

1861

A very excellent production - sensible &  
Systematic - with truths obviously taken  
& showing some personal observation in Mr. [unclear]  
headed "Travels of Commodore"

ON

JM

Miller

EPIDEMIC YELLOW FEVER.

J. L. MACLEAN.

Travels of Commodore

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EPIDEMIC YELLOW FEVER.

The subject of Yellow Fever is happily not one of general home interest; for it is only in the exceptional case of some steamer rapidly arriving here from the Tropics, with the disease on board, that we have an opportunity of seeing it. Yet to many persons in this country the subject must possess an interest, so long at least as the empire and commerce of Britain bring us into relation with the countries in which Yellow Fever has its seat: and, indeed, in this view, no disease is foreign to us. To the medical man, certainly, some acquaintance with it is almost essential - as may be said of almost every malady - either as enabling him to form more correct ideas of disease in general,

or as preparing him for its judicious treatment, should circumstances ever call for it. Two opportunities of witnessing this epidemic, and the experience of an attack of it, during a brief residence in some of the West Indian Islands, have necessarily given it a place in my own thoughts.

My object is to give a brief general outline of Epidemic Yellow Fever, so far at least as I can obtain one from the bewildering confusion in which the subject is shrouded. In doing so I purpose taking up the chief points in the following order: - Its name, literature, history, and geographical range; its etiology, prophylaxis, symptoms, course, treatment, and pathology. In order not to interfere with this summary, I shall throw into an Appendix a few slightly extended remarks, chiefly relating to matters which fell under my own observation in the West Indies.

**NAME.** The nomenclature of this fever is unusually extensive, probably from the circumstance that so many European nations are represented in the numerous islands that lie between the two

continents of America, and also from the fact that the disease has on various occasions extended to the Southern Shores of Europe.

Two names indicative of the most prominent symptoms — in English "Yellow Fever" and "Black Vomit" — are repeated in most European languages, and there are also numerous nosological terms applied by various writers, such as, *Synochus causs*, *Synochus icterodes*, *Typhus icterodes*, *Febri gastro-hepatica*, *pestilentia hemagastica*. As examples of local names, we have Mal de Siam, Bulam fever, Barbadoes fever. A list of fifty names could easily be formed, but these will suffice to indicate the variety.

**LITERATURE.** The number of writers and books on Yellow Fever is truly astonishing — amounting to hundreds — but an explanation is to be found in the reasons just adduced to account for the multiplicity of names, and a still better one in the circumstance that in the endless war of "contagion" versus "non-contagion", the varied statements regarding Yellow Fever, <sup>have</sup> always afforded plentiful arguments to the combatants on either side.

Publications in the English language are to be reckoned by scores, and extend over a period of a hundred and fifty years, but it is to be regretted that, with so vast an amount of matter, the recent writings should shew so little actual progress in our knowledge of the disease — especially in its etiology and pathology. Indeed the very excess of the literature is the strongest proof of the difficulties attending enquiry. Abundant reasoning is to be met with, but an insufficient substratum of reliable "facts". Without these, as has been well remarked "conclusions, if such are arrived at, must necessarily be lame and impotent." As a steady source for their accumulation, the records kept by the Medical Officers of the Army are perhaps not sufficiently made available.\*

HISTORY AND  
GEOGRAPHICAL RANGE } It may be said that yellow  
fever is a comparatively  
modern epidemic, for the attempt to discover it  
in the writings of the fathers of medicine is  
inconclusive, nor has any one been very suc-  
cessful in tracing it back beyond two or three

\* See APPENDIX A.

hundred years. In considering its history and range, we are struck by the fact of its limitation (speaking generally) to the shores and outlying islands of the great continents which are washed by the Atlantic; and to those shores within a certain parallel north and south of the Equator, which may be roughly stated as equidistant between the equator and the pole. (See Map.)

It might be possible to enumerate the various epidemics which have visited certain countries within the limits just assigned—especially those in the temperate Zone, as the United States, and the Spanish Peninsula—but this could not be attempted in the case of those within the tropics. On account of their frequency, I shall therefore on this as on other points prefer to give a general view.

