Notes on typhoid fever : tropical life and its sequelae / by Jeffery A. Marston.

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TYPHOID FEVER:

TROPICAL LIFE AND ITS SEQUELÆ.

BY

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TO

JOHN ANDERSON, M.D., C.I.E., M.R.C.P.,

PHYSICIAN TO THE SEAMEN'S HOSPITAL.

My dear Anderson,

We have often been associated in past years in professional work, and always in friendship. In both respects I have been a great gainer.

These pages contain nothing, I am afraid, that you do not know already; but it is very pleasant to dedicate them to you in assurance of the warm regard and best wishes of your old and sincere friend,

JEFFERY A. MARSTON.

October, 1890.

PREFACE.

It is often superfluous and generally wearisome to say much in the way of explanation or preface as to a writer's aim and object in publishing.

The observations and impressions derived from a long and varied professional experience must be left to speak for themselves; they are either worthy of record or they are not; interesting or the reverse; and the reader is quite able to draw his own conclusions correctly in regard to them, which their author often is not.

But a military medical officer's opportunities and experiences differ materially from those of other members of the same profession. If he gains in breadth of view by personally observing disease under different aspects, in different climates, and under various conditions, he is apt to lose in exactitude and accuracy by breaks in the continuity of his observations, by his inability to obtain and apply at the moment all the aids and instruments of research available to those engaged in hospital practice at home, and by the loss or grave curtailment of the power of prompt reference to the records of medical literature. And, whereas a medical officer is compelled, at the time probably when his oppor-

tunities for seeing and studying disease are greatest, to devote himself to other and more pressing requirements, his *confrère* in civil life can concentrate his attention on some particular branch of study, multiply his instances, and complete or correct his observations. There is, however, this consideration to be borne in mind. In dealing with the diseases of soldiers we are dealing with men living in community, under exactly the same conditions. We know their mode of life, their habits, their outgoings and incomings, so that observations regarding a body of troops partake somewhat of the nature of an experiment; the conditions affecting the subjects of it are more exact and more thoroughly known than would be the case with a similar number of civilians.

The Notes on Typhoid Fever obviously make no pretensions to being elaborate or to being considered in the light of a treatise. The observations on Abscess and other Diseases of the Liver, and the paper on Tropical Life and its Sequelæ have already appeared in the *Lancet* and are republished at the suggestion of some of those who have read them, with the kind permission of the proprietors of that journal.

At the end of the first paragraph of page 49 the words "by excision of the perforation and stitching of the bowel, or by the formation of an artificial anus," have been inadvertently omitted.

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TYPHOID FEVER.

CHAPTER I.

Introduction.

It has often occurred to me that an interesting series of papers might be written under some such title as dropped stitches in the pathological pattern of typhoid fever.

The disease though stamped with a certain uniformity of type, so as to leave no doubt of its identity, presents so many points of affinity and contrast with other febrile diseases of a specific character, such varieties in itself, and so many concomitants, complications and sequelæ, which are commonly, but not necessarily, associated with its medical history, that the study of no disease surpasses that of typhoid fever in interest.

In the first place, it has no geography. It may be said to range from the Rocky Mountains to the Himalayas, notwithstanding that there is a close coincidence, indicative of a causal connection, between

its maxima of prevalence and those of climatic temperature. It is conterminous with the presence of the British soldier in India and all our Colonies, and with that of the European at home and abroad.

Next to consumption, typhoid fever probably gives rise to a larger amount of sickness and mortality than any other disease, and it is perhaps the most important of all the diseases making up the pathology of tropical and semi-tropical life.

The influence of race is an important factor in typhoid fever, and one which has arrested the attention of many observers. The Eastern and Southern races, the Asiatic, African, and mixed races, and the inhabitants of warm climates generally, enjoy a relative degree of immunity from attacks of typhoid fever—an immunity which is almost absolute as compared with "white" peoples, the inhabitants of cold and temperate regions. Opinions and beliefs based upon *à priori* considerations have been expressed to the contrary no doubt, but corroborative evidence, of which there should also be an abundance, is not forthcoming, and the fact remains as stated. The number of deaths from typhoid fever among the vast native populations of India occupies an insignificant position compared with the great mortality from that disease among the relatively small population of Europeans in their midst.

As regards Egypt, the observations of Pruner-Bey, Griesinger, and others, confirm those of MM. Colin and Laveran, as to the rarity of typhoid fever amongst the Natives and Creoles in Algiers.

In the 1882 Campaign in Egypt, and again in that of Suakin, the Native Contingent from India enjoyed an immunity from this fever, which prevailed so extensively and fatally among the European portion of the same force. And the experience of the French army in Tunis—on the same littoral as Egypt—was nearly identical with that of our own Egyptian campaigns. Every brigade taking part in the Tunis expedition suffered from typhoid fever, although separated from one another by considerable distances. The Zouaves and troops with Arab blood were not attacked, and, similarly, the troops coming from Southern France suffered less than those from the North; the native population remained unaffected. Other things being equal, the prevalence of typhoid fever among the French troops was in direct proportion to the amount of exposure and fatigue they had to encounter; and the large hospital corps of sick attendants suffered relatively less from this fever than other bodies of men, notwithstanding that their duties brought them more directly and intimately in connection with those suffering from that disease.

Compared with the contagious and febrile forms of the exanthemata, typhoid fever has a variable and often extended period of incubation, and there is none with which it corresponds in this respect. In the ordinary exanthemata, for example, the incubationary period is pretty definite and well known; but in typhoid fever it is far otherwise. On the one hand, it may manifest itself within ten days or so after exposure to its apparent cause; and, on the other, its earliest manifestations may not declare themselves until as many weeks have elapsed as there have been days in the case of the acute exanthemata. About this prolonged incubation in typhoid fever I hope to have much to say later on.

There is no disease in which the symptoms of its invasion manifest such variety. Typhoid fever may occur after an ill-defined period, and an ill-defined kind of malaise; after a febrile sort of dyspepsia or "bilious attack;" after a period of insomnia and headache; after an attack of tonsillitis and sore-throat; after a period of a progressively rising temperature; after a rigor, or a sudden increase of temperature, or an acute paroxysm of fever, like an intermittent or ague fit, and so on.

In small-pox, measles or scarlatina, the characteristic exanthem appears in a few hours or a few days, but in typhoid fever the rose coloured spots,

which are so frequently its outward and visible sign, do not make their appearance until about the end of the first week, and frequently even later.

And, in the exanthemata, the skin affection, when it does appear, does so once for all, within a definite period of time and with a certain uniformity as to the region affected; but in typhoid fever the spots upon the skin, corresponding to the exanthem of other constitutional febrile diseases, frequently occur in successive crops, sparsely or copiously, so variable in quantity as to amount to two or three only, or so numerous that they cannot be counted, but coming in successive crops, it may be during the whole course of the disease, each crop of ephemeral character, appearing and disappearing in the course of a few days, so that the average total duration of the eruption is fourteen or fifteen days. But what is a still more curious phenomenon, a relapse, properly so designated, following a distinct and well-marked period of apyrexia, may be attended with a recurrence of the cutaneous eruption, occasionally even with more numerous spots than had appeared in the primary attack, and following exactly the course and duration that its predecessors had done. On this subject, too, I hope to make some remarks subsequently when the pathology of typhoid fever comes to be considered.

As regards the varying or different degrees of severity—from mild to grave types—typhoid fever is allied in this respect to the exanthemata, but in none of them is there exhibited such an apparent tolerance of the symptoms as is occasionally seen in cases, and sometimes fatal cases, of typhoid fever, which have hence been designated the ambulatory form of that disease; and, on the other hand, as in the case of scarlatina, the nervous system and physical powers may be so overwhelmed in some rare examples of typhoid fever, that the patient's condition may resemble that seen in a severe form of typhus fever, and he may be dead before the anatomical lesions of the disease have fully developed themselves.

As regards the course of typhoid fever, if we strike and obtain an average duration of the disease, computed from a large number of cases, there will be many exceptions, that is, a number of departures from that average at either end, and especially in that the fever is often much prolonged beyond the average time.

Moreover, as in small-pox and scarlatina, but more strikingly, perhaps, in the case of typhoid fever, there is a double disease present, in that there are two distinct sets of morbid phenomena unfolding themselves, which are capable of being

grouped in two divisions: one primary, essential and referable to the typhoid fever process itself, the other secondary and common enough, but still non-essential, and referable to septicæmic processes consecutive to, and consequent on, those destructive ones set up by the morbid lesions attending the typhoid fever process.

If we except ague and relapsing fever, with neither of which are its phenomena at all allied or comparable, typhoid fever is about the only disease characterised by so-called relapses, where the pattern of the first set of phenomena is repeated in subsequent attacks, the series making up one and the same sequence of results, and attributable to and developed out of one and the same cause or conditions.

Then there is the remarkable susceptibility to the disease on the part of young adults newly arrived in warm climates. For example, the disease of which young and unacclimatised soldiers die in India and hot countries is typhoid fever. Cases of this fever occur in nearly every corps and battery of Royal Artillery that disembarks at Bombay, during their first and second years of service in India. Notwithstanding that such troops are distributed throughout the various military stations and commands of the three presidencies, out of 73 regiments and batteries that came to India between 1871 and

1877, only nine remained free of enteric fever in the first twelve months after landing, and I believe that no material change has taken place in this respect since that time. The liability, in the case of a soldier of over seven years service in India, to die of this fever is only 3·87 as contrasted with 82·44 in the young and recently arrived, and 13·69 in the class resident from five to seven years, reckoning the liability at 100. This constitutional vulnerability or susceptibility of young men recently arrived in a hot climate arrested my notice more than a quarter of a century ago, and attention was directed to it in a paper on the fevers of the Mediterranean, published in 1861. Andral had long before remarked on a similar fact in connection with students coming to Paris from the provinces of France, and the subject has since been thoroughly worked out by the late Dr. Bryden. The anatomical structures in which the typhoid fever process has its *rôle* are the glands, Peyerian and solitary, of the small intestine. Louis said that in order to determine the presence of typhoid fever it was not necessary to see the whole body, you had only to look at a few inches of the ileum. These glands cease to have any physiological significance after middle age, and we can consequently understand the relative immunity of persons of fifty years of age and upwards from attacks of this fever.

As regards the causation of enteric fever, there is still much diversity of opinion among European pathologists; and this diversity becomes more sharply defined in the case of those whose sphere of observation has not been limited to Europe, but has included that of other continents, climates, and races.

Typhus fever is a disease of the poor, the overcrowded, and the grain-feeding peoples, and contagion is a main and dominating factor in its spread. Typhoid fever is quite as much a disease of rural as of urban populations; it is no respecter of persons, attacking the rich and well-to-do as well as the poor; it is a disease of the flesh-eating races, and direct contagion is not the principal cause of its spread.

As the religions of the world may be divided into Buddhist and non-Buddhist, so may the creed of the medical world in regard to this fever.

When Dr. Budd's papers originally appeared in *The Lancet* they were so logical, lucid, and plausible, that, in common with most people, I was almost persuaded to be a Buddist; but the inexorable logic of facts and experience—which somehow did not seem to fall naturally within his doctrine and refused to be reduced to any arbitrarily devised system—made me hesitate.

Budd's views simply and shortly are these:—Typhoid fever is an infectious fever and mainly through the excreta. Sewage, that is indifferent matter, may exist for an indefinite time without giving rise to enteric fever, but once introduce the specific material derived from a diseased intestine, and you have a focus of infection. He gave numerous illustrations and went on to compare the sewer to a prolongation of the infected intestine. He regarded the spontaneous origin of typhoid fever as mythical as the spontaneous origin of a plant or a man, and said that the evidence on which the hypothesis rests is negative only—consisting solely in our inability to trace the continuity of a chain whose connecting links are known to be invisible—and he proved that an impossibility in tracing lineage is of no force as an argument against propagation by continuous succession.

Budd set forth and defended his position in one of the most masterly treatises in the English language.

