapped up in blankets and placed in bed. He then gave him a strong infusion of the euphorbium officinale. After symptoms were relieved he administered a dose of calomel and jalap, in preference to castor oil, which he considered might produce vomiting. Powerful stimulating frictions over the spine and lower extremities completed the cure.

The old captain specially insisted on the necessity, as he termed it, of " starting the urine." For this purpose he administered every two hours one drachm of sweet spirits of nitre.

This treatment of Captain Williams, suggested by common sense and experience, calculated to prevent stagnation of the blood in the capillaries, and to restore the secretion from the liver and kidneys, was, by a remarkable coincidence, the very treatment which has lately been adopted, with great success, during a late fearful epidemic of yellow fever in Pensacola, in the Southern States of America.

The Secretary of the Treasury at Washington having instructed the supervising surgeon of the Marine Hospital service to prepare, or cause to be prepared, a brief and succinct history of the yellow fever, as it prevailed in various parts of the United States, that gentleman submitted a report of Dr. Frank Reilly, from which I extract some very useful

observations respecting the character and treatment of yellow fever.

Dr. Reilly says: " And it is precisely because the occurrence of these diseases, as cholera, yellow fever, malarial fever, is so unusual ; because their origin, nature, and progress are still largely veiled in mystery ; because some of the most important laws which govern them are yet unknown—it is by reason of these attributes that they inspire terror, that communities are thrown into panic, give birth to commissions, conferences, reports, and quarantine, we are forced to turn to agencies for the control and prevention of this disease, which we know to be efficient in a greater or lesser extent.

" Such agencies are summed up in : general sanitation, in which are included thorough cleanliness, efficient disinfection, pure air, unpolluted water, wholesome food, and individual hygiene."

In conclusion, he states his opinion respecting the nature and origin of yellow fever as follows :—

1st. The poison is not an emanation from the poison of those sick with the disease. (To this I am not quite prepared to agree.)

2nd. A certain elevation of temperature is necessary for its multiplication. Its rapid progress is promoted by a moist atmosphere, and, probably, by the presence of a decomposing organic matter.

3rd. The poison is portable in ships, goods, clothing, &c., and a minute quantity is capable of giving rise to an extensive epidemic.

4th. Exposure to a temperature of 32° Fahr. completely destroys the poison.

5th. It may remain in a quiescent state for an unknown length of time, when not subjected to a freezing temperature, or exposed to the conditions necessary for its multiplication, and may again become active and increase indefinitely when these conditions prevail.

6th. While liability to the disease, and its severity when contracted, depend to a certain extent upon age, sex, temperament, previous habits, and acclimatization, they also depend, to a great extent, on the degree of concentration of the poison.

Dr. Reilly's plan of treatment during the late epidemic has been very successful. It is very simple :—

When the patient is seen during the first stage (during the first twelve hours, if possible), he resorts to hot mustard baths, either general, local, or up to the knees, according to circumstances.

The patient is next well wrapped up in bed, and supplied with ice water *ad libitum.*

If there be any irritability of stomach a mustard poultice is applied to the cardiac portion of the stomach.

When the stomach is not too irritable, castor oil,

or in capsules, may be given, or an enema of two drachms of castor oil, with twenty drops of turpentine, with yolk of egg, in a pint of water, to be repeated if required. If there be suppression of urine a flannel, well soaked in oil of turpentine, is applied over the region of the kidneys, and this application is repeated until the flow of urine is copious.

The hot bath is repeated should the perspiration become checked, so also mustard poultices, if needed.

The doors and windows are to be kept closed, and all draughts to be avoided. Any sudden change of temperature may prove fatal. Dr. Reilly believes (and I entirely agree with him) that the word " ventilation" has killed more people in yellow fever than anything else. The patient is seen at one time much improved, sweating profusely, and the next day, after the ventilation, you will find him with a dry skin, delirious, trying to jump out of bed, or complaining bitterly of a return of his aches and pains, with suppression of urine, or with coma.

Drs. Reilly and Stolbergh give ice water and small pieces of ice in the mouth after the hot bath. It causes the perspiration to flow freely ; besides, it produces it in far less time than when hot drinks are resorted to. It is, moreover, infinitely more grateful, and suits the inflamed state of the stomach. It soothes its irritability, and has a tendency to check vomiting and hæmorrhage.