(1) The West Indies. The earliest epidemic of which we have satisfactory evidence is that which raged in Barbadoes in the year 1647, about twenty years after the settlement of the Island. Towards the close of the same century, the disease again visited Barbadoes, having previously appeared

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in some other islands. During the early part of the 18<sup>th</sup> Century, the fever prevailed widely, and was especially fatal among the shipping. After a considerable lull, it broke out again in 1793 (a notable year in the annals of Yellow Fever) and caused wide devastations, the frequent military expeditions furnishing numerous victims. Within the present century epidemics have occurred at intervals of a few years, and are said to have been more frequent of late, since the establishment of steam communication; indeed the disease appears to be almost endemic at St Thomas, the central station of the mail steamers. Accurate information, however, is needed on these points.

(2) In North America this fever is stated to have shown itself about six times during the last century, chiefly at the principal sea-ports, and since then the outbreaks have been quite as numerous, although there is some ground for hoping that the periods of exemption will gradually increase. New York has suffered in 1803, 1805, 1819, 1822 and 1853.

Of South America, not much is known. In the European colonies of Guiana, Yellow Fever is

no stranger, and we hear of it also as occurring from time to time in the cities on the eastern coast of this Continent, as far south as Buenos Ayres.

(3) The history of this fever in Europe is almost limited to the southern provinces of Spain, where, since 1730, it has recurred about as often as in North America; Cadiz being the most frequent seat, and the cities and towns in its neighbourhood generally participating on each occasion. Gibraltar, and Malaga, Carthagena, and Barcelona, on the Mediterranean coast have suffered more or less. Leghorn seems the furthest point in this direction reached by the epidemic, about sixty years ago. Lisbon is remarkable on account of the lengthened period which intervened between its attacks: one took place in 1723, and the other so recently as 1856-7, and both were unusually severe.

(4) Although the coast of Africa near the equator is one of the reputed habitats of Yellow Fever (having furnished the name "Bulam"), yet epidemics appear to be rare, owing perhaps to the limited number of European residents. Visitations at Serra Leone during 1823 and 1829

are specially recorded. The occurrence of the disease in the island of Ascension in 1823, and in Boa Vista (one of the Cape Verde group) in 1845, immediately after the arrival of a man-of-war from the Coast, is well known.\*

In reviewing the history of Yellow Fever Epidemics - apart from all debated questions - a remarkable coincidence presents itself, namely, the evident means of communication between the places chiefly affected. Thus, between Spain and her great West Indian possessions, there must have been constant intercourse; and, again, between most of the West Indian islands and the seaports of the United States a regular trade has long existed.

My omission, in this brief notice, of epidemics stated to have occurred in France, the Netherlands, Southern Italy, Greece, the East Indies, &c, may

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\*The "Eclair" was so dreaded a name, that it had to be changed, and this vessel now appears in the Navy List as the "Rosamond". I have some recollection of hearing that Yellow Fever subsequently manifested itself on board this steamer while on the West India Station.

seem arbitrary, but my reason for passing by them is, that either the information regarding them is so insufficient, or their rarity is so great, as to preclude my classing them with the frequent and well ascertained epidemics of the borders and islands of the Atlantic. It is possible, however, that they may have been exceptional modifications of the same disease.

ETIOLOGY. Much uncertainty prevails as to the etiology of this fever. Among the chief causes or conditions upon which its development or manifestation are supposed to depend, are, heat, malaria, miasmata and atmospheric changes.

Our difficulty lies in distinguishing the essential from the accessory and in order to found a true distinction, much accurate observation and research are needed. All that can be done at present is to arrive at probabilities, and to narrow the ground by the process of exclusion.

Heat seems undoubtedly a necessary agent; and by observing the extreme range of epidemics we are able to say that a certain heat suffices for their propagation. With this datum, parallels of