Since his time other views have been advanced, from those of Murchison's pythogenetic theory to the latest, that of Gaffky and others, viz., that typhoid fever depends upon a specific organised pathogenetic poison—a specific variety of short rod-shaped bacteria (bacilli) which appears in this

disease alone and is to be found in the intestine, especially in the lymphatic apparatus, mesenteric glands, spleen, liver, and kidneys. Investigations into the etiology of typhoid consequently, it is urged, must now be undertaken to ascertain how and through what channels these bacilli get into the bowel.

It must not be forgotten, however, that there is another class of observers who, looking to the diversities of climate, altitude, soil, sanitary and social arrangements under which typhoid fever manifests itself, have come to regard the positive doctrines advanced by the observers of one country in regard to the etiology of this disease as either inapplicable to, or as requiring much modification in order to adapt them to the same or similar occurrences in another country; and these would contend that the doctrine which holds the invariable descent and dependence of one case of typhoid fever on another and preceding one in lineal continuity is altogether too limited and exclusive to embrace all the facts; indeed, some would go so far as to deny not only the adequacy of infection, but even of filth conditions, pythogenetic causes, to account for all cases of the disease in question.

They would by no means set aside or undervalue the importance of the evidence and experience in

favour of the intimate connection of this fever with specific infection, or with filth causes with which, according to most European authorities, it is invariably associated.

They would regard it as at least highly probable, if not proved, that typhoid fever, however and whenever occurring, may be spread by infection under certain circumstances, and that the occurrence of local outbreaks or "household epidemics" of that disease was very properly attributed to the presence of certain causes or conditions with which they had been so repeatedly found associated, and where, moreover, the evidence and sequence of events made up a consistent history indicative of the action of a common cause. But in the case of tropical and semi-tropical countries—let us say India, for example—they would contend that there are a number of cases which do not possess any such medical history, and cannot be so accounted for; consequently, these observers have had recourse to another hypothesis which may be formulated as follows:—

The altered conditions of life to which the young and recently arrived soldier in India is exposed, subject him to a great constitutional change—from the influence of climate, using the term in its widest significance as including altered habits of life, diet, and notably increased climatic heat—coincident with

which, and consequent upon it, the abdominal viscera, with their lymphatic and glandular systems, are in an exalted state of physiological activity; and that, in many instances, this physiological activity overstepped its limits and became pathological—in other words, that swelling and disease of Peyer's and the solitary glands took place, and that the clinical and pathological phenomena of enteric fever became developed and evolved out of this morbid condition.

These observers would therefore be driven to the conclusion that one and the same phenomenon, or set of phenomena, need not invariably be the result of one and the same cause. They would probably hold that there is a variety of typhoid or enteric fever, apparently identical, as far as its clinical features and post-mortem lesions are concerned, with the typhoid fever of European pathologists, which should be ascribed to a combination of conditions rather than to any one specific cause, to co-existences and sequences of causes (to the investigation of which the principle of elimination could not be applied in an unqualified way) rather than to successions of phenomena; in short to the various factors present in a new environment. And they would regard this variety of typhoid fever as the gradual result of an intoxication, instead of ascrib-

ing it to the action of a specific poison directly introduced from without and perfectly foreign to the individual affected.

Similarity, or even apparent identity, of the anatomical lesions discovered in a given structure is presumably, not necessarily, a proof of pathological identity, or of their being really the product of one and the same cause. Peyer's patches and the solitary follicles of the small intestine are but aggregates, agglomerated masses of lymphatic tissue, one of whose functions is that of physiological filters, and different morbid irritants affecting those structures may give rise to the same or very similar lesions. If the same typhoid bacillus be invariably found in all the fatal cases in hot countries the fact would no doubt go to establish their pathological identity with typhoid fever elsewhere, but this has not yet been demonstrated.

But to the practitioner the interest of a study of typhoid fever mainly gravitates in the direction of its varieties and their causes, its pathology, clinical history, relapses, and treatment; and it is with these that I propose first of all to deal, before proceeding to an investigation into its causes, that is its etiology.

CHAPTER II.

Typhoid Fever: its Varieties and Periods of Incubation.

Typhoid fever, described under various synonyms, is a fever of different degrees of severity and duration, but invariably lasting, even in its mildest form, beyond a week, with an evening temperature of over 100°. It is characterised by a tendency to abdominal symptoms, looseness of the bowels, by the frequent appearance of crops of lenticular rose-coloured spots and pulmonary complication; the disease is accompanied with some splenic enlargement, a swelling or infarction of the Peyerian and solitary glands, followed usually by more or less ulceration of those structures, and attended with enlargement of the mesenteric glands.

It is, of course, commonly found that in a given number of cases of this, as of any other disease, one or other of the above characters, such as the spots or the diarrhœa, is absent. A description of disease has never the accuracy of a photograph, but there is no more difficulty in identifying typhoid fever than any other disease by its general con-

formity to the group of symptoms, which, as a whole, serve to distinguish it. When, however, the period of observation is limited or there are no characteristic symptoms, or where these have not developed themselves, the exact nature of the disease may be doubtful; it cannot be diagnosed; its nature can only be surmised. Still, even in the absence of rose spots, the temperature and course of the symptoms in any case that has been under observation for a week or ten days will leave little or no room for reasonable doubt.

Although it is common enough to meet with more or less typical cases of typhoid fever, it must be borne in mind that in actual practice, especially in warm climates, this fever does not invariably conform to the temperature ranges which have been far too arbitrarily laid down by Wünderlich and other medical authors; for a fever may be non-conformable to such ranges and to typical temperature charts and yet be indubitably typhoid fever.

The varieties of this fever may be grouped as the mild and severe forms, with, of course, those of an average medium kind in point of duration and severity; the insidious, latent or ambulatory form; the so-called relapsing variety of typhoid fever in which, instead of the phenomena and stages of the disease being evolved and developed in continuity

from its first to its final stage, the disease is made up of a series of attacks with repetitions of essentially the same morbid phenomena, but separated from each other by short intervals of apparent convalescence and absence of fever; that variety—more commonly seen in hot than in temperate climates—in which the glands of the larger bowel are unduly affected, or dysentery is superadded to the typhoid fever; and, lastly, that variety in which the phenomena of the typhoid fever proper may be complicated by those attributable to a previous malarious history. I do not, it may be remarked however, recognise typho-malarial as a separate fever, or as the true hybrid of typho-malarial parents.

We have, first of all, to consider the period of incubation. There have been a large number of observations of a more or less exact kind recorded in respect of this by the medical officers of the Local Government Board in their official reports upon outbreaks of this disease; and by numerous other authorities also. These investigations have been often based upon observations of a precise kind; the circumstances connected with the attacks have been such as to have referred an outbreak of the disease to a common cause, operating at a given definite time upon a given number of individuals or a

community, and almost to have partaken of the nature of an experiment. If I do not cite the results of such experience it is not that I underrate their value, but their records are already available, and it has seemed preferable to limit the inquiry to facts that have come within my own knowledge and experience, in order to see whether any, and what, light can be thrown upon it by independent investigation and judgment.

It was an important part of my duty, of course, not only as an executive medical officer engaged in active professional work, but as a member of the Head Quarter Medical Staff, and in connection with the sanitary branch of the War Office and the Army Sanitary Committee, to have to investigate a number of such outbreaks and occurrences. To enter into all the details would prove a very tedious and lengthy proceeding. Consequently, I limit myself to a statement of the general conclusions arrived at. These fall naturally into two groups or divisions :—

1. Where water contamination has been the apparent cause. I set aside, for practical purposes, the question of whether such contamination was specific in kind, that is to say, derived from the body of a sufferer from typhoid fever or not; let it suffice, that the evidence was sufficient to my mind to

establish the fact, or to render it, at any rate, highly probable, that the contamination was that of sewage —a fæcal contamination.

Again, whether the effect of drinking such water gave rise to a disease which was classified and treated as "diarrhœa" or typhoid fever does not affect the issue, where a certain number of cases of that fever made up part of the medical history of the occurrence in question.

The inference has been derived from such circumstances as the following:—where a particular water-supply after having been consumed for a long time with immunity to health has been cut off, and the use of other water substituted for it was followed by sickness at a definite date after it had been brought into use, and where such water proved on chemical analysis to be impure, and the source of its contamination had sometimes been traced; and, similarly, where water shipped on board a vessel has proved to be impure and an outbreak of typhoid fever followed its use; together with other occurrences of a like character.

The interval that has taken place between the consumption of such contaminated water and the manifestation of disease has been 5, 7, 10, 14 days, and upwards; the two earlier periods commonly being those in which the patient's illness was

ascribed to diarrhœa, the latter where it was recognised as typhoid fever.

2. One great difficulty in inquiries into the origin of typhoid fever is the long and uncertain periods of its incubation and that of its undefined insidious commencement. The period may be very short where an individual, for example, has been poisoned by exposure to the concentrated products of sewer air, and the disease manifests itself almost at once and virulently; or, on the other hand, the incubation may be very long.

The late Prof. Parkes referred to this in one of his papers published in the Appendix to the Army Medical Department Report for 1872. Dr. Parkes said that he possessed notes of an undoubted case in which the disease appeared 29 days after exposure. But I think there is evidence to indicate that the period of incubation may be much more prolonged than even 29 days.

As everyone knows, the British troops in the Egyptian Campaign of 1882 and subsequent campaigns in that country suffered much from typhoid fever. On the termination of those expeditions the troops returned in large numbers to this country and were quartered in different garrisons and barracks of the United Kingdom. The disease became unduly prevalent among them after their arrival

home; and that it had been contracted and was the result of the conditions to which they had been exposed in Egypt seemed to be shewn by the fact that they exclusively were attacked by it.

And that which was the case at home stations was likewise the case at some stations abroad, viz., the troops from Egypt suffered from typhoid fever, other regiments in the same garrison, and other soldiers even of the same regiment and occupying the same barracks or barrack rooms not being affected at all, or when attacked, as happened in some instances, not until subsequently. And what was true of the men was applicable to the officers also, several of whom manifested no symptoms of typhoid fever until long after they had left Egypt.

I can recall more than one case in which officers, appearing before medical boards for wounds or diseases contracted in Egypt, were subsequently attacked with typhoid fever. One officer of my acquaintance, a member of the staff of the Viceroy of India, proceeded to Egypt, went through the campaign, and then proceeded to Paris, where he spent some time. He returned to this country and became the subject of typhoid fever, of which he died in London.

Unfortunately I had not an opportunity of recording the exact dates, but the interval between

his leaving Egypt and manifesting the disease was so long as to have quite excluded the idea of his having contracted typhoid fever in that country, and I had no doubt in my mind at the time in attributing it to the period he was in Paris, where the disease was prevalent, but subsequent experience in connection with other officers who had been in Egypt, but not in Paris, rendered this view doubtful. An officer was invalided from Egypt on account of a wound. Whilst on sick leave in this country he had the offer of a staff appointment in Egypt, and came before a medical board with a view to being allowed to return to duty and take up that appointment. Thinking that he did not look well, in spite of his assurances to the contrary, I took his temperature, and finding it abnormally high, remarked that he should go home and to bed. He did so, and subsequently told me he had remained in bed for six weeks from an attack of typhoid fever, and that Sir W. Jenner had seen him in consultation on his case. This officer left Egypt on the 13th of April, 1885, and took to his bed with what proved to be a severe attack of typhoid fever on the 13th of July following. In the interval, after his arrival in this country on the 28th of April, he had been fishing in Scotland.

This subject of the occasional prolonged incubation

of typhoid fever arrested my attention soon after the Egyptian campaign of 1882; and to indicate that it had not escaped the attention of others I may mention that Surgeon-Major Harrison, M.B. Lond., F.R.C.S., of the Grenadier Guards, in March, 1883, was good enough to send me a list of the cases of typhoid fever which occurred amongst the men on their return from Egypt and were treated in two of the three hospitals of the brigade of guards in London. The list comprised thirty-two names, but did not represent a complete roll of all the cases, for fourteen or fifteen in addition were treated in a third hospital, and a few cases also occurred at Windsor.

The point, however, to which Surgeon-Major Harrison specially called attention was, that although the battalions left Alexandria at the end of October and in the first week of November, cases of typhoid fever continued to be admitted for nearly nine weeks after that date. Even supposing the disease was contracted from water on shipboard—which is not at all probable—the incubation is a very long one.