While warm drinks frequently sicken and produce vomiting, and are often the cause of the patient's attempting to rise and get out of bed into the air, or rush to the pitcher of water, or to the ice, and if he be delirious he tries to rush out to the seaside, or to any other water that may be near at hand.

Since the ice system has been adopted no patient has attempted to get out of bed, nor has become delirious. No change of clothing is allowed before the eighth day, and then with care, all the doors being closed. The patient must be kept perspiring freely with ice. No food is given for many days. The recumbent position must be retained for seven or eight days.

These physicians never prescribed calomel or quinine; they considered it of great importance to relieve the patient's mind of all anxiety, and to assure him of the happy termination of his disease, and the same caution must be impressed both on relatives and friends.

The rationale of this excellent mode of treating yellow fever, recommended by men of great experience, is very simple—a plan I had employed for many years, but in a modified form, requiring but very few drugs, and capable of being conducted by any intelligent person.

We know something respecting the poisons of malaria and of cholera by their effects. We suspect that the former produce nerve depression, the latter arterial spasm. We are enabled to employ anti-

septics to obviate the effects of malaria, antispasmodics to relieve cholera.

But as to the poison of yellow fever we know nothing. It cannot partake of the nature of malaria, since it exists in localities where malaria is unknown. Its first effect is, not to depress, as in malaria, but to excite or cause reaction, whereas the depression of malaria is followed by excitement, while the excited period of yellow fever is followed by depression. Like the poison from the bite of a serpent, it instantly attacks the constituents of the blood, a reaction results, soon to be followed by the stage of prostration.

All systems of treatment, however excellent, will prove of no avail without the knowledge of their proper application, which knowledge can only be acquired by observation, patience, and experience.

ASIATIC CHOLERA.

WE have seen that the localities on the earth's surface which are saturated with the specific poison of yellow fever, in which it is endemic, comprise the larger Antilles, Cuba, Havana, the Coast of Florida and Mexico, including the Cities of Vera Cruz, New Orleans, &c.

We shall now treat of cholera, the permanent or determining cause of which is situated in Asia, in the valley of the Ganges, in that vast delta formed by the innumerable branches of that mighty river, a locality which is the type of the true focus of endemic cholera.

Some writers date its origin from the destruction of the canals which formerly, long before the occupation of India by the British, contained the waters within their banks, or to the mysterious influence assigned to the peculiar mouldy and slimy waters of the Ganges, or to the heaps of human remains which formerly had been cast into that river according to the rites of the Hindoo religion.

When a cause of infection has existed for a long period of time in a particular soil, that soil becomes impregnated or saturated with the morbid

cause which becomes endemic or special to that soil.

The nature of the cause is a mystery, but when we consider the mode of its development, of its action upon the human system, cholera appears to be a principle derived from a local infection, generated under conditions altogether differing from those of marsh and yellow fever.

The usual focus of all morbid emanations is situate in a low damp soil, alternately flooded and dried up; whereas cholera appears as an endemic in every season, in the dry season, in the absence of decomposition of all organic matter, and of the evaporation from the effluvia from miasma, (for sporadic cases occur in all seasons); and when the rains set in under the influence of the south-west winds, cholera often rages with greater intensity.

The period of the invasion of cholera does not correspond with that of malaria or of dysentery, hence it would appear that the meteorological condition of the former is the dry season, that of the latter the seasons of rains and of storms. Not that cholera is antagonistic to malaria or to dysentery, but this is probably due to the nature of the essential cause, to a difference in the period of time when the elements of infection are concocted, from which the different endemics derive their origin.

When cholera rages, the conditions of climate have little or no influence in its propagation.

Unlike yellow fever, heat is by no means an

essential element in its development, for we meet with cholera in the coldest as well as the hottest regions of the earth. The force and direction of the winds, the electric and hygrometric state of the atmosphere, the presence or absence of ozone, have been regarded as important agents in its development, but they are of a secondary importance; experience teaches that cholera can only with certainty be propagated far away from the endemic focus by being transmitted from man to man.

Epidemics of cholera always follow the direction of the highways of man, whether by land or by sea, and this propagation, independent of climate and locality, is always in conformity, not in advance, of the modes and facilities of communication.

The direction which an epidemic of cholera takes does not depend, as that of malaria, upon atmospheric agencies, but is transmitted, like yellow fever, by infection, by merchandise, or through vessels from an infected port, which are frequently the receptacle in which the infection is concentrated, and to which it clings.