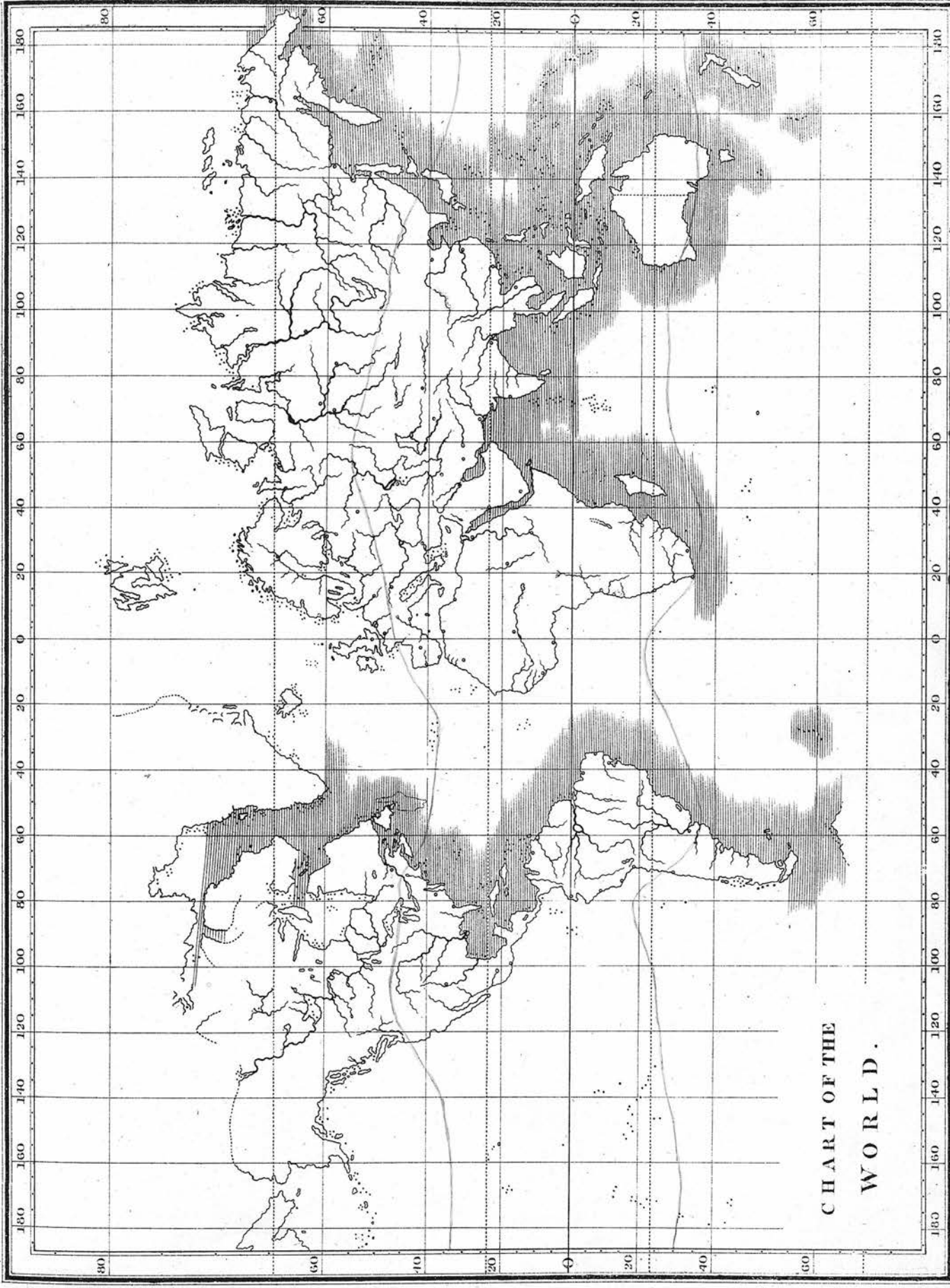


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WORLD.

latitude have been fixed upon to shew the northern and southern boundaries of Yellow Fever. But as these parallels do not indicate uniformity of heat, it is preferable to take as our guides the isothermal lines; and in the accompanying map I have, upon this principle, traced in the two hemispheres the isotherms of the hottest months, as given in Professor Dove's work.

It were much to be desired that the other conditions could be as easily determined as that of heat. Our information, however, regarding them is imperfect and perplexing. The attempt made by Dr. Caneroff to assign as the cause malarious emanations produced by a certain temperature is very unsatisfactory to any one acquainted with the West Indian islands, and with the very different situations in which epidemics have appeared there — more particularly among the Troops. The heat from year to year does not differ much, and if, in certain years, the malaria are so intense as to cause these fearful epidemics, at least we should expect to find in the intermediate years the milder forms of malarious disease; but in many places these are unknown, because, in truth,

there are no marshes. That malaria form a potent accessory and modifying condition, by increasing the impurity of the air, can scarcely be doubted; that they may cause an aggravated endemic fever which in its turn may originate the epidemic or communicable form seems at present a possibility: but that malaria are to be regarded as sufficiently accounting for all Yellow Fever seems unwarrantable.