In one case of which I had record, there was an interval of about seventy days between the dates of departure from Egypt and the recognised manifestation of symptoms of typhoid fever. In another, that of a cavalry soldier, sixty-three days; and in

two cases—infantry—there were intervals of thirty-six and twenty-three days respectively, between the dates of embarkation from Egypt and admission to hospital for enteric fever. In the case of an officer (in 1885) twenty-four days elapsed. In that of an infantry regiment, out of six cases of typhoid fever (two of them fatal) the interval between the date of leaving Egypt and that of admission to hospital, ranged from twelve to thirty-three days.

Some facts in connection with the expedition to Suakin in 1885 are interesting in the same direction.

The brigade of foot-guards arrived in Suakin in March 1885, and left on the 14th and 18th of May following.

During the stay of the Coldstream and Scots Guards at Suakin, enteric fever had not declared itself, and the first cases were noticed on their return in the Red Sea. The brigade of guards went to Cyprus, which they reached in the middle of July, 1885, and left towards the end of August (26th and 27th). The steamers conveying them to England arrived at Spithead on the 10th of September following. It was stated in an official report that typhoid fever was unknown at Troödos before the arrival of the brigade of guards, and that the site of the camp was as healthy as any place could be. On the 28th of August a private of the Scots Fusilier Guards

died of typhoid fever on board the "Poonah" and was buried at sea, and after leaving Malta (29th of August) four fresh cases occurred. These occurrences took place seven weeks after leaving Ramleh, and some three months after leaving Suakin.

The symptoms of typhoid fever are frequently so insidious and undefined at the commencement, that it is, of course, very difficult to assign the actual date of the patient's illness before his admission to hospital.

In January, 1887, I had the records searched of the medical occurrences in connection with the prevalence of typhoid fever among the troops that had returned from Egypt, with the view of ascertaining the number of days that had elapsed between the date of their departure from Egypt and that of admission to hospital for this disease, and the results of over fifty cases were tabulated. The interval extended from under three weeks to nearly three months, and in a few instances was so considerable that one is compelled to have recourse to a subsequent fresh infection in this country by way of explanation; still, the broad general fact remains, and its significance and point consists in the circumstance that the disease prevailed so disproportionately, and in many instances exclusively, among those who had been in Egypt and undergone the

exposure and hardships of service in that country; notwithstanding, as I have said, that the troops on their return were quartered in different places, and occupied barracks contiguous to, and in some cases the same barracks or barrack-rooms as, men who had not been in Egypt and who escaped the disease. The obvious inference is that the episode of Egyptian service was not a simple coincidence, but that it probably stood in some causal connection with the result, typhoid fever.*

* Murchison in his *Treatise on the Continued Fevers of Great Britain* (1873), speaks of two cases in his own practice in which the period of incubation was not longer in one case than twenty-one days, and in the other than fourteen. He alludes to De la Harpe's inference from twenty-one cases, that it varies from six days to eleven weeks! But none of his observations, Murchison adds, fix the duration precisely.

CHAPTER III.

TYPHOID FEVER: ITS VARIETIES—MILD, SEVERE, LATENT OR AMBULATORY, AND RELAPSING FORMS—SYMPTOMS; PATHOLOGY AND DIAGNOSIS.

A CONSIDERATION of the varieties—the different forms, types and degrees of severity—of typhoid fever, is not devoid of practical interest, but with regard to some of them we are still ignorant of the precise nature of their anatomical morbid lesions. For instance, there is every reason to believe that a very mild and abortive form of typhoid fever exists, but of the exact nature and extent of its concomitant morbid lesions in the intestines and mesenteric glands we know but little, for such cases are obviously not fatal. The fact, however, that they occur under the same conditions, time and place, as indubitable—and occasionally fatal—cases of typhoid fever, naturally causes us to attribute them to the same origin. Frequently, when there is a well-marked outbreak of enteric fever, the occurrence of cases of diarrhœa forms a precursor to such outbreak; and, together with cases of pronounced

typhoid fever, other very mild forms of fever, with possibly some gastro-enteric symptoms, frequently prevail, indicative of some mutual, etiological and pathological alliance between them. Take a case like the following, which it would be easy to multiply: a lady suffered from a very severe and prolonged attack of typhoid fever in a station where that disease had often prevailed, and while living in a house where a case of enteric fever had previously occurred. During her convalescence her husband was attacked. He manifested symptoms indicative of that fever, including the appearance of a few rose-coloured spots at the end of the first and beginning of the second week, but the fever temperature, which had never been high, sank at the end of the first week to 100°, and soon afterwards became normal; there was some splenic enlargement, but no abdominal symptoms, no diarrhœa; the loss of flesh and strength was insignificant, and the patient, after the first week of febrile invasion, felt quite well, and his illness was not followed by sequelæ of any kind.

It is, of course, a safe practical rule to treat all cases of diarrhœa, attended with pyrexia, as typhoid fever, until further observation has proved the contrary. The events making up the medical history of an army in the field develop themselves with a regularity that is almost monotonous. Looseness of

the bowels, under the name of camp diarrhœa, begins to be common almost as soon as the army takes the field. This is, in a large number of cases, quite compatible with apparently good health, and is largely attributable, no doubt, to a changed condition of climate and life. But soon cases of fever appear, some of very brief duration, which are classified as heat fever; in some others, the sickness begins to lengthen out, and to be attended with diarrhœa, marking the commencement of enteric fever in the force. The subsequent development of the disease, and the proportions it will assume, will then be merely a question of time and circumstances, and it will embrace every variety, from the mildest to the severest types, from the latent, so-called ambulant, and relapsing to the most fatal forms. In the milder varieties the thermometry of the fever fails to be recognised, or, at any rate, fails to be recorded with any degree of accuracy. On field service, and in a rapid campaign especially, it cannot be otherwise, and it is as impossible to say when the disease began as to give anything like an accurate numerical expression of its extent.

In such cases as these, that is to say, in the mildest forms where the morbid phenomena are rudimentary, little marked, and of brief duration, the anatomical lesions must be very slight, and the

new material deposited in the glands would either be absorbed without previous disintegration and ulceration, or the ulceration must be very limited in extent; the glands probably rupture and discharge their contents into the bowel with trifling breaches of surface, leaving very superficial net-like appearances in Peyer's glands to indicate the seat of rupture and elimination.

Whilst serving in India I tried to ascertain whether undue prominence or tumefaction of the glands of the smaller bowel was frequently present or not in individuals dying of other diseases than typhoid fever, and the very limited results of such inquiries led me to imagine that it often was so—in soldiers dying of heat apoplexy for example; and I endeavoured, at the same time, to elicit information as to the state of these glands generally in order to determine two points: first, whether their enlargement, or increased vascularity and catarrhal inflammation of the bowel in their vicinity, was a common phenomenon among Europeans residing in India; and second, what were the signs, if any, accompanying mild and unrecognised forms of typhoid fever. I regret that the data proved insufficient, however, to form any conclusion.

In a typical case of typhoid fever of medium

severity the disease unfolds itself in a definite series of phenomena and after a regular pattern. Those which belong to one stage do not continue into another or repeat themselves. Apart from complications and local affections that may interrupt or disturb its course, the different phenomena make up a sequence in their continuity. The temperature rises gradually from day to day by regular ladder-like steps till it reaches a maximum, remains stationary for a certain period, fluctuates, and then descends by way of those deep daily dips which are peculiar to it. The fever is of a remittent type, and while the temperature almost invariably rises towards the evening of each day, it sometimes happens that there is a closer relation between the temperatures of alternate days than between those of two succeeding days. The headache of the early period is not accompanied, but replaced later on, by delirium; their co-existence—complaints of great headache combined with delirium—being rather suggestive of intracranial disease than of uncomplicated typhoid fever. The more active and noisy delirium gives place to that of a dreamy apathetic kind. The constipation is often replaced at a later date by a looseness of the bowels or serious diarrhœa; pulmonary symptoms tend to appear at a definite date; and the close of the phenomena at-

tributable to the typhoid fever process is succeeded by the appearance of those of another set—of a septicæmic character.

Everybody is familiar with the ordinary type of the disease, and on the picture of it, as presented by cases of medium severity, there is no need to dwell; but the variations from it are very numerous. One epidemic differs also from another. The heat of a tropical or warm climate, when superadded to the fever heat proper to the disease, augments the distress and danger to which, in the case of a campaign, the transport of the patient, when rest and quietude are so essential, introduces a still further element of risk and danger. In many cases in India I have noticed that the attack tends to terminate, critically as it were, on or about the twenty-first day, and I think I have remarked this more in India than elsewhere, but there are so many exceptions to any general statement, that an average is only an approximative one and of little practical value. If even the mildest case of typhoid fever gives rise to a certain amount of anxiety on the part of those best acquainted with its nature and occasionally untoward results, we frequently need not despair of the severest case, or rather of one in which a stage of the greatest prostration and enfeeblement has been reached.

With regard, however, to cases at the opposite end of the scale to those which might properly be designated the mildest and most rudimentary forms of the disease, it is very important to see if we can discover any features by which they—the severe and more fatal varieties of typhoid fever—can be distinguished.

I am not alluding now to those latent or ambulant forms in which the patient often seeks medical advice, or is admitted to hospital, at an advanced stage of the disease, and then possibly complaining of symptoms of some outlying pulmonary or other affection, only to die in a few days of perforation of the gut and peritonitis. Such cases are by no means very rare, and they occasionally give rise to very unfounded imputations of ignorance or neglect on the part of their medical attendants.

The cases to which I am referring are rather those in which the constitutional symptoms and the nervous disturbance are indicative, at an early stage, of its grave or severe nature.

Some cases of this kind are occasionally mistaken for typhus fever, to which their symptoms bear some resemblance.

The patients have a heavy dull drunken aspect, the face is rather flushed or venously congested, the pupils are contracted rather than dilated and the

conjunctivæ injected; there is unwillingness to speak or to be disturbed; tremor of the tongue, facial muscles and hands is present; the patient sometimes grinds his teeth, the muscles of the extremities often twitch when he is asleep, and in some cases I have found the tendon reflexes increased; the headache is severe and soon passes into a noisy active delirium at night, and the patient may become comatose; the tongue is often broad, thickly furred in the centre, with red tip and edges (not red, dry, glazed, fissured and pointed); the amount of urine is much diminished, slightly albuminous, deficient in chlorides, but of high specific gravity, and sometimes in hot climates, though rarely, dark with bile pigment. The abdominal symptoms are not marked; there is tolerance of pressure, or the tenderness is very trifling and bears no relation to the amount of anatomical lesion discovered after death, which usually occurs too early for the appearance of diarrhœa and pea-soup stools.

The temperature in such cases is usually high, but this is not invariable, and the symptoms cannot consequently always be referred to hyperpyrexia. The pulse, however, is commonly very frequent—120 and upwards—sometimes soft and dicrotous, irregular or intermittent, but occasionally it is a pulse of tension.

It is a matter of common experience that the higher the temperature the graver the case, and that slight and short morning remissions, sudden rises, irregular ranges and fluctuations of temperature, are indicative, as a rule, of a severe form of the disease.

If the patient's illness has advanced beyond the first week, spots may appear on the skin, and in a few cases I have seen petechial or purpuric spots, together with vibices and bullæ on the extremities, in addition to, and independent of, the ordinary rose-coloured papules. These petechial or purpuric spots were persistent on pressure, but in other respects they did not resemble the mulberry rash of typhus fever.

As Sir W. Jenner pointed out, marked muscular tremors, the mind being clear, indicate deep ulceration of the intestine.

Speaking generally, it may be said that the risk of relapses and of a prolonged course and duration of the disease is in proportion to the mildness of the attack; in other words, the disease often makes up by its long continuance and by the way it spreads itself out for what it lacks in point of severity. Instead of the diseased process going on continuously to completion in all the affected glands within a definite period of time, it takes place

in successive crops; the tumefaction, softening, and ulceration, ensuing in a certain number of glands and in a limited extent of intestine at one time, and another set of glands and portion of intestine at another time, with an interval between these occurrences. This introduces, however, some debateable points connected with the pathology of the disease, which must be considered hereafter. Be the explanation what it may, the fact to be recognised in the meantime is, that there is a variety—and a very important one—of typhoid fever, called the relapsing form. In this variety the disease may repeat itself after having apparently already run its course, and may spread itself over three months or more. A typical relapse resembles the primary attack in all respects, except that the course is shortened and more condensed, and, as a rule, the morbid phenomena are more in miniature as it were.