Cholera commits great ravages amongst the natives of India and the coloured race. This is owing rather to their inferior social and hygienic, than to any peculiarity in their physical condition.

Fear, moral influences, and irregularities of life, all causes of muscular and nervous debility, produce a disposition in the human body to be impressed by the cause of those endemic diseases.

A man in his usual previous health may in one moment be seized by vomiting and purging, not of the usual contents of the stomach and bowels, but of a fluid like rice-water, tending towards prostration and fainting.

The face becomes livid, the surface cold as ice, the voice hoarse, the eyes sunk in, the features pinched in, and the expression of the countenance cadaverous and horrid. The entire body is collapsed, and the fingers and toes corrugated, as if soaked in water or parboiled. The urine is deficient, with a total absence of bile. While the patient feels like ice to others, he complains of a burning heat within, with great thirst. During these rapid changes violent cramp of all the muscles supervenes, adding unutterable torture to the wretched patient, death in a few hours being his only relief.

The appearance after death from cholera collapse is very characteristic. So intensely rapid is the rigidity greater than that which follows death from any other cause that the body preserves the very attitude it presented at the moment of death. Skeleton-like, the eyes are glassy and staring, sunk deep into the sockets. The colour of the body is livid, leaden, or dark blue, and spots of ecchymosis may be observed in various parts.

In those who have died suddenly, spontaneous muscular fibrilous movements have been frequently noticed, especially in the Negro race, imparting to the features a singularly varied expres-

sion. The eyes would appear to converge inwards and the lower jaw to move.

The condition of the heart and lungs after death illustrates in a very striking manner the mode of action of the poison of cholera when received into the blood, causing irritation and contraction of the pulmonary vessels controlled by their vaso-motor nerves, and consequent obstruction to the circulation of the blood in the lungs.

The heart is flabby and contracted; the right heart pulmonary arteries and arterioles are engorged and distended with a dark viscid blood, while the left heart aorta and systemic arteries are found empty.

The lungs are pale and anæmic, rose coloured, but when death occurs during the stage of reaction then we meet with lobular pneumonia, capillary bronchitis, &c. During an epidemic of cholera the expression of the countenance will often announce to an experienced physician the approach of an attack even before the patient is sensible of any change in his features or in his feelings.

When the seizure is not too sudden, as in the case just described, the symptoms observe the following order : Diarrhœa sets in without pain and often unnoticed. This may last from a few hours to as many days. The evacuations become more profuse, the patient more feeble, but as he experiences little or no pain, he feels no alarm, and yet he may be on the very verge of cholera collapse, but

soon the discharge from the bowels is more copious and passes with a violent irresistible effort.

The patient begins to feel anxious, is seized with nausea, and soon vomits up the contents of the stomach; it may be pure water, or a fluid similar to what passes from the bowels.

He is soon seized with cramps, the abdomen contracts and is flattened; the pulse, from small, becomes scarcely perceptible; the face is livid or blue; breath cold, icy; voice sepulchral; the genital organs retracted, the urine suppressed; the entire body appears to shrink and collapse, and death closes the scene during a calm the effect of profound prostration.

This diarrhœa is not a premonitory symptom; it is one of the first symptoms of the disease itself.

Diarrhœa is the ruling symptom of cholera, upon the character and treatment of which depends not only every succeeding symptom, but also the final result.

It is evident that the act of dying is a consequence of the terrible depletion produced by previous discharges from the bowels, with the exception of such fulminating cases, when death from cholera asphyxia may be the speedy consequence of a concentrated poison without such depletion.

It is a copious hæmorrhage of the fluid parts of the circulating mass, and that such is the case is indisputable when we reflect that the bodies of such

as have died from cholera present the extraordinary peculiarity of being without fluid : nothing remains in the small vessels but the thick parts of the blood.

Still this diarrhœa may be absent in the old and feeble, in those who are enfeebled through want and disease, or when cholera succeeds to some moral depressing influences, or when epidemics fall with unusual severity upon large masses of a population.

Nevertheless, in those who die from cholera asphyxia, although diarrhœa may not have appeared during life, I have seen on two occasions the characteristic rice-coloured fluid in the intestines after death.