It is perhaps safe to consider together three assignable causes, which have all an animal origin - I mean, (1) gaseous and cutaneous emanations, (2) faecal excreta, (3) putrescent animal matter. To this class considerable importance, it appears to me, may be attached, as we can probably trace the existence of one or other of these agents in all epidemics\*.

On ship-board, the second and third may be wanting, but with men crowded together, the first must prevail. On land, all three may be found either alone or associated. Certainly, it may be said that in proportion to the intensity of these conditions is the prevalence and severity of the disease, as has been recently shown by Dr Lyons in his account of the Lisbon Epidemic of 1856-7. He aptly quotes, as describing what came under his own notice,

\* See APPENDIX B.

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the pithy expression of a medical historian of the Lisbon epidemic of 1723, "most deaths where most dirt."

Of meteorological conditions we are as yet very imperfectly informed, and their important part in this and other grave disorders remains to be investigated.

To other alleged causes, brought forward in special cases, such as terrestrial exhalations, bilgewater, green-wood cargoes &c., I do not think it necessary to devote time. They are important to the extent in which they vitiate the atmosphere and injure the general health.

Some very interesting questions bearing on the etiology of yellow fever suggest themselves when we consider the degree in which various races are affected by the disease.

The comparative immunity of the negro has always been noticed; but in looking at the map we are struck by the exemption of other races differing in complexion, but living under conditions apparently favourable for the promotion of the disease. Take for example the Chinese. No country is more thickly peopled than China;

low marshy ground abounds, and the people are not noted for their cleanliness: yet do we ever hear of this fever ravaging their ports? It may be said that they burn their dead and use all refuse material for manure, but they could scarcely thus secure such remarkable exemption. Do they then enjoy a special immunity similar to that of the negro, resulting from a peculiar cutaneous secretory power or from nervous insusceptibility? This question might be answered as some Chinese have been employed as labourers in the West Indies, but I regret that I have not the necessary information on this point. Or, lastly, is the absence of this disease from China to be accounted for on the ground that the specific poison which produces it has not reached that country? Those who incline <sup>to</sup> this view might find support for it in the fact that the negroes of the West Indies suffered fearfully from the Cholera when it reached their shores.

A few words may suffice as to the circumstances which render individuals liable to an attack of Yellow Fever, as these are not so much matters of dispute. Among them are, recent arrival in an infected locality, exposure to night air,

excesses, anxiety, and the other causes which usually favour the production of disease. Doubtless the difference of susceptibility which exists among different races, holds true in degree with regard to individuals of different temperaments; thus plethoric persons of the sanguine temperament, it is well known, are specially prone to suffer.

The greater liability of the male sex is perhaps explicable on general grounds.

**PROPHYLAXIS.** Is Quarantine justifiable in the case of yellow fever? With the Boa Vista case in view, and in the present imperfect state of our knowledge and equally imperfect sanitary arrangements, it is perhaps safer to reply that Quarantine is advisable. But it would be sad indeed were it to be trusted to as a safeguard, to the neglect of sanitary measures. It is not my purpose to enter into sanitary questions generally, but I would make a few suggestions for guarding the troops in the West Indies against this disease, from which they are such great and constant sufferers.

(1) That all barracks whose situation is low and unwholesome should be abandoned.

(2) That as the unhealthy period of the year is from June to September, and as removal generally suffices to check the progress of an epidemic, there should be an annual change of quarters at that period, so as to allow of a thorough cleansing of the old quarters. (3) That the privies should be at a much greater distance from the buildings than they now are, and that there should at least be two, so as to allow of thorough alternate purification\*

In the Appendix (C) I have stated the facts which induce me to make the foregoing suggestions.

The precautions to be observed by individuals against an attack of fever are so well known and so evident that I do not think it needful to allude to them.