By a relapse is meant a fresh attack after a distinct interval of apyrexia and an apparent convalescence of five, seven or ten days or more; and there may be more than one such relapse. I think, but it is somewhat difficult to be sure on this point, that in these cases, the spleen does not return to its normal size during the apyretic interval.

The relapsing is a common variety of the disease,

but, happily, not, as a rule, a fatal one; the majority of cases recover in time.

The temperature in a relapse begins to creep up in the same ladder-like way that it did in the original attack, and there is a repetition of the clinical details of the case.

As a rule the temperature keeps rising during the first five days of the relapse, continues high up to the eighth or tenth, and then begins to descend—sometimes very rapidly, almost critically, and it is almost always lower about the tenth or twelfth day than it was on the corresponding days of an ordinary primary attack. False relapses or recrudescences, as they are called, have shorter periods of apyrexia, are irregular in all respects, and are not attended with the rose spots and other clinical phenomena of typhoid fever, but are due to some intercurrent local affection or complication.

When a case of typhoid fever occurs where there are relapses, or where these, again, are complicated with increases of temperature from other causes, the case may assume a very mixed character, and it may be as difficult to find the cause of, or a clue to the phenomena as to unravel a cat's-cradle. In some rare cases, of one of which I preserved notes, the prolongation of the fever and other symptoms are found, on post-mortem examination,

to have been due to a suppurating mesenteric gland having formed an opening by ulceration into a contiguous portion of the intestine, the two parts having been agglutinated together by previous peritonitic adhesions.

I think the ready acceptance given to the view of there being a separate and distinct variety, designated typho-malarial fever, arose more in consequence of that expression having met several practical requirements and covered the conditions under which cases of typhoid fever often presented themselves, than from anything distinctive in the clinical features or post-mortem appearances. Murchison recognised a malarial stamp in some of his cases; and there can be no doubt that the subjects of malaria in warm latitudes are often attacked with typhoid fever, in which case the latter disease may follow, or be followed by, the former (ague). The occurrence is probably a coincidence rather than due to any causal connection between them. Typhoid fever may appear to follow, and often does follow, an attack of ague, and similarly, an an attack of intermittent (with a temperature 105°-107°) may take place during convalescence from typhoid fever. Still there is no reason, as I have said, to suppose that this constitutes a separate entity or variety, a typho-malarial fever, or a hybrid

product of the double parentage implied by that term. The most malarious stations in India, for example, do not furnish the largest number of cases of typhoid fever, nor is the season for the prevalence of the one disease that of the greatest prevalence of the other. It must be borne in mind, too, that eccentrically high temperatures of very brief duration are not unknown in cases of typhoid fever treated in non-malarious countries and subjects. The intimate connection and correlation of heat manifestations with nervous influence are well known, and in typhoid fever often rendered evident.

There is a somewhat rare variety of the disease which seems to be, and very naturally, more frequent in hot climates than in temperate ones. It may be designated—the dysenteric.

In this form the diarrhœa is of a dysenteric kind, and the stools partake of that character rather than of the ochrey pea-soup colour and consistence of typhoid. In fatal cases the solitary glands of the large intestine and rectum are found enlarged or ulcerated, together with signs of a diphtheritic inflammation of those parts, in addition to the glandular lesions of the ileum and cæcum indicative of typhoid fever. The symptoms of dysentery in such cases may be earlier, more pronounced, and urgent than those of the typhoid fever; the stools frequent,

accompanied by some tormina and tenesmus, and sometimes containing blood and mucus. But there is more fever present than usually accompanies dysentery, and more tympanites—the belly tends to become tub-shaped. This variety of the disease occasionally occurs in individuals soon after their arrival in India; but I have seen the symptoms of dysentery so pronounced in the case of an officer's wife in the Mediterranean that the disease was treated as dysentery until the subsequent progress of the illness left no doubt of its nature—typhoid fever.

It is not uncommon to find the glands of the large intestine affected in fatal cases of typhoid fever in this country, but the complication of dysentery is very rare.

The symptoms and pathology of this fever are described in every ordinary medical text-book. But it seems desirable to add a few remarks on these heads, and on the differential diagnosis and the prognosis of typhoid fever, before considering its treatment and causation.

The lenticular rose spots generally appear about the sixth or seventh day, rarely earlier, frequently later. The spots are papular, pink or rose-coloured, temporarily effaceable by pressure, and do not vesicate, although it may happen that a very minute

vesication is occasionally discernible on their summits. Each spot lasts 3, 4 or occasionally 5 days.

They commonly appear upon the front of the trunk, but it is always well to look for them on the back also. The amount of the eruption has no particular significance; for the spots are not at all more numerous in the severe than in the mild forms—rather the reverse in my experience. The eruption is often absent in children and in individuals of over 30 years of age; and it is more frequently absent in cases of typhoid fever abroad (in tropical and demi-tropical climates) than at home. It is certainly more difficult of detection and identification in hot climates owing to the presence of other skin affections.

The eruption is quite copious in some cases of typhoid fever. Its amount is, I think, greatest in young subjects of fair complexion with delicate skins and an active tegumentary circulation, in whom the earlier crops of spots are sometimes very pink, while those which appear later (in the diarrhœal stage of the third week, for instance, when the patient is much enfeebled) are often of a deeper, less delicate tint.

Such spots in a doubtful case of fever are, no doubt, diagnostic of its nature; but they often occur too late for their discovery to be of any great value.

It sometimes happens that, after a brief fall of temperature and apparent improvement of the patient's condition, fresh abdominal symptoms, with increased tenderness, tympanites, and diarrhœa occur, and these symptoms will be preceded by, or coincident with, a fresh crop of spots. The eruption may indeed continue to appear up to late dates, and in the relapsing form to the end of the case, that is to say, up to the time of the latest relapse.

The course of this disease in a case of medium severity has a sort of regular irregularity; and in the relapsing variety this feature becomes still more marked. Now assuming the essential cause of the fever to be a specific poison of some kind, the question arises—Is the eruption simply one of the phenomena directly and primarily attributable to the action of that poison—part and parcel of the resultant phenomena originated by it; or is the eruption secondary, and dependent upon the existence of any anatomical morbid lesion as its necessary antecedent? The reply to this question involves a discussion of the pathology of typhoid by anticipation. I think the latter—that, in fact, the appearance of rose spots is connected with and dependent upon the intestinal glandular lesion; and that some change in the material in the glands is a necessary antecedent.

The late appearance of the eruption as compared with that of other acute infectious diseases; its relative absence in the very young and in old subjects; its recurrence in connection with manifestations of renewed abdominal mischief at later stages, and with renewed attacks of fever in the so-called relapses, are more plausibly and correctly explained, it seems to me, on such an hypothesis than by the assumption that the phenomena are all the outcome of one and the same original infection or of any renewed and fresh infection from without. The eruption is, I conceive, the result of an auto-infection, the source of which is to be sought in some morbid product or other absorbed from the diseased intestinal glands. This seems to accord best with the clinical features of the fever; and it finds corroborative evidence in the post-mortem appearances, viz., that the affected glands are found in different states and stages at different sites of the intestine. Be the seed sown what it may, the crop, as far as the intestine is concerned, does not all ripen at one and the same time; the eruption, febrile exacerbations and relapses correspond with and depend upon the evolution taking place in the anatomical lesions—that is, the morbid changes affecting the glands, intestinal and mesenteric.

As regards the *digestive system*—other things

being equal—it is, I think, a matter of common experience that the greater the diarrhœa the greater the danger. It is not at all uncommon for a case of typhoid fever to pass through its course from first to last without diarrhœa; but in the majority of cases the stools are loose at some period or other of the disease, and, as is well known, diarrhœa is often an urgent and dangerous symptom. The stools—in the later stages of the disease at any rate—are of the well-known ochrey, pea-soup character. It often happens that a patient reaches a stage in which the diarrhœa is excessive, the pulmonary symptoms marked, and the nervous prostration and debility so great that it is doubtful whether he will be alive in another twenty-four hours; and yet the patient's condition may be much improved on the succeeding day, and he steadily progresses from that time towards recovery. This corresponds to a stage of active or even explosive ulceration or sloughing of the affected glands, through which, in a greater or less degree, all severe cases have to pass.

In some cases a very dangerous condition is reached in which the meteorism is great, impeding respiration and the action of the heart, and we find a rising pulse and decreasing temperature, with a tendency to collapse. This may be due to the rapid separation of sloughs, the occurrence of abdominal

hæmorrhage, or to the effect of tympanites only. In the latter case, there may be no diarrhœa; the rectum may even be blocked with some hard fæculent matter which is causing the retention of liquid alkaline decomposing fæces above, with attendant tympany; and the use of a long rectal tube, combined with the administration of stimulants, may give rise to remarkable relief.

Bronchitis, catarrhal, lobular and lobar pneumonia and pleurisy, one or more of them, are of frequent occurrence in typhoid fever, and commonly at the later stages—the third week, for example. In an otherwise doubtful fever case, the detection of pulmonary disease between the twelfth and twentieth day, would be corroborative of the nature of the fever being typhoid. And, on the whole, I think the earlier the occurrence of such symptoms the better, as indicating a less protracted course of the fever. The pneumonia of the late stages is not always attributable to the typhoid fever itself, but is of a secondary, embolic or septicæmic character. In some cases—those of a grave and rare kind which are fatal at an early stage of the disease—the lung structures have a mottled, ecchymotic, blood-stained aspect suggestive of blood poisoning, and sometimes portions of lung present the appearance of pulmonary apoplexy. I always ex-

pect, in anything like severe cases, the appearance of pulmonary disease during the progress of the case. But its symptoms are sometimes the first indication of typhoid fever, and a patient may be treated for pneumonia whose real disease is enteric fever, of which the pneumonia is merely one expression. Pneumonia of typhoid type occurs sometimes in the "household epidemics" and other outbreaks of this fever, and is attributable to the same etiological causes. It is not uncommon to have the two diseases prevailing in a community exposed to the effects of a sewer-contaminated atmosphere.

One of the dangers of typhoid fever, in persons of big chest with large voluminous lungs, is cardiac failure; the pumping power the heart being unequal to propel the blood through the lungs, it clots in the large vessels, and symptoms of apnœa and collapse ensue, sometimes quite suddenly.

Epistaxis often occurs at early and late stages of typhoid; usually slight in the former and occasionally profuse in the latter.

Intestinal hœmorrhage.—Some difference of opinion appears to exist as to the gravity of this; and its import will, no doubt, vary according to its causes, source and amount. If it occurs at an early stage it has not the same importance as later on. My

own experience is that, where the amount of blood lost has been at all considerable, it is of very serious import; at one time four cases out of five that had occurred in my practice died; and my subsequent experience, if it has diminished this proportion of fatal cases, still leaves it large—nearly one-half have died. It all depends, of course, upon the source of the hæmorrhage; whether it comes from a fairly large vessel being involved in an ulcer or in the separation of a slough; but I have known blood to escape in large quantity and prove fatal without being able to trace the source of the leakage. Intestinal hæmorrhage, from insidious ulceration going on during apparent convalescence, is not very uncommon, and the risk of this serves to indicate the care required as to diet more than the fear of its causing a relapse; for the relapses of typhoid fever are not the result of improper diet, much as that has occasionally to answer for, but are part and parcel of the disease itself.

Gurgling on pressure of the right iliac region has no special significance in my experience unless it be more or less persistent over some time.

If we except cases in which the peritoneum was involved, tolerance of pressure was usually out of all proportion (that is, bore no relation to) the amount of disease discovered in most of the fatal cases I have seen.

Peritonitis, the result of perforation of the intestine, usually occurs about the third or fourth week of the disease, and sometimes later. It is also the occasional cause of death in the more insidious, latent, ambulatory forms of the disease. The perforation of the bowel commonly takes place low down on the right side of the abdomen, and in my experience, within about 4 or 5 inches of the cæcum. With some very doubtful exceptions, it is fatal. It seems to occur as a pin-hole perforation at the base of an ulcer, as a minute slough, or as a crack or fissure of the serous coat of the intestine. Judging from my own experience I should say that a pin-hole perforation was the most common; the crack or fissure I have not seen.