The stage of reaction may be followed by an improvement in the symptoms, and the patient may recover, with little or no injury to the different organs which appeared to have been so violently affected. But it happens more frequently that the reaction is incomplete. The signs of intoxication from the poison of cholera do not entirely disappear, and death is frequently the consequence of an incomplete reaction. Nevertheless, the reaction may be exaggerated, and may assume one of two forms—the typhoid and adynamic, or the cerebral or ataxic forms.

The form of complete cholera may vary greatly, both in its symptoms and in its severity, from one of a mild to one of a fulminating and violent character.

In all epidemics such cases do occasionally occur at the first invasion. In every case some symptoms are apt to predominate, and impart a marked character to the attack.

We may have a gastro-intestinal form, a nervous or spasmodic form, or an adynamic form, in which the disturbance of the pulmonary apparatus is most prominent. This last was the form in which I have seen large numbers, especially Negroes, suddenly carried off during a terrible epidemic in Cuba in 1871.

The patient appeared as though struck with horror, stupefied, paralysed. After rallying slightly he continued in a state of stupor. He next complained of intense pain in the abdomen and over the heart, as though held down by a band of iron. He seldom vomited or passed a motion. He was bathed in a cold icy sweat. Respiration became more and more oppressed; he looked dark and livid, and after passing a slight motion he would fall down lifeless.

All those distinct forms of cholera may be convenient for the memory, but they must be regarded as arbitrary, as they are all occasioned by the same cause—viz., obstruction to the pulmonary circulation from the right to the left heart, consequent non-oxygenation of the blood and the tissues, and exudation of the watery portion of the blood into the intestines. Blood drawn from a vein in the

cold stage is dark, viscid, gelatinous; its specific gravity is increased; instead of forming an independent clot it coagulates in isolated portions. It contains three times more salts and albumen than in the normal state.

Dr. G. Johnson is of opinion that this thickening of the blood does not occur in the stage of diarrhœa, however profuse, but only during the stage of collapse.

As he expresses in one of his admirable essays: "The blood thickening, as a rule, has a direct relation to the degree and duration of the collapse, which is a consequence of impeded flow of blood through the lungs. This impeded circulation, with the consequent stagnation of the systemic venous system, is the main cause of the blood-thickening. The blood is thickened partly in consequence of its slow movements and partial stasis within the veins, but mostly, perhaps, by the passage of its watery portion through the wells of the capillaries."

Now the watery portion of the blood, passing into the intestines, constitutes the essential symptom of cholera, producing a desiccation of all the tissues of the body and the state of collapse.

The characteristic evacuations consist of 90 to 100 of the fluid derived from the blood, rich in chlorides and phosphates of soda, contain little or no albumen, are alkaline, have a peculiar odour, are often expelled involuntarily and with violence.

The spasmodic action of the intestines is com-

pletely painless. These rice-coloured evacuations contain flakes of intestinal epithelium.

It has been found that the composition of the rice-water stools is similar to that of the intestinal juice, but in a very dilute form. Such a diluted juice, which is almost identical in composition with the stools of cholera, is secreted by the intestines, when the nerves going to it are paralysed, as was proved by the well-known experiment of Moreau. In this experiment all the nerves going to or supplying the intestine had been divided, and therefore paralysed.

But in the valuable experiments made to investigate intestinal secretion by Drs. Lauder Brunton and Pye Smith, the mesenteric plexus only was divided, and the result of this paralysis was an effusion of a secretion into the intestine almost identical with that in cholera.

Dr. Lauder Brunton continues :—" We have then in cholera the same secretion as in Moreau's experiment, and from identity of effect we may fairly infer identity of cause, and are therefore justified in concluding that the great outpouring of fluid into the bowel is due in both cases to paralysis of some, at least, of the nerves of the intestine. The probability that only some of the nerves, not all of them, are paralysed in cholera, is strengthened by a consideration of the circumstances which induce a paralytic secretion of saliva in the submaxillary gland.

" When some of the nerves connected with this gland are paralysed by dividing, a continuous and profuse secretion is poured out by it. When some additional nerve fibres, however, are divided, instead of the secretion becoming still more profuse, it becomes diminished."

This appears to me a very valuable discovery, and one greatly calculated to throw a light upon the effect of the poison of cholera on the human body.