**SYMPTOMS.** The symptoms of this disease have been very frequently and very differently described. But if we bear in mind that epidemics may vary in their type - that any epidemic may vary

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\*Water is usually so scarce that its cleansing power is seldom available. The use of chloride of lime does not appear to be effectual.

in its character at different periods, — and that the train of symptoms may be modified according to the type and severity of the disease, or to the constitutional peculiarities of the patient, we shall not find it difficult to reconcile the discrepant accounts. It would be vain to attempt to describe in this outline the series of symptoms which is presented in each form of the disease, and in the different stages of these forms; I shall therefore merely enumerate the chief forms or types, the names of which will give a general guide to the symptoms to be expected, and then under the head of each system of the body, I shall briefly state the variations in the more prominent symptoms.

Types or Forms. Beginning with the simplest we have the ephemeral or mild form, the sthenic or burning, the Typhous (primarily or secondarily so), and the Algid or collapse form. Again, according to the degree of continuity of the symptoms, we have Remittent, Intermittent and Continued varieties. Other terms are also in occasional use, such as, Hæmorrhagic, Purpuric, Cerebral, Ambulatory, & Toxic. We may

of course usually expect a commingling or succession of some of the foregoing or <sup>some</sup> of other forms.

Prominent Symptoms considered with reference to the different Systems.

Nervous System. There are the usual premonitory symptoms of fever, lassitude, chills, lumbar pains, &c; the severity of the latter, in some cases, has given rise to the term "Coup de barre." Great uneasiness and a burning sensation in the epigastrium are almost invariably complained of. The mental condition may vary much: there may be intense anxiety and restlessness, or complete apathy; there may be delirium, convulsions, or coma.

Respiratory System. Thoracic symptoms are seldom very grave. Respiration may be frequent, or slow and deep, and accompanied by moaning. Cough and dyspnoea are rare; the sputa are often mixed with blood. Epistaxis is not uncommon. The tone of the voice may be altered.

Circulatory System. Great difference in the force and frequency of the heart's action is to be looked for, according to the type and stage of the

disease; the corresponding alterations in the pulse (which need not be specified) may be anticipated.

Integumentary System. The countenance changes with the stage of the disease and the state of the mind. Venous turgescence added to the yellow discoloration gives a peculiar, livid, muddy appearance in bad cases. The watery shining eye is a common early symptom; the conjunctiva afterwards takes on the icteric tinge. The heat of the body may rise to  $104^{\circ}$ , though not exactly in proportion to the rapidity of the circulation. In algid cases, the superficial temperature is very low. In these cases, <sup>only,</sup> the yellowness of the skin, from which the disease takes its name, is occasionally absent. The color may vary much in depth, as well as in the period of its occurrence; it may even shew itself after death. Lividity, petechie or purpuric patches may appear in severe cases. Erythema and bloody furuncles have been noticed; parotitis also. Sweating (not profuse), or miliarary eruption may occur. No very marked change is observed externally in the condition of the abdominal organs, but meteorismus may be present. In the advanced stage of fatal cases, a very unpleasant earthy smell is widely diffused.

Digestive System. The tongue, as we might expect, presents very different appearances. At first it may be dry and coated, or pasty; afterwards dry, brown, and contracted, or tumid and tremulous; in the worst forms, it is red, raw, and bloody. The mouth and fauces to some extent correspond. Thirst is by no means an invariable symptom. Appetite is very slight; it may be capricious. Nausea, hiccup, and vomiting (at first simple), with proportionate epigastric uneasiness, are frequent; the "black vomit" often comes on insidiously. Costiveness is common. If the bowels are opened early, the evacuations are clay colored; later on, black or tarry.

Genito-Urinary System. According to the degree of febrile action, the urine presents at different times the most opposite conditions. Lithates, urea, albumen, biliary coloring matter (rarely), blood cells, renal tubercasts, &c may appear in greater or less quantity. Suppression of urine, which is said to occur more frequently in this than in most diseases, may shew itself before the cerebral symptoms are marked. Retention of urine may arise in this as in other fevers. As from all mucous outlets, blood may flow from the urethra or vagina, (the latter independently of the menstrual function).

Congestion and even sloughing of the genitals may take place.