Peritonitis arises from other causes than perforation of course—excited by the extension of an ulcer towards the serous coat, and the disease need not then be fatal or even general, but limited and protective. As a rare event a localised peritonitis may be set up around a softening mesenteric gland as I have myself seen.

I can recall the case of a fine young soldier about whose recovery from an attack of typhoid fever I was greatly interested. Symptoms of peritonitis from perforation suddenly occurred; the poor fellow before he died importuned me to do something—anything

that offered the smallest chance; he placed himself unreservedly in my hands. Had I known then what I do now, I would have offered him the chance—however remote and slight—of a laparotomy and the washing out of the abdomen, in order to see whether it were possible for surgical interference to have effected a cure.

In addition to the state of the dry and furred tongue in typhoid, thrush and pharyngeal inflammation may occur; and ulceration or perichondritis of the larynx may also take place and prove the cause of a rare complication—emphysema. Sometimes even a phlegmonous inflammation of the maxillary glands, throat and mouth, allied to *angina Ludovici*, may appear. These affections, though rare, possess a practical importance, from the fact that attention to the condition and cleanliness of the tongue mouth and fauces of the typhoid fever patient may prevent the occurrence of some of them, and in any case add materially to his comfort.

It occasionally, though very rarely, happens that a patient has an attack of otorrhœa at an early stage of the disease attended with sharp pain, a rigor, and high temperature. In what relation this stands, if any, to the typhoid fever I do not know, but its occurrence may be embarrassing as regards diagnosis.

The pathology and morbid anatomy of typhoid fever are amply discussed in medical text books, and of late years important additions have been made to our knowledge. As far as the intestinal lesions are concerned, however, I do not think that Rokitansky's account of the morbid appearances has been surpassed for fidelity of description.

From about the eighth to the twelfth day of the disease is the best period for observing the degree and amount of the swelling of the glands. If the patient die at the commencement of the ulcerative stage the altered gland structures become exposed from the loss of mucous membrane, and the new material acquires a yellowish stain and resembles the yellow flaky matters seen in the stools. When the new growth or deposit is very large it can be seen to slough away; when less in amount, but still large, portions remotely placed for vascular supply die in small pieces, or undergo a still finer or molecular necrosis, or, degenerating, may be absorbed or pass off with the intestinal discharges. And so we pass on to a condition in which there is a minimum amount of swelling or infarction; the new material undergoes a granular, fatty, and pigmental degeneration, and is absorbed without any, or with the most trifling, loss of substance in the mucous membrane.

The enlargement of the mesenteric glands occurs simultaneously with, or follows very closely indeed upon that of the intestinal glands.

The spleen, in which alterations are so constantly discovered after death from febrile disorders, is enlarged at an early date in typhoid fever, and the knowledge of this fact occasionally aids in diagnosis.

I have no special knowledge of the peculiar granular degenerations and softening of muscle attending this disease.

The differential diagnosis of typhoid fever from other forms of fever is not usually difficult, provided the period of observation be sufficient, and a due regard be paid to the patient's antecedent medical history, the temperature, eruption, the state of the abdominal organs, and the conformity or not of the symptoms, in the group, to those which serve to characterise typhoid fever as a separate and distinct fever everywhere. Still, there are cases in which it is very difficult, and sometimes impossible even, to be sure of the exact nature of the fever under which a given patient is suffering. Classical cases are, of course, diagnosed with facility; but, on the one hand, a case may want the distinguishing signs and still be typhoid fever, and, on the other, it may possess some of these and not be typhoid.

Some of the tediously protracted examples of fever met with in the Mediterranean and at stations abroad—cases in which the same phenomena go on from week to week and month to month with monotonous uniformity and presenting no significant clinical features—are most difficult of diagnosis. The increase of temperature, which is the most constant objective sign of fever generally, here apparently constitutes the disease; but it does not conform to the thermometrical ranges of typhoid fever, and the pulse-rate stands in no corresponding relation to it, for in some cases it may be nearly normal with a relatively high temperature. The headache is variable in site and duration; there is no eruption; the abdominal symptoms, if any, follow no pattern; there may be constipation or looseness of the bowels, but the stools are not yellow; there is generally anorexia, sometimes vomiting, often nausea, and signs of gastric catarrh perhaps; the tongue is rather large and white or quite clean; the spleen doubtfully enlarged; the patient slowly emaciates and becomes anæmic; and the attack is followed, soon or remotely, by some form of muscular rheumatism or neuralgia. What adds to the difficulty of determining the exact nature of the illness is the fact that such cases may occur at the same seasons and places as furnish those of typhoid fever, and that there is

commonly no malarial history present. I have tried all kinds of treatment in such cases with apparent, rather than any real, benefit; for the increased temperature (2 or 3 degrees above the normal), which is the prominent clinical feature, may persist after the patient's removal to this country. A sufficient clue has been afforded by the foregoing description to distinguish these cases from those of typhoid fever; but, after all, there will remain a lurking suspicion, at least as regards some of them, that they might have been typhoid, which most of them, however, certainly are not. Happily the disease is very rarely fatal, but the characteristic enteric lesions of typhoid fever were absent in the few recorded post-mortem appearances of well-marked examples of this fever.

The diagnosis between malarial remittent and typhoid fever is also often extremely difficult, but the different temperature chart, absence of eruption and abdominal disease, and the history of the case will usually serve to distinguish remittent fever. Typhoid, it must be borne in mind, is a remittent fever; and the chances are strongly in favour of the disease being typhoid fever in the case of an individual belonging to the white population, of the enteric fever age, and especially if within the first year of residence in India.

In some examples of a typhoid form of acute tuberculosis, the phenomena of typhoid fever are so closely mimicked that the diagnosis is occasionally most difficult; and if it be true, as alleged by many Continental authorities and by some British, that an eruption very like rose-spots occasionally occurs in acute phthisis, the resemblance is almost complete, and goes to corroborate the hypothesis that there is some intimate connection between the appearance of such spots and disease of the intestinal glands.

The diagnosis will turn upon the closer correspondence of the symptoms with one or the other disease, the very irregular type of the thermometry in tuberculosis, and the previous history of the case. The intestinal glandular lesions seen after death are quite different and distinctive; the tuberculous ulcer being often girdle shaped, with its edges and base thickened and infiltrated with tuberculous growth.

There is perhaps no disease in which so many mistakes are made in diagnosis as in the early stages of typhoid fever. The presence of sore throat, or a reddish efflorescence on the skin which occasionally happens, may cause scarlatina or diphtheria to be suspected. The most extraordinary mistake, however, that I can recall, was that of a case of well marked typhoid fever being treated for delirium tremens.

CHAPTER IV.

TYPHOID FEVER: PROGNOSIS; ACCIDENTS; SEQUELÆ, ETC.; TREATMENT.

Prognosis.—I should say from my own experience, setting aside cases of peritonitis from perforation and those of serious intestinal hæmorrhage where the prognosis must obviously be very grave, that:—

1. In the early stage—say for the first ten days of the fever—those cases in which the temperature is high, the pulse rapid, soft and compressible, the urine scanty, high coloured, and possibly albuminous, the breathing embarrassed from pulmonary congestion, and a tendency to coma, form a very serious variety, threatening death at an early date of the disease.

2. Great headache and sleeplessness, followed by acute active delirium, in which the patient is kept in bed at night with difficulty, indicate a severe attack.

It is, of course, very difficult to prognosticate at an early stage the result in cases of typhoid fever, because the invading symptoms may be severe and

the subsequent course mild, and *vice versâ*. Cases also in which the disease is latent or apparently mild often terminate fatally.

3. As already stated, severe and marked muscular tremors indicate, as pointed out by Sir William Jenner and Dr. Murchison, deep and rapid ulceration.

4. The higher the range of temperature the greater the danger as a rule; but a high initial temperature is not necessarily, or usually, indicative of a severe form, and is opposed to the diagnosis of typhoid fever. The temperature remaining high when it should be declining, or rising at late stages of the disease; the absence of morning remissions, or these of slight and transient character; marked irregularities of temperature, without local complications to account for them, on the one hand, and, on the other, a rapidly falling temperature with a rising frequency of pulse, which may be indicative of intestinal hæmorrhage or the separation of sloughs, are grave indications.

5. Vomiting is a comparatively rare but not usually grave sign, except when it occurs as one of the first symptoms of perforation or peritonitis, as it sometimes does.

6. Diarrhœa and meteorism are dangerous in proportion to their severity, amount and duration.

7. Attention has been already directed to the tendency to cardiac failure and sudden collapse, especially in patients with large chests, or where the pulse is weak soft or intermitting, or where there is little or no systolic first sound.

It may not be without interest here to gather up a few of the results of my observations and experience in connection with what may be termed the outlying phenomena, sequelæ, and accidents of typhoid fever.

As an illustration of the slight impression which the disease occasionally seems to make on a patient, take the following :—During the last Afghan war a man of the 11th Regiment, on his way to the front, was admitted into hospital suffering from some alleged injuries received from a fall down the hold of the steamer conveying him from Bombay to Karachi. He died on the morning of the third day after admission. On post-mortem examination ulcers in process of cicatrisation were found at the usual sites—in Peyer's glands—of the small intestine. The man had passed through all the stages of the fever without having reported himself sick, and had recently been medically inspected and passed as fit for field service by a medical officer.

As is pretty well known, one attack of typhoid

fever is usually protective against subsequent attacks; the constitution having once paid its tribute acquires immunity for the future. No doubt this is generally the case, and the effect of the disease on the glandular structures in which it has its *rôle* explains why it is so. But the immunity is relative, not absolute. I have not infrequently heard it alleged by a patient suffering from typhoid fever that he had previously suffered from an attack of that disease, but it is not always easy to obtain confirmatory proof of this. I may, however, cite the following in illustration, as the evidence appears to be pretty complete. A private of the 12th Lancers was admitted to hospital in 1884 for enteric fever, and remained under treatment for sixty-five days. The symptoms were undoubted, and included a continued form of fever with an eruption of rose-spots and diarrhœa. In 1886 he was admitted for the second time with that disease, of which he died; and, on post-mortem examination, recent and characteristic lesions were found; and, in addition, the distinct mark of an old ulcer was discovered.

Venous thrombosis.—Phlegmasia dolens I have frequently seen at a late stage, or as a sequel of an attack of typhoid fever. The swelling is not, however, invariably attended by pain. In my experience it has been associated with a clot in the iliac or femoral vein, and has been preceded by increased

temperature, local pain and tenderness. Cases of gangrene dependent upon arterial thrombosis or embolism I have not seen.

All authors refer to *tubercular deposit* in the lungs and other organs as a common sequel of typhoid fever. Such has not, however, been my own experience. The instances in which tuberculosis has followed an attack of this fever have been very rare, notwithstanding that I have always been on the look-out for them.

The number of fatal cases among typhoid fever patients treated abroad is larger than it is at home and in temperate climates; and there are several reasons why this should be so. There is the heat of the climate; the difficulty of securing early rest and quietude and skilled nursing. And, in army life, a medical officer has to conform to the regulations of the service, and to diagnose and classify his cases promptly in order to embody them in his official returns. All fevers are much alike as regards their initial symptoms, and it is absolutely essential that a certain time should elapse for a disease to develop and manifest its specific characters; but in military life accuracy of diagnosis has to be sacrificed to promptitude in classification; and it often happens that only the more serious and fatal cases of typhoid fever are included under that head. Nevertheless, there can-

not be a doubt that the mortality from enteric fever is increased in India by heat-apoplexy and nervous exhaustion, and by other prejudicial conditions—climatic and otherwise—affecting the subjects of that disease. I should say, as a result of my own comparative experience at home and abroad, that the nervous symptoms were more pronounced in the latter class of patients; cases of noisy active delirium were of more frequent occurrence, and to such a degree was this occasionally the case as to have given rise to a suspicion of the existence of intra-cranial disease—meningitis, for example. My own experience would not corroborate that view; for I have only twice met with any evidence of it on post-mortem examination, and then, I think as the result of pyæmia or septicæmia. Still, I know that other medical officers in India have met with fatal cases, in which increased vascularity, opacity of the arachnoid, effusion of lymph or serum, or tubercular meningitis has been present. Paralysis I have never seen after an attack of typhoid fever, but neuralgia and muscular rheumatism frequently.