The term collapse is a very appropriate one, and it is literally true that the vessels do collapse, from a loss of their fluid parts, precisely as in mechanics a tube exhausted of air undergoes the same process.

The collapse of innumerable small vessels which compose the human frame occasions what is called collapse of the soft parts of the whole person. A diarrhœa has existed, and it has accomplished its direct work; it has carried away the water of the circulation; the body has become a living mummy; it is dried up; nothing is left but the solid parts, which cannot flow off.

Collapse is recognised by the shrivelled and cold skin, cold tongue, cold breath, blue surface, icy sweats, coma, and contraction of the pupils, suppression of bile and urine, and of all secretion of animal heat.

As the cold stage progresses, and the discharge of the fluid of the blood increases, the action of the

heart, from the want of its natural stimulus, becomes more feeble.

In other diseases, where large quantities of red blood are lost, the patient becomes pale; but when the watery part of the blood only is discharged into the intestine a leaden or blue tinge, not a pale one, is imparted to the skin, in consequence of the remaining constituents being in a state of stagnation, from the loss of their fluidity.

But should reaction take place, the obstacle to the pulmonary circulation being removed, the head resumes its natural heat; the colour of the skin and animal heat are restored.

As the capillary system no longer performs its function, during the stage of collapse, and the powers of absorption are nearly annihilated, active poisons administered by the mouth, or by friction, produce little or no effect.

The stagnation of the blood in the capillaries, and in the systematic veins, and consequently the smaller quantity of blood supplied to the lungs, produce a profound disturbance in the process of oxidation.

The air expired contains only a small quantity of carbonic acid, in proportion to what it contains in its normal state; the venous blood is charged with it; combustion of the tissues is almost suspended, hence the air expired is cold and icy.

It is not the air which is wanting to the blood, it is the blood which is wanting to the air. The

air rushes in freely enough, but the blood cannot become exposed to its influence, because it is prevented from getting to it. It is very evident that if no blood can reach the liver and kidneys, they cannot secrete their secreting fluids. This suppression of both secretions is one of the most constant phenomena in cholera.

Cramps always accompany profuse hæmorrhages, and what else can we consider the great loss of the fluid constituents of the blood if not a hæmorrhage? When excessive discharges, from any cause, take place from the circulating fluid of an animal, the natural contractility of the whole system immediately manifests itself, in aid of the general tendency of the vascular system to contract as the fluids in their cavities are diminished; the nervous and muscular systems co-operate, and this gives rise to cramps.

Animals bled to death always die with cramps or spasms very similar to those occasioned by the loss of the fluid of the blood in cholera.

When these cramps are violent, the patient screams with pain; he leans his body backwards or forwards, as in tetanus. The muscles swell out like whipcords, and as the cramps subside the muscles resume their normal condition.

It has been a subject of doubt in the minds of some whether cholera asphyxia be the result of vascular contraction, or of paralysis of the pulmonary vessels controlled by their vaso-motor nerves.

Now identity of cause will produce identity of effect. If an excessive loss of red blood be followed by muscular contractions or cramps, why may not the choleraic discharge of white blood produce similar effects—namely, vascular contractions?

Might not, therefore, the condition of collapse in cholera be ascribed to a muscular spasm of the pulmonary vessels, exactly of a similar character to that produced in the voluntary muscles of animals, the contraction in both cases arising from a similar cause—excessive loss of red blood in the one case, and excessive loss of the fluid of the blood in the other?

Might not this excessive loss of white blood cause the pulmonary vessels to contract, just as happens in the muscular walls of the vessels of animals, as the fluids in their cavities become diminished, the nerves coinciding with this action, and by their collapsing or contracting on their contents, impede the passage of the blood from the right to the left heart? In a word, just as cramps proceed from excessive loss of blood in animals, might not all the symptoms of cholera collapse be the natural sequence of excessive depletion, or the discharge of the fluid portion of the blood, giving rise to vascular contraction, not vascular paralysis?

Thus, paralysis of the intestine might be regarded (adopting this theory from Lauder Brunton's experiment) as the immediate effect of the poison of

cholera. The consequence of that paralysis would be a secretion from the blood, of rice-water motions into the intestine; and this excessive depletion would cause to manifest itself, the natural contractility of the entire vascular system, to contract upon its contents, or to collapse on them.