**DIAGNOSIS.** There is much difficulty in distinguishing between sporadic cases, and those of severe yellow endemic or of "seasoning" fevers. With reference to treatment the distinction is not very important, but highly so in a prophylactic point of view, as a true sporadic case should be viewed as a decided indication for general precautionary measures. When an epidemic does break out, diagnostic difficulties are soon removed by the repeated appearance of the characteristic symptoms; yet there will always be a number of mild cases not easily pronounced upon.

**PROGNOSIS.** In making a prognosis many circumstances must be taken into account, such as, the age, sex, temperament, diathesis and state of health of the patient; the length of residence in the climate; the prevailing type of the disease; and the degree in which the patient's treatment will be favoured by external conditions. Next to the ephemeral form, the sthenic is perhaps the most hopeful; the algid the least so. Besides making ourselves acquainted with the history of the attack, we must seek to arrive

at the state and stage in which the patient is, by carefully observing his posture, expression, mental state, the heart's action and pulse, the state of the secretions &c. &c.: in short, due value must be given to all the symptoms which guide our prognosis in other fevers and diseases. Special weight must also be attached to those symptoms which are said to be characteristic of Yellow Fever: thus, if the tongue present the bright red raw appearance, if nausea and epigastric uneasiness be great, if the yellow tinge has appeared before the third day, the prognosis is unfavourable; still more so, if there be suppression of urine, constant hiccup, black vomit, bleeding from the mucous outlets, or purpuric patches. One curious feature in the disease is to be remembered, that a brief and deceptive improvement appears in many cases just before the fatal black vomit comes on. If nothing untoward occur before the fifth or sixth day, there is good prospect of recovery.

**COURSE, &c.** The period of incubation is unknown, probably under ten or twelve days. The duration of the disease is from two or three to seven days, or it may even be prolonged to fourteen.

Three stages are spoken of, - that of invasion, - that of reaction, - and that of exhaustion; but they are extremely variable, as will be readily understood. When an amendment is established, recovery is generally rapid, especially when favoured by circumstances. Sequels are rare. One attack of this fever is as usually protective as one of the other specific fevers is found to be.

*PATHOLOGY.* Under this as almost under every head, information is unsatisfactory. Pathological anatomy is, however, now being more carefully conducted and may lead to some results. The descriptions of the morbid appearances after death are as yet somewhat contradictory, but this is perhaps due to varied degrees of decomposition dependent upon temperature, duration of the disease, or period of examination.

The general results can be stated in few words. The vascular system is the one apparently at fault; in almost every organ congestion or engorgement exists, and often capillary extravasation, the mucous surfaces being specially liable to the latter. The degree of the vascular lesion will depend

upon the type of the disease, and the amount of blood that has passed from the Alimentary canal, either by vomiting or dejection. Inflammatory action does not appear anywhere; and indeed the only organ which seems to be altered in structure is the liver, which (as Dr. Lyons seems to have established) shews signs of fatty degeneration; its appearance is generally described as fawn or buff coloured. Some observers state that the alimentary mucous surface is abraded at the upper portion of the canal - in the oesophagus and stomach - but this is by no means certain. The chemical changes in the blood yet remain to be ascertained.

. How these few morbid appearances are to be connected with the symptoms observed during life, and how they are all to be consistently explained, it is not easy to say.

That an aerial poison is inhaled and vitiates the blood - that the function of the nervous system, and especially of the sympathetic portion is altered - that secretion generally is interfered with - that the depurating power of the liver particularly is suspended, and

that hence degeneration commences - that the bile-forming and other elements which should be excreted, remain in the blood - that the clogged capillaries (especially those of the mucous surfaces,) allow of the exudation of the vitiated liquor sanguinis, and even of extravasations of blood: such statements may be made with <sup>more</sup> or less plausibility, but they are as yet little better than conjecture.

The study and comparison of this disease with Asiatic cholera will perhaps afford the means of reaching tenable conclusions at some future time.

**TREATMENT** is on the whole very imperfect.

In the more aggravated types of this fever, the vital struggle against the disease is a most unequal one, and the aid of medicine seems to go for nothing. There are however many cases in which judicious treatment may turn the balance in favour of the vital powers, and others of a milder form in which remedies are valuable auxiliaries. The indications for treatment are in many respects those for fever in general: nature must be relieved and aided.