Orchitis occasionally occurs as a sequel of typhoid fever; and abscesses in connection with the parotid and other parts of the body are not very uncommon.

I think the subjects of typhoid fever when they have recovered grow fat as a rule, although their

muscular system has wasted, and they look anæmic and feel unequal to much exertion, bodily or mental. Sometimes, however, in addition to debility and anæmia, they not only fail to recover weight but waste; they suffer from symptoms of atonic dyspepsia, do not assimilate their food, are liable to chronic diarrhœa, attended occasionally with abdominal tympanites, and get into a condition resembling that of marasmus following *diarrhœa tropica.* I have very rarely indeed seen such cases terminate fatally, but if I may judge from the results witnessed in one fatal case of this kind, the glands, both enteric and mesenteric, and the coats of the intestine, are found thin and atrophied, the liver is small and pale, the gall bladder empty or nearly so, the spleen shrunken, and there are the signs of amyloid degeneration of the smaller vessels of the intestine. But we have really very little information as to the morbid appearances in such cases.

Treatment.—The patient should be placed in a fairly large and well-ventilated room, from which the light can be excluded or admitted at will. The temperature should be from 60° to 65° F., and the room stripped of carpets and divested of all unnecessary furniture and articles. All nursing appliances and the means for disinfecting excreta and fouled linen should be ready and accessible.

There is no objection to treating a number of patients together in a ward with ample cubic and superficial space and good ventilation.

It is better to have a fire in the room as an aid to ventilation and for the purpose of promptly heating food, &c. In hot climates the sunlight must be excluded, and it is well also to expose a large block of ice in the room to reduce the temperature. Speaking generally, it is better to follow the sequence of events in normal healthy life, and to have the room light by day, and darkened at night to encourage sleep.

There should be a washstand with a supply of Condy's fluid and a ball of sand soap or carbolic soap available. And it is desirable to have a zinc bath with some fluid disinfectant for the reception of dirty linen.

The bedstead should be of iron and firm; the bedclothing light, and it is often useful to have two beds for alternate use if required; and it is needless to say the bed linen should be kept clean, and the sheets without rucks or creases. A water bed is always expedient, sometimes essential. The patient's person should be kept scrupulously clean, and for this purpose, as well as for his comfort and soothing effect, the skin should be frequently sponged, piecemeal as it were, with cold water,

vinegar and water, spirit or eau-de-Cologne and water, or occasionally with weak carbolic solution.

The earliest manifestation of bed sores should be sought for, and the patient's position should be changed from time to time to avoid the effect of continued pressure on any part of the body.

There should be a small bedside table for things in immediate or frequent use; and it is well to have, in addition to a little iced water, some preparation composed of boric acid, alum, or tannic acid with a little glycerine and rose water, for washing the patient's tongue, mouth and gums. This procedure not only adds to the patient's comfort, but is an aid in guarding him against local infections of the parotid, ear, throat, larynx and lungs.

There should be a water closet, if possible, in convenient proximity, with supplies of disinfectants, and the bed-pans should have a layer of some disinfectant ready for use. As little food as possible should be kept inside the sick room, and if the window has an outside ledge it might be utilised for this and other purposes. It is an excellent plan to have a tin utensil provided with a lid and handle for the reception and transport of the bed pans.

The presence of a trained nurse is highly desirable, if not absolutely essential, for saving labour and responsibility in carrying out directions and mak-

ing clinical observations and records. She should keep a temperature chart, with pulse, respiration, and temperature observations, and a brief diary of events, times of feeding, &c. The medical attendant should also keep a separate temperature chart compiled from his own observations and those of the nurse.

As the disease progresses, and the patient becomes more and more enfeebled and ceases to make his wants and wishes known, more and more attention is required as to his feeding, and as to his being supplied frequently with water and drinks. These details may be deemed too minute and well known to deserve record, but it is surprising how often some of them are overlooked or scamped; and skilled nurses are not always procurable abroad.

I think it is generally recognised that there is no specific treatment for typhoid fever; no drug or line of treatment by which we can abort, or control the development of the disease, or shorten its course. Nevertheless, I am convinced that there is no disease which will repay the medical attendant more for the exercise of vigilant care, thoughtful observation and good judgment than typhoid fever. No two cases are exactly alike; there is much to interest and observe, and ample room for the exercise of a wise eclecticism.

The treatment of fevers generally, and of enteric fever especially, hinges upon rest in bed from the first, thoroughly efficient nursing, suitable diet, the watching of the temperature, and the use of those drugs only which are necessary to meet the varying requirements of the case, administered with sufficient foresight and judgment just to forestall those requirements. It is often quite as important to decide what not to do as what to do.

Many cases require no drug treatment whatever. Rest in bed, good nursing, and milk diet (taking care that the amount is not in excess of the requirements and that it is really digested) suffice.

Enteric fever affords an apt illustration of the way in which our treatment has been influenced by our knowledge. A very free use of stimulants and the right kind of food may save a patient's life at one time and jeopardise it at another. It is a matter of common sense, no less than of physiological knowledge, to recognise that it is of the first importance to a patient suffering from a fever associated with, if not mainly attributable to, serious disease of the intestine that "his fever should not be fed," in the sense overfed, but that his diet should be suited, in quantity and quality, to his condition—that is, supporting, easily digested and readily absorbed from the stomach, and not likely to decompose or irritate

the local lesions with which it comes in contact. Nevertheless, we occasionally see diet lists in which are enumerated milk, in too large a quantity, starchy compounds, beef tea, effervescing drinks, with wine or brandy, supplemented possibly by quinine in large doses as a medicine. Such diet sheets are rather to be ascribed to the fears of the physician than the needs of his patient.

Cow's milk is that most easily obtained and most suitable. It is more palatable when fresh; but it is, on the whole, better to have it boiled, as this prevents fermentation, renders the coagula smaller, the casein more flocculent, and only diminishes the nutritive value of the milk to a very trifling extent, while it has the advantage of minimising the risk of any poisons of which it may possibly be a vehicle. An anti-scorbutic element seems to be present in fresh milk, but absent in the preserved and condensed varieties. It may be well to remark here that goat's milk is not a suitable diet in this disease. It contains a large amount of casein, and is consequently digested with difficulty. I have more than once seen a good deal of abdominal pain and distress attend its use; followed by the vomiting of a large piece of casein in shape and appearance closely resembling a peeled plaintain or banana. If we are compelled to have recourse to

goat's milk as a diet it should be well diluted and its administration watched.

As to the quantity of milk to be used, this must greatly depend upon the digestive power of the patient, and upon its agreeing with him or not. Between one and two pints in the twenty-four hours is sufficient, administered in the proportion of three or four ounces every three or four hours; but from a quart to two quarts can usually be taken in the day. Its use must be watched to see that it does not give rise to tympanites, colicky diarrhœa, and stools containing portions of undigested casein. Of course the milk can be diluted with water, barley water, or lime water, but there is in cases of typhoid fever too great a tendency to alkalinity of the gastro-enteric secretions; and effervescing fluids, like soda water, rather add to the flatulence and distress than otherwise, especially in cases attended with meteorismus. In some cases it is better to give skimmed milk, or simply whey, or to alternate the use of milk with whey, or supplement the one with the other; and in others peptonised milk may be necessary. The milk can be administered warm, or iced if necessary. As a drink there is nothing better or so grateful to the patient as cold water, of which he should be encouraged to partake, in reasonably small quantities at a time of course. Barley water, with the addition

of a small quantity of cream, a little sugar and a piece of ice, forms an agreeable drink. If the milk disagrees, or any special indication arises, peptonised milk should only be given for a time. Koumiss or buttermilk may be suitable for some cases. Valentine's meat juice is miscible with, and can be added to milk, if necessary.

I have been in the habit of using for typhoid fever patients raw meat juice made by mincing finely the lean part of beef-steak and soaking it in water for an hour, and then forcibly expressing the juice through muslin, a little hydrochloric acid and a few grains of salt being added. Where there are many fever cases under treatment in a ward, as was the case in the fever wards of the fine Citadel Hospital at Cairo, this preparation can be as systematically administered as a medicine. It is rich in proteids and extractive matters. Raw beef juice, iced, is occasionally useful in restraining nausea and vomiting. Extract ot meat is a good addition to soups, for it has a stimulating effect on the nervous system.

As regards the use of alcohol.—Some cases do not require any alcohol throughout the attack, but the majority are distinctly benefited by its administration during the later (not the earlier) stages of the disease and convalescence from it. In the more severe and protracted forms of this fever; in all cases

where the debility and prostration are great, the circulation feeble with a rapid soft pulse, diminished cardiac impulse, and short first sound of the heart; and, lastly, where serious nervous symptoms are present, alcohol is of great use.

The question must always be—When, under what circumstances, and to what extent shall stimulants be used in any given case? and it is from a rational reply that success in practice must be expected to follow. I can state as the result of a tolerably extended series of observations, that a stimulating plan of treatment in all cases and stages of fever in hot climates is fraught with evil consequences to the patient. The early exhibition of alcohol it must be remembered, too, robs us of a powerful aid at the time perhaps when alcohol may be most needed and likely to make a quick and decided impression upon the system for good; but such is not the case if it has been given early and in anticipation of symptoms, the occurrence of which its administration will fail to prevent. The treatment of typhoid fever differs very much in this respect from typhus, in which the earlier exhibition of stimulants can be made with advantage. It may be safely said that the largest number of cases of febrile disease require no alcoholic stimulation during the earlier stages.

Happily the beneficial effects or not of alcohol on the

heart and pulse, and on the system generally, can soon be recognised by a little observation of the patient. The fear of increasing the fever, where the condition of the patient otherwise indicates it, is an ungrounded one. By the end of the second or third week of typhoid fever, eight to ten ounces of wine daily may be of essential service to anticipate and counteract the exhaustion induced by the disease. In some cases, where the diarrhœa has been excessive, a stage of great asthenia is reached, coincident with the separation of the last slough or the end of the ulceration of the intestine, and the patient may be said to be brought to the edge of the grave. The free use of stimulants (brandy, port, champagne) in small and repeated doses, may then save him from dropping into it. Most physicians have had experience of such cases; and it may be said that there is hardly any case of typhoid fever—short of general peritonitis from perforation—about which we should despair. But alcohol should always be prescribed as we prescribe a drug, to meet a special object and not as a routine practice.

It must be remembered that the varied clinical phenomena arising in the course of an attack of typhoid fever are all links in one and the same chain; or rather, that the morbid process is but as the unfolding of a tape or ribbon on which the pattern

alters. If this fact be lost sight of, we shall be led into the mistake of believing that what was a natural change has been artificially induced, and that that which would have followed in the sequence of events is attributable to some remedy or other which may have been administered. An attempt to combat every symptom as it arises is not only futile but misleading. We are only likely to complicate the phenomena of the disease with those of our own producing by the unnecessary and untimely administration of stimulants, by the use of opiates to procure sleep, expectorants to relieve bronchitis or pulmonary symptoms, and astringents to check a moderate, and what may be perhaps necessary diarrhœa, although we are required to do these things at times in the interest of the patient.

Let us suppose a case of fever with no eruption visible, the temperature and pulse over 100, the tongue foul, the bowels confined, or rather loose, accompanied by frontal headache and possibly nausea or vomiting. The disease may be anything; the patient probably calls it a "bilious attack;" but typhoid fever is perhaps suspected, because other cases have occurred. The diagnosis is necessarily conjectural; and, beyond keeping the patient in bed and giving him plenty of fluid to relieve his thirst, it is not necessary to do anything. But assuming

the patient not to have been ill over a week, and that there is no evidence (in the event of the case being really typhoid fever) of intestinal ulceration, some relief would probably be afforded by the administration of an emetic or a dose of calomel and rhubarb, followed by frequently repeated doses of tincture of aconite, to the extent of eight or ten drops in the day. I am in the habit of adding eight or ten drops of aconite to an ounce of water, and telling the patient to take a teaspoonful every hour or two, or of prescribing a similar amount of the tincture of aconite in the form of the compressed triturates. This affords a little time for observation and temperature taking, and whatever the disease turns out to be, does no harm.