According to this view of the pathology, cholera might be defined, " a paralysis of the nerves of the intestine, causing a discharge of the fluid constituency of the blood into the intestine, followed as a natural sequence by pulmonary vascular spasm."

Diarrhœa is always present in cholera; many are unconscious of its existence, as the stools pass away insidiously, without pain or inconvenience.

This special diarrhœa is the essential character of Asiatic cholera. Dr. Castellane, of Vera Cruz, describes one case in particular, in which he detected after death from six quarts to two gallons of rice-water fluid in the stomach and intestines.

I have assisted at the post-mortem of two cases who had passed no evacuations during life, and who had died in the stage of collapse.

The one was a Mulatto girl, in whom we found half a gallon of fluid of the usual character; the other was a Negro, with an immense secretion of fluid, both in the stomach and intestines.

In both cases the abdomen was very prominent, not retracted or flattened against the spine, as always occurs in cases attended with profuse diarrhœa.

Such cases of " cholera sicca" are generally more

fatal and rapid. They die from asphyxia, as though strangled by violence.

In all cases of collapse the fluid part of the blood must have passed into the intestine, otherwise collapse is impossible. We may except sudden fulminating cases, in which the concentrated poison may strangle in a moment.

It has been attempted to explain why the stools should be retained during life, and not discharged, as in " cholera sicca," by attributing some extraordinary vigour to the sphincter ani—the muscle that last closes the intestine. In effect, we often observe at the point of death that a discharge takes place from the bowels, when the sphincter becomes finally relaxed. Convalescence from an attack of cholera is often very slow, especially in the coloured race. Some patients continue in a nervous state for a long time. They are emaciated; eyes hollow and dejected; they suffer every evening from slight fever, food sits heavily on the stomach, or produces an obstinate diarrhœa; they may be anæmic or suffer from œdema. I have seen persons, especially among the coloured race, attacked by a partial arthritis from gangrene, or to be troubled with muscular or tetanic pains for a long time, or from a partial loss of sensation and motion in the lower extremities. I knew an American gentleman who, having recovered from a severe attack of cholera, suffered from a peculiar form of idiotcy, or melancholy, which completely altered his character.

In tropical climates the cold stage of cholera might be mistaken for an attack of algid pernicious malarial fever, but we must remember that the coloured races, especially the Negro, is not easily impressed by the poison of malaria.

The cold stage of cholera is usually preceded by diarrhœa, which may last forty-eight hours, while the cold stage of malaria never lasts beyond twenty-four hours. This is ushered in by alternations of heat and cold; cholera by vomiting, and diarrhœa, and cramps, and is never ushered in by fever, as is the case in malarial pernicious fever.

In cholera there is a thickening and stagnation of the blood, in pernicious fever the blood is normal.

Pernicious fever sets in with heat, and is followed by perspiration, while in the reaction from cholera there is a restoration of heat with typhoid symptoms.

On the theory of cholera asphyxia being the result of arterial spasm, is founded the most rational treatment—that of relaxing the condition of the pulmonary capillaries, that of treating causes not effects. Maxwell, McIntosh, and others practised bleeding in the cold stage of cholera. The plan, although a dangerous one in a tropical climate, from the tendency to anæmia, was scientific, as it relaxed spasm; for, I believe, if this state depended on paralysis, not on spasm, bleeding, so far from relieving, would aggravate it. A paper of great interest, by Surgeon A. Hall, of the Army Medical Department, was read

in 1874 before the Royal Medical and Chirurgical Society.

Mr. Hall says : Presuming that the morbid state against which we have to contend to be one of asphyxia, caused by spasm of involuntary muscular fibres, due to a condition of hyper-activity of the sympathetic nervous system, the logical inference directly points to the exhibition of remedies calculated to neutralise this condition.

Mr. Hall recommends the subcutaneous injection of chloral hydrate as the remedy best calculated to obtain this result.

I have never derived any decided advantage from the subcutaneous method of nitrate of amyl, or of any other drug, owing probably to the almost total suspension of the powers of absorption in cholera.

The treatment which I have found most successful was based on the conviction that the preliminary diarrhœa was not premonitory, but rather the first symptom of the disease, or the disease itself.

I considered that to arrest this diarrhœa, which, unchecked, led to collapse, and to such fatal results, was as essentially indicated as it would be to arrest hæmorrhage from a bleeding artery.