Pure air is the first requisite. The bowels must be freed by means of purgatives or enemata, and the stomach perhaps, if there is evidence of its being unusually loaded; but emetics, as a rule, are dangerous. Calomel may be used as a purge, but its continued administration with a view to stimulate the secretion of the liver and other organs is a very doubtful expedient, as hundreds of grains often fail to produce any effect; indeed the want of secretion of these organs is probably due rather to a fault in the blood and in the nervous system than to one in them. Croton oil and salines are much employed as purgatives, but there seems to be no special virtue in the latter. The general opinion against depletion has reached this disease, although many old practitioners still resort to it—probably from habit. Mild diaphnetics and the external application of water of a temperature agreeable to the patient may be serviceable.

Quinine is very generally and largely used; theoretically we might expect more benefit from it than we actually find. Arsenic does not appear in the ordinary lists of remedies, perhaps

from a fear of its irritating the mucous surfaces, but it might be tried; Strychnia also, on the supposition that the Vagus is involved. Dr Lapland highly recommends turpentine, early in the disease, and its reputed qualities as a styptic, anti-septic, and stimulant entitle it to consideration. He also classes with it creosote, camphor, the chlorides and chlorate of potash. The perchloride of iron has been brought forward as an anti-hemorrhagic. To allay the irritability of the stomach, hydrocyanic acid is certainly preferable to opium, but ~~stimu~~ effervescent drinks are probably better. Stimulants generally must be freely used as the disease advances. Counter-irritations especially by means of stimulating liniments tend to relieve congestions, and the epigastric uneasiness. Articles of diet must of course be of the simplest and blandest kind.

The above or other remedies must be used in the different phases of the disease upon common-sense principles, care being taken to commence their administration in good time.

MORTALITY. The mortality, as might be inferred differs greatly, according to the type of the disease,

the persons attacked, the local circumstances, &c. Fear, in this as in other fatal epidemics, greatly adds to the mortality. Towards the close of an epidemic, more persons probably recover. Various tables shew the deaths among those attacked in different epidemics to have been occasionally as low as one in ten, usually one in two, three or four, but in some cases the numbers have been almost equal.

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## APPENDIX.

A. (page 4.)

Military records of cases. During an epidemic in the island of Trinidad in 1853, I remember turning over a volume of fever cases kept by the surgeon of the Regiment then stationed there, and wondering at the minuteness with which the symptoms and post-mortem appearances were entered (although I did not understand them). On asking him what would be the result of all this trouble, he said that he was obliged by the regulations to keep these records, but that he knew of no use that they would serve, that these volumes would be sent home and shelved as lumber. Poor fellow! he anxiously toiled away as long as he could with his daily increasing work (as he had done during another epidemic, the previous year, at Barbadoes), until he himself fell a victim to the fever.

It is needless to mention the great advantages enjoyed by military surgeons for obtaining accurate information regarding the diseases which come under their care, for the profession is already much indebted to individual labourers

for exercising these advantages, and giving precise views on disputed subjects. It seems a great pity, however, that for the disentangling of knotty questions - such for instance as Yellow Fever - some systematic use is not made of the varied and valuable records that the Army medical officers furnish. It is true that on some special occasions - as at Gibraltar, in the Crimea, or the Bermudas - efforts have been made to collect data, but how much more generally useful would be the regular accumulation and diffusion of information from this valuable source.

APPENDIX B. (page 11.) I am inclined to attach a high importance to the animal causes of Epidemic Yellow Fever from the instances given by Authors, and partly from my own (I must say very slight) experience in the West Indies. Although I have not by me any record of occurrences eight or nine years ago, yet ~~the~~ so strongly were the circumstances impressed on my memory at the time, that I can vouch for the general correctness of these statements.