Supposing the case proves to be one of typhoid fever of ordinary severity, then I think the following method of procedure a good one. On the whole, the administration of a very dilute acid (hydrochloric, phosphoric or aromatic sulphuric) forms a grateful drink to the patient. Have a light cradle made of wood and wire of sufficient length and height just to cover the patient's body, to the various angles of which affix a number of tin vessels or gallipots filled with pieces of broken ice. Whenever the patient's temperature rises above 103°, place this cradle over his body, throwing over

it a sheet or blanket, and allow him to remain in this cool chamber until his temperature sinks a degree or two. At the same time the face and hands should be sponged with vinegar and water, or spirit and water. The body may also be sponged at intervals during the day when the cradle is not being applied. Anticipate the occurrence of diarrhœa and meteorismus (about the period of the third week of the fever say) by the application of a broad flannel roller to the abdomen. This affords a certain amount of rest and support to the intestines, and tends to discourage frequent palpation of the abdomen to discover gurgling or tenderness.

The stools should be watched to see that they do not contain undigested casein, in which case, or if there is persistent diarrhœa, alum-whey should be given or peptonised milk, and opium may be administered either as a starch and opium enema, or by the mouth, or both according to circumstances.

As soon as the deep daily dips of temperature begin to occur quinine seems to be useful, administered an hour or two before the evening rise of temperature.

To carry out cold bathing systematically causes so much labour and difficulty in private houses that it often cannot be done. Nor must it be forgotten that a cold bath is occasionally attended with

danger to the patient, from collapse and pulmonary congestion. I have no doubt, however, of its efficacy in cases of hyperpyrexia attended with nervous phenomena. The observations and experience of German physicians, corroborated as these have been by so many authorities in this country, (Dr. Cayley and others for example), sufficiently attest the value of baths as a systematic method of treatment. Still, notwithstanding my desire to adopt it generally, my experience has been too limited to be of any value. In some cases of hyperpyrexia I have seen a cold bath not only reduce the patient's temperature but give rise to a quiet sleep afterwards, in place of previous active delirium and restlessness, and its use followed by manifest improvement in other respects. I have occasionally used Leitner's tubing for a similar purpose.

It is the practice of the Germans to give two or three large doses of calomel at the outset of an attack of typhoid fever; but this has not been productive of any benefit in my experience. I have often been tempted, however, to try the effect of calomel or the perchloride of mercury administered in minute doses, in consequence of the favourable impressions I derived from observing the results of this method of treatment in the hands of an old practitioner many years ago, but could not quite satisfy myself that it was theoretically sound.

Passing to a consideration of the treatment of the symptoms in detail, we may take them somewhat in the order of their occurrence, but I shall only indicate those remedies and methods of which I have had personal experience.

If there is sleeplessness and it threatens to affect the patient injuriously, hyoscyamus is a good remedy, though somewhat uncertain; two drachms of the tincture should be given at first, to be repeated twice if necessary, in drachm doses, at intervals of 2 or 3 hours. It may be usefully combined with the bromides of ammonium and sodium, particularly if there is much physical restlessness; otherwise, chloral or opium may be necessary, of the latter 5 grains of the soap and opium pill every 2 or 3 hours, up to 2 or 3 grains of opium, or the equivalent of the sedative solution or Jeremie's preparation of opium. Sometimes Bromidia answers well. Of tincture of Indian hemp my experience is limited.

It is far better to avoid the use of chloral and opiates if possible. It is important to ascertain that the sleeplessness is not caused by tympanites or some trouble that can be remedied; that sponging the patient or a douche to the head at bed time, or some change or addition to the diet will not, for example, procure the end in view. As has been said already, sleep generally follows the use of a cold bath in cases

attended with high temperature and nervous excitement.

The use of opium is not to be commended in typhoid fever; about this there can be no doubt; still, I have seen it of much service under the following circumstances. In the sleeplessness attended with a quiet kind of wandering in refined and intellectual persons of nervous temperament (neurotics) where there are no urgent symptoms, but the pulse is quick, soft and weak, the pupils dilated, and the symptoms are those of asthenia. In such cases small and repeated doses of the extract of opium, or opium combined with a minimum dose of the tincture of digitalis, have directly a stimulating effect, and remotely, by their accumulative action, a hypnotic and sedative one. The presence of an intelligent and sagacious nurse is necessary to watch the effect and guard against an overdose. In a few cases advanced to the third or fourth week of the fever, where there is sleeplessness and great debility following diarrhœa, and attended with some pulmonary symptoms but no sign of cyanosis, it becomes a choice of evils; either the injurious effect of a sleepless night or the risk attending the use of opium. Assuming that the patient has been well and frequently fed, and supplied with a liberal allowance of wine or alcohol,

a dose of opium (the soap and opium pill) will occasionally procure quiet sleep and effect a great change for the better in his condition. The equivalent of one grain of opium, repeated once in two or three hours, if necessary, suffices for the purpose.

As regards the abdominal symptoms and diarrhœa, if the number of stools be only three or four in the 24 hours it is better to let the diarrhœa alone, especially if the meteorismus appears to be lessened by it. When it occurs, however, to such an extent as to be plainly weakening the patient it should unquestionably be checked. Before attempting to do so by drugs it is well to inquire carefully as to the patient's diet, and to examine the abdomen and inspect the stools, to see that the milk is being digested, and that neither beef tea nor any amylaceous food is being given, for these tend to increase the meteorismus and diarrhœa. Satisfied on these heads, if the tongue is red, fissured, and beefy looking and there is much meteorismus, it is well to try, in the first place, if the latter cannot be lessened by the passage of a long rectal tube. Sometimes under such circumstances the administration every hour or two of a powder of bismuth or sugar, to which a drop or two of turpentine or terebine has been added, is very efficacious. An enema of starch and opium will usually give relief and temporarily

check the diarrhœa. Bismuth is occasionally useful, but I have not seen much benefit from it, nor any from the use of powdered charcoal. When there is much meteorismus the application of a cold compress to the abdomen occasionally does much good. If the patient's abdomen be very tympanitic and distended, the diaphragm is pushed upwards, the heart's action and that of the lungs are embarrassed, and the patient becomes semi-collapsed, in which case the passage of a rectum tube is essential. It must be borne in mind that fluids will trickle out of the intestine, but gas will not—muscular contraction is necessary to expel it; and the small intestines and upper part of the colon may be distended with fluid fæces and gas with scybalæ even in the rectum. The patient's condition is one of colic, of the pain of which his brain may not be cognisant, but his nervous centres are.

Temporary relief to urgent symptoms having been obtained, the question mainly turns on diet and how to check the diarrhœa. I have found alum-whey very useful in persistent diarrhœa as a temporary substitute for milk. It is prepared by the addition of one teaspoonful of powdered alum to a pint of boiling milk by which about half the casein is precipitated. The milk should be well strained when cold and is then fit for use. It is still nourishing;

but the patient may have, in addition, a teaspoonful of Brand's essence or some Valentine's extract from time to time, with some port or burgundy wine, brandy or whisky, as deemed desirable.

This, with a starch and opium enema or a little opium by the mouth, and pieces of ice to suck occasionally, will commonly suffice.

In the event of there being much irritability of the stomach or vomiting, the following preparation can usually be taken by the patient:—

Add a teaspoonful of brandy and 3 or 4 grains of sugar to the white of one fresh egg; whip this thoroughly into a light froth, then ice it and give a teaspoonful of the froth, with small fragments of ice to suck, every 20 or 30 minutes, until the vomiting or irritability of the stomach is allayed.

Bismuth, chalk mixture, the mineral acids, vegetable astringents, nitrate of silver, acetate of lead, and sulphate of copper, in combination with opium, have all been used and recommended; the last named (sulphate of copper) is occasionally useful in diarrhœa occurring in late stages of the disease, where other remedies have been tried in vain. Chalk mixture and vegetable astringents are not, in my experience, very efficacious remedies. A simple plan is to add a few minims of a liquid preparation of opium to each dose of acid mixture taken by the patient.

For abdominal hæmorrhage the best plan is absolute rest, ice and opium, cold or iced compress to the abdomen and tincture of ergot in drachm doses by the mouth or ergotine by subcutaneous injection. A hypodermic injection of morphia and atropia is indicated.

Of peritonitis from perforation but little need be said. The question to be promptly determined is, whether surgical interference (laparotomy) should be resorted to or not; for the rest, the treatment must consist in the persistent employment of opium so as to maintain the patient under its influence for two or three days, with ice and Valentine's juice frequently in very small quantities at a time.

Many physicians are in the habit of using large doses of quinine as an antipyretic; and others employ antipyrin or antifebrine or other drugs for a similar purpose. My experience of large doses of quinine, with the object of reducing the temperature in typhoid fever, is not favourable on the whole. Quinine produces no sustained effect and often interferes gravely with the patient's digestion and comfort. In cases, however, where there is a history of malaria and the patient's temperature suddenly goes up to 104° or 107° (as I have seen) during convalescence, without any local cause being discoverable, it does good. With regard to the other

agents their employment may be, and occasionally is, necessary perhaps, but their use seems to me unphilosophical, occasionally dangerous, and they do not appear to exercise any real influence over the course of the fever, or to produce any effect adequate to the risk and the complication of the symptoms they are apt to induce.

CHAPTER V.

Etiology and Causes of Typhoid Fever in India.

I have already indicated the views which are held by European pathologists and observers regarding the etiology and causation of typhoid fever. Even in Europe, where its connection with a specific poison, or with the products of fæcal decomposition, contaminating air or water, seems to be established on a large and repeated number of observations (the cumulative effect of which amounts to very forcible evidence) it cannot be said that we have exhausted our knowledge of the causes of its prevalence; but in India this is still more the case. Medical officers of both the British and Indian medical services have been drawn from the same medical schools and educated in the same doctrines, and consequently may be assumed to recognise cases of typhoid fever when they occur, but, if I may judge from the numerous reports I have read, they have failed to trace out their intimate and invariable connection in India with specific infection and those pathogenetic causes with which, according to European authorities, that disease is always associated elsewhere.

Typhoid fever, whether we regard it in relation to the mortality it causes, the long period of inefficiency it entails on the soldier, or the great loss to which it subjects the State, is perhaps the most important of all the diseases making up the pathology of an Indian climate. The European military population of that country may be said to constitute a great experiment in pathology, for while the population of every European country is made up of inhabitants from the age of a day to that of a century, we have in India a white population composed almost exclusively of those ages most liable in all countries to enteric fever. The period of greatest predisposition to contract this fever is probably between the ages of 18 and 30. The European garrison of India consists of soldiers within those limits of age, and, under a short service system, its numerical strength can only be maintained by fresh arrivals of young men annually from the United Kingdom. We are therefore confronted in India with two powerful factors (youth or early manhood and recent arrival in a new and hot climate), the combined influence of which enormously increases the susceptibility to this disease. This susceptibility or vulnerability of the European constitution is at its maximum during the first year, markedly decreases during the second and third, and is practically nearly exhausted be-

tween the third and fourth year of an Indian residence. A young soldier, say of the age of 20, is as likely to die of typhoid fever during his first two years of Indian service as of all the other diseases put together. It is necessary, however, to bear in mind on the other hand, that although the young soldier newly arrived in India exhibits this proclivity to attacks of typhoid fever, his chances of contracting and dying of other diseases are much less than those of older and longer resident soldiers; in fact, the average expectation of life diminishes, of course, in India as at home in proportion to age, only in a far higher ratio in the former country.

This subject of the influence of age and recent arrival is one of much interest and importance. Our own experience in this respect has been equally the experience of the United States army during their war;—accessions of typhoid fever associated with the advent of new and so-called unseasoned men, and the decrease of the disease as these men became converted into veteran soldiers.

The question arises: What is the cause of this greatly increased liability of the soldier to typhoid fever for a definite limit of time, during which he would almost appear to be acquiring an immunity from it by some process of physiological accommodation to his new surroundings, in other words, acclimatization or seasoning?