It is more than twenty years ago, when residing in Lima, in Peru, a pamphlet was placed in my hands on the treatment of cholera, written by Dr. Cox, of the United States. I remember to have

been greatly impressed with his theories and treatment. He considered that the cholera stool was a hæmorrhage, and should be treated as such. The opinions and practice of Dr. Cox greatly influenced my treatment of cholera ever since.

The plan of treatment which I adopted was as follows :—

Firstly.—I prescribed a cessation from all labour and fatigue out of doors, and on the very first appearance of diarrhœa to observe the horizontal position.

All excessive labour exhausts the vital powers, and demands the return of repose in exact proportion to its extent. Great bodily fatigue not alone exhausts the muscles of volition, but also the mouths of the vessels which open on the mucous membranes of the intestines; and thus a condition of fatigue disposes the system to suffer more easily from the paralysing effect of the choleraic poison.

Secondly.—The next object is to arrest diarrhœa, whether it exist in the preliminary state, depending, as Dr. Lauder Brunton observes, " probably on irritation of the intestinal nerves, without paralysis, just as an abundant secretion of saliva may be obtained from the submaxillary gland by irritating some of the nerves connected with it, without division or paralysis of any one of them," or whether this diarrhœa take the form of rice-water evacuations.

As the disease commences by the intestine, medi-

cine is more appropriately and directly applied to its seat by means of suppositories and enemas than by the mouth. The intestine will tolerate three times the quantity which we can commit to the stomach.

This remark is especially true of narcotics. Opium when taken into the stomach may affect the digestive functions, the action of the heart, or the operations of the brain, from the propinquity of these organs to the stomach, while its effect on the intestine may be slight, especially in the cold stage, when the powers of absorption are impaired, if not annihilated. Hence I consider that if opium be intended to act as an astringent and anodyne to the intestinal vessels, disposed by the agency of the mysterious poison to discharge from their minute mouths the fluid parts of the blood, it might be more effectually applied to them by the medium of suppositories and enemas.

While this is true in reference to these medicines, which are intended to act on the bowels, yet in the administration of cordials and astringents, as ammonia, ether, chlorate of potash, and which are intended to act on the brain, and thereby increase the energy of the nervous system, it is preferable to administer them by the mouth.

I have used from two to three drachms of laudanum in a little water as an enema. We must not temporise with respect to quantity once rice-water

motions have set in. The disease is rapid in its progress, and the treatment must be prompt and efficient. Should the enema come away it must be repeated, and if administered in sufficient yet judicious quantity it may probably arrest the disease altogether.

So large a quantity of laudanum as that prescribed may not be necessary in every case.

In an incipient case of choleraic diarrhœa, one grain of opium as a suppository may be sufficient.

But as the disease advances the tendency to profuse evacuations becomes greatly increased, and, like the law of falling bodies in natural philosophy, it augments in geometrical ratio, and hurries its victim to the grave with corresponding rapidity.

It is evident that the judgment of the physician must be relied on to graduate the quantity of laudanum required, according to the degree of exigency and the different stages of the disease.

I once had the medical supervision of five large sugar estates near Havana, in Cuba, which contained a population exceeding one thousand between white and black. In each epidemic of cholera I gave especial directions to the apothecary on each estate to give to every labourer before proceeding to his work a few drops of a stomachic tincture known as " Indian drops," composed of various aromatic herbs and spices, with quinine, and above all to administer on the very first appearance of diarrhœa a suppository of one grain of opium, and,

if necessary, from two to three drachms of laudanum in water as an enema, and the plan carried out on a large scale was very successful.

One great object is to moderate the discharge so that the patient may not bleed to death.

Thirdly.—We must next endeavour to supply the loss of fluid. For this purpose let the patient drink *ad libitum* iced or cold water, cold tea, or chicken tea. They allay thirst, compose the stomach, afford the means of circulation, of efficient respiration, and consequent secretion of animal heat. At the same time I ordered a cordial astringent mixture, as in common diarrhœa.

All counter-irritants, sinapisms, hot applications, are of no benefit, have no effect in relieving the patient. Nothing but the restoration of the fluid to the blood can afford warmth to the body or relieve pain, hence the value of transfusion into a vein. Twenty or thirty ounces of water containing carbonate of soda a drachm, and ten grains of common salt to the quart, at a temperature of 98° Fah., should be carefully introduced into a vein.