(1). In 1852, at the ordinary time of year, Yellow Fever appeared in Barbadoes, shewing itself in some degree throughout the island, but with greater violence (as usual) among the troops, and the crew of a frigate, the "Dauntless"; after a time, on the garrison and sailors being encamped, the fever gradually disappeared. Of one regiment, the 69<sup>th</sup>, which was quartered in St Ann's "Stone barracks", I wish to speak particularly. The deaths in it were not numerous - so far as I remember, under 40, - but there was a remarkable contrast between the number of cases from different parts of the barracks. Nearly fifty years before, a surgeon writing of these same barracks, mentions that out of 278 men attacked with fever 77 died. The barrack (he says) has "low wet ground on each side", and the

men on the lower floor were taken ill "in the ratio of three to one of those on the upper floor" (This is one of the instances cited by Dr Bancroft to prove the marsh origin of Yellow Fever.) The "low wet ground" did not exist in 1852, perhaps owing to improvements, but the peculiarity in the ratio of the deaths was as well marked then - as doubtless it repeatedly had been in the epidemics which occurred between these two periods. In 1852, the barracks were in the form of a square: at one side were the officers quarters; opposite to them was a low line of buildings consisting of stables, guard-house &c; the other two sides were occupied by the mens' barracks, both ranges being two-storied; one was built of stone, the other of iron. At one angle, near the iron barrack and the stables, was the privy which would be used by between 500 and 600 men; it was, as usual, to leeward, and during most of the year, no unpleasantness resulted from its proximity, on account of the steadiness of the trade wind. But when (as happens occasionally during the hot months) this generally constant wind lulled for a few days, and a slight current set in from the opposite quarter (the south-west), a sickly fetid odor permeated the whole barrack, fever broke out

and removal became necessary. Now the special peculiarity, which I wish to notice is that the deaths were not only more numerous on the lower than on the upper floors of each building respectively, but that they were decidedly more numerous on each floor of the building nearest the privy; that is the men living on the upper flat of the iron range suffered more than those on the lower flat of the building on the opposite side of the square, and the men on the lower iron flat most of all. Of the officers living on the ground floor, three were attacked and two died; none living above suffered.

I find that this detailed description has occupied too much space, and must therefore state very briefly two other facts.

- (2) In the same epidemic, the whole family of an officer living at a considerable distance from the barracks, and away from marshy ground, suffered from fever, and the greater number died: their house was in the vicinity of the slaughter-house.
- (3) In the island of Trinidad, in 1853, a part of the 69<sup>th</sup> Regt again suffered from an epidemic, and the evil effect of faecal emanations seemed undoubted. Besides other exemplifications of this,

one was very evident in the fact that some six or eight tailors who worked close to the privy were all attacked, and died to a man, I think.

It may seem superfluous to bring forward these instances, when there are so many of a parallel kind constantly coming under our notice in this country. They form, however, a confirmation of these home cases, and shew the necessity for unremitting attention to sanitary improvements. Unfortunately, owing perhaps to the confusion reigning with regard to Yellow Fever, comprehensive sanitary measures do not appear to be entertained in the West Indies. In large cities, the very great difficulties in the way of carrying them out almost prevent effort, but since in the case of barracks, these difficulties scarcely exist, and improvements could be so easily effected, it is to be desired that the paramount importance of the matter should be adequately recognised.

APPENDIX C. (page 152) In explanation of these precautionary suggestions, I would say that in the two epidemics which came under my notice, removal under canvas to a low and otherwise indifferent situation was soon followed by a cessation of the attacks; and a return to the same barracks, after the close of the unhealthy season, was not attended by any bad result. But the delay in encamping, and the absence of proper precaution were very lamentable, and it is on this account that I suggest either an annual change of quarters, or that at least every preparation for a sudden change should be annually made. At Barbadoe, in 1832, for many days, marked cases of Yellow Fever occurred, affording ample warning; but so great was the responsibility of ordering a removal, that not until about half-a-dozen cases were terminating fatally one Sunday morning, was the encampment determined on. When it is considered that tents for a Regiment had to be got out of store, removed to a distance of about a mile, and pitched; that iron bedsteads, bedding, &c &c had to follow, and that the small carts used in conveying these things had chiefly to be scraped together from the neighbouring town on Sunday afternoon, some idea of the confusion and

difficulty of such a removal may be imagined. It is not easy to find an excuse for the want of preparation, but the delay (during which the seeds of the disease were being widely sown) was probably owing to a fear of incurring expense. Even in this point of view, it was a very mistaken policy, for if the cost of replacing the soldiers who died, (at £100 each, or even half that sum,) were taken into account, the expense of an encampment, or even of a new barrack would be well laid out.

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