I have never given calomel. It can act only as a purgative, or as an alterative. In a disease like cholera, which runs its course with so great rapidity, calomel has no time to act as an alterative and as a purgative. I have found it injurious, even when combined with opium.

We have sufficient proof that cholera can be cured without the use of calomel.

The only alterative action required is simply to astringe the mouths of the small vessels which open into the intestines to relieve paralysis of those nerves, and, should collapse occur, to relax pulmonary spasm, and for these objects I doubt whether calomel is required even when combined.

It cannot be required for the condition of the liver, for the liver is not primarily affected in cholera : its substance is unaffected, except inasmuch as it cannot receive one drop of blood, and consequently cannot secrete one drop of bile.

The function is suspended only, not abolished, and so soon as vascular spasm and blood stagnation are removed the function of the liver is relieved without the use of calomel.

As regards the kidneys the case is different; they may remain intact, and only deprived of their due supply of blood. Still urea may accumulate in the blood, the function of the kidneys being suspended, thus giving rise to coma, contracted pupil, and cerebral irritation. The conditions of the liver and kidneys are not causes but effects of the disease.

I believe that no purgative, however mild, should be administered in cholera. There is no danger in arresting diarrhœa, and no safety until it is arrested.

Supposing the case to be in a fair way of recovery, the stools in the course of two or three days may become hard and entirely free from bile, or the evacuations may be quite natural.

This does not proceed from any disease of the liver, but because its secretion has been suspended.

The liver performs its functions irregularly. It is very much in the condition of the liver of a new-born child, the first discharges from which—the meconium—are perfectly black; but in cholera we know that so soon as the liver resumes its functions the bile is prepared from blood unusually loaded with carbon. In such case a small dose of calomel may sometimes be very useful at the conclusion, if there be any defect in the biliary secretion, but never for the purpose of arresting the disease, or when bile is in excess.

Cholera may therefore be described as a special secretion from the circulating mass discharged into the bowel, produced by a partial paralysis of the intestinal nerves through the agency of an unknown poison, succeeded by vascular spasm, the natural sequence of excessive depletion, terminating in partial or complete asphyxia or in death.

The endemic diseases of the tropics may be reduced to very few—marsh malaria, cholera, and yellow fever—since we may regard endemic hepatitis and dysentery as complications or modified products of malaria rather than diseases deriving their orgin from distinct poisons peculiar to themselves.

The poison of cholera would appear to possess some analogy with that of malarial fever, the one producing collapse or choleraic asphyxia, the other the cold stage of intermittent.

Such may be the immediate effect of the action of the two poisons, but the ultimate is entirely distinct. The poison of cholera leads to reaction, that of malaria to sweating and profuse perspiration. The two poisons, as well as those which generate all other endemics, may possibly derive their origin from the same elements, but in a different state of chemical combination, and in different proportions, under the influence of special hydrogeological and atmospheric conditions.

The poison of yellow fever is the opposite in its effects to the two preceding.

It produces a violent, nervous, and vascular reaction, followed by a profoundly characteristic hæmorrhagic prostration.

The poisons of cholera and of yellow fever are capable of being transmitted, reproduced, multiplied, and elaborated in the human system.

Nevertheless, all these endemic poisons, the product of some source of infection, some miasma or emanation from the soil peculiar to each, possess one character common to all.

They all act as poisons in the blood, favouring its decomposition, and determine to those organs, specially directed to the elaboration and depuration of the blood, the liver, and the spleen.

When this dissolving element is introduced into the human system in a determined quantity, it soon produces a modification in the constituents of the blood, and such modification tends to its decomposition. When blood thus modified is brought into contact with the different tissues and organs of the body, it determines by virtue of its specific properties, the phenomena peculiar to the disease, and, according to the idiosyncrasy, or peculiar morbid constitutional disposition, it will spare or pass over one individual and seize upon another. It will cause some symptoms to be more prominent than others—that is to say, it will impress upon the disease its particular type or form.

The mode in which these types are produced will depend on some pathological idiosyncrasy, but the determination of their cause is the direct effect of the special miasma.

All causes of infection, all deleterious emanations from the earth's surface, however varied may be their effects, in every climate, and under every sun, the last are capable of becoming, if not completely neutralized, at least greatly modified, by a due and rigid attention to the social condition of a people and to the strict observance of the laws of hygiene.

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