Apart from the direct bearing which the reply has on a matter of State policy, there are other considerations, the study of which possesses this very practical interest, that if all the typhoid fever of hot countries be essentially identical in its nature and causes with that seen at home, then we may confidently anticipate that such causes, being of a preventable character, are as capable of being discovered and removed in India as elsewhere.

As regards its clinical features and anatomical characters, typhoid or enteric fever appears to be everywhere essentially one and the same, and, as far as India is concerned, it is quite common to meet with numerous instances of a disease indistinguishable from that which is recognised everywhere else as typhoid fever, such as one sees in Great Britain, France, Germany, the Mediterranean and America.

The question that arises, however, is as to its causation. Whether *all* the cases that are met with in India are attributable to exactly the same causes as are in operation in England and temperate climates; or whether, in other words, there is a variety of typhoid fever in India and hot countries which cannot be traced to and accounted for by such causes.

That a disease, however it has originated, may acquire specific properties and powers of infection

under certain circumstances is no new doctrine. Pathology is only physiology gone wrong; and the Darwinian theory of evolution cannot be circumscribed within the limits of Biology. It has thrown a strong light upon other spheres of research and probably is as applicable to pathology as to biology.

The occurrence of an eruption, or rose spots, in a case of typhoid fever no doubt tends to remove it from the category of non-specific diseases, for all febrile constitutional disorders attended by an eruption may probably be regarded as specific; the skin affection being an expression of blood poisoning of some kind; and such diseases may possess or acquire infective powers; but this does not warrant our postulating that they have invariably arisen from one and the same cause, or always propagate themselves in one and the same way.

The logical and philosophical rule to have recourse to known laws, where these seem capable of affording an explanation of phenomena, rather than seek such explanation in some new and unknown direction, is no doubt sound; but are the accepted doctrines applicable to, and adequate to account for *all* the facts as far as hot climates are concerned?

The experience of the connection of typhoid fever with infection elsewhere has been so frequent that

wherever the disease has arisen an antecedent case is presumed to have existed. The failure to discover such case has been regarded as illustrating the difficulties in the way of a thorough knowledge of the facts rather than as demonstrating its non-existence; and it is contended that in India such investigations have not been pursued in the exhaustive and thorough way, and with the scientific precision that they have been in this country. If we adopt a still wider basis, that of pythogenetic or filth conditions as the cause of any given epidemic, outbreak or case of typhoid fever, it would no doubt be exceedingly difficult to prove a negative, especially in the case of a country like India for example, where, whatever may be the condition of the cantonments occupied by European troops, that of the native bazaars, towns and villages in their vicinity is often extremely dirty and insanitary. It is commonly urged, and with apparent force, that so long as soldiers continue to frequent these native places, there are abundant opportunities for their being exposed to the conditions capable of originating typhoid fever, not only in the way of direct infection, but through such media as contaminated water, air, soil, milk, aërated drinks, liquors, &c.

These points will have to be examined later on, but I desire, in the meantime, to guard myself

against being supposed to deny the existence and influence of such causes, or to set aside the results of European investigations and experience in favour of others which are unproven. There is abundant evidence to show that many outbreaks of typhoid fever in India are capable of the same explanation as in England. Every channel must be searched and every assigned cause eliminated before ascribing a case of this fever to general causes over which we have little or no control; and, in any case, we are obviously bound to satisfy ourselves that the water-supply is good and protected against contamination before declaring that there are no local conditions present to which this disease could be attributed.

There is no doubt that typhoid fever is an infectious disease capable of spreading in a community under certain circumstances, and of adhering to and forming part of the medical history of a corps for a long time, and that many cases are traceable to a common cause, such as contaminated water, or organic laden air. But then the facts make up a consistent history. The concurrence of cases will be too numerous to be coincidences, but will be indicative of some community of cause; and the evidence will not be wanting, even where we fail to trace its exact nature, to indicate the harmony and relation of the phenomena one with another.

The present view is that the cause of typhoid fever has to be sought in a specific, organized, pathogenetic poison; and the latest bacteriological investigations, it is alleged, have revealed that it consists of a specific variety of short, rod-shaped bacteria (bacilli). But this does not invalidate, on the contrary, it gives greater precision to the previous doctrines of European observers, viz., that the cause is not the contamination of air, water or milk with any ordinary indifferent material, but with one of a very specific kind—that as an atom from a small-pox pustule, so the minutest fragment of *débris* from the intestinal follicle of one, the subject of the disease, is capable of causing that disease in another and healthy person, and even of imparting its disease-producing properties to other excrementitious matter with which it may come in contact. On the other hand, there are some authorities, the late Dr. Murchison for example, who contend that ordinary sewage matter, and especially any fæcal contamination of air, water or food, may, under certain circumstances, give rise to the disease; and, lastly, there are others who, although not denying the morbid potency and activity of such agents, specific and otherwise, regard the view of those who hold that their presence is essentially necessary as inadequate to account for all cases of the disease.

Considering the great difficulty which occasionally attends the diagnosis of fever cases and the different etiological conditions under which typhoid fever manifests itself in hot climates, it seems well worth trying whether the presence of typhoid bacillus of Eberth and Gaffky cannot be detected in the stools. This bacillus is said to be characteristic of typhoid fever, and its discovery in a doubtful case would not only serve to distinguish its nature and stamp its identity with the typhoid fever of other countries, but we might in that way obtain a clue to the cause of its spread. There must be several medical officers in India possessed of the requisite training in bacteriological research to do this. This suggestion is put forward on the assumption, of course, that the bacillus present in the lesions is shed into the intestine during their ulceration.

The doctrine that every case of typhoid fever is the product of a specific germ or micro-organism, presupposes that, in certain cases, such germ has been in existence for a long time without manifesting its presence, or that some tramp or other individual affected with the ambulant form of typhoid fever had given rise to the infection.

That typhoid fever is no new disease in India is almost certain. It has probably existed from the time we first held sway in that country to the

present day. It is a very significant fact that, according to statistical data, the ratio of fever mortality of past years (in the gross, and before fevers were differentiated from one another as they now are), is nearly identical with that of typhoid fever at the present time, if taken in relation to months and seasons and newly-arrived regiments.

There seems to be a connection, which is more than a coincidence, between the heat maxima of the climate and the prevalence of typhoid fever.

This fever occurs in India at two periods of the year especially—at the end of April and beginning of May, and at the end of the monsoon season (August, September); and it usually prevails at rather later dates in the hills than in the plains of India. It is pertinent to remark here, that April-May being the hot and dry season, the well-water, which is the source of much of the drinking water in India, is at its lowest, while in September, the end of the monsoon, it is at its highest level; these two opposite states corresponding pretty accurately with the two periods of maximum prevalence of the fever in question, and the tendency of the disease to manifest itself at these seasons, would indicate that it is in response to some condition then prevalent.

As regards the water supply, for that will include the milk when water is used for adulterating it,

there is no doubt that well-water, for drinking purposes, is always a possible source of danger; but water contamination cannot, in my opinion, account for all the typhoid fever in India, nor will the use of bazaar liquors, drinks, &c., for these reasons:—

The number of sporadic cases of the disease that occur under all sorts of conditions and circumstances. India is not sewered. If we except some cities there are no sewers, as in England and Europe, down which typhoid fever excreta may pass and lodge, and from which soakage of sewage into the water supply can take place; and, assuming the water to become contaminated by surface impurities, it is strange that the time when the well-water is lowest and most concentrated, and that at which it is highest and most diluted, should be coincident respectively with the greatest prevalence of typhoid fever. Women and children, who may be assumed to drink more water and certainly more milk than men, do not suffer more, but less, from typhoid fever than soldiers. Officers who certainly do not, as a rule, consume liquids supplied by native bazaars, suffer from typhoid fever in India about equally with the men. Typhoid fever has prevailed under circumstances where the milk was not adulterated, where the cows were the private property of officers and others, and where they were watched whilst

being milked. Whether cows herded in foul sheds and fed on foul fodder, &c., furnish milk of dangerous quality, has often been suspected, but not proved; still the question is certainly worthy of more thorough investigation, although it seems difficult to explain its connection with a "typhoid bacillus."

If it could be shown that typhoid fever was a disease of the native populations of India, then we should not have to go far to seek for the specific elements of the disease; for from the habits of the native population, its germs would be sown broadcast throughout the country, and it is quite conceivable that minute particles of desiccated fæcal matter would be blown about by the wind and deposited in wells or elsewhere. But enteric fever would seem to be exceptionally rare among them. Taking the medical history of the jail population of the Bengal Presidency for a number of years, from 1871 to 1876 inclusive, representing in the aggregate upwards of 398,000 individuals of different ages, we find that only 28 are returned as dying of typhoid fever, and it is to be remembered that the diagnosis was not verified in some of these cases by post-mortem examination. Moreover, epidemic outbreaks of this disease have never occurred in any of these institutions. If the diarrhœa of native children was, in reality, a mild unrecognised form of typhoid fever,

it might be argued with much plausibility that the enteric fever poison having exacted its tribute from the native in early life conferred an immunity on him from subsequent attacks. But there is no satisfactory evidence that this is so. I instituted, whilst in India, a number of inquiries and referred to the statistics of native jails and hospitals, with the result that the ascertained number of cases of typhoid fever in the enormous native population of that country is quite insignificant in comparison with the great mortality caused by that disease among the relatively small European population in their midst.

Typhoid fever, except among the Goorkha regiments, is of extremely rare occurrence in the native army.

In the Kingdom of Nepaul the most numerous of the inhabitants are the Mongolian Newars, and the Goorkhas form the military class and dominating race, and these appear to be an exception as regards the prevalence of typhoid fever, for, according to Macnamara, during the hot weather and the rains it occasionally becomes epidemic and depopulates whole villages. The climate is more temperate, owing to its altitude, and the Nepaulese drink alcoholic spirits and eat meat, when they can get them, like Europeans.

Assuming the cause or pathogenetic germ of

typhoid fever to be once introduced or present in a station, barrack, or corps, it might be fairly argued that its development and spread would depend upon favouring conditions of season and susceptibility of individuals exposed to its influence. Heat and moisture may supply the first, fresh arrivals the second. And so the same place or corps might furnish a definite and continuous medical history of this disease for a series of years interrupted only by such intervals as could be accounted for by the absence of favouring seasons on the one hand, or susceptible individuals on the other. There is no doubt great difficulty in replying to an argument of this kind, and for a long time I deemed it a very probable and reasonable solution of the problem. So long as the same barracks must be occupied year after year by different corps there is an apparent probability of the existence of some continuity of descent underlying the whole medical history. It depends upon the time over which the hypothetical cause, be it a pathogenetic germ or animal poison, can remain dormant, but capable nevertheless of renewing its activity. But it has often happened that an Indian station, after having been occupied for some years and remaining free of typhoid fever, has on the arrival of a corps fresh from England, returned cases of that disease. The

British troops engaged in the Afghan campaign occupied, in the course of their marches, numerous positions that had probably never before been occupied by human beings, and as, in some instances at any rate, it was extremely improbable that the water supply had been fouled, that campaign afforded an opportunity for excluding the influence of an infected water, soil or site, although it cannot be said that the possibility of importation by a previously infected corps was also excluded. The distribution of the disease showed, however, that there was scarcely a position taken up by our army at which cases of typhoid fever did not occur. The same result was experienced in our various Egyptian campaigns. The native contingents did not suffer from typhoid fever, neither did the European regiments that came from India. The British regiments which had already served in Egypt and were stationed there at the time of the first expedition to Suakin escaped it, and this was attributed at the time to their being supplied with distilled water. On the next occasion, however, of an expedition to Suakin, when the main part of the force went from this country and had undergone no previous service, seasoning or acclimatisation in Egypt, typhoid fever was very prevalent, notwithstanding that the troops were supplied with condensed water.

There is no satisfactory evidence to show that typhoid fever is imported into India; that, in other words, the soldiers bring the disease with them from England. A recruit is, on an average, one year at the depôt before he joins the service companies of his regiment; he embarks on board one of Her Majesty's troop ships about October, and is about a month on the voyage out. He is medically inspected before embarkation. The returns of the health of the troops on shipboard do not afford any indication of the prevalence of typhoid fever; on the contrary, the health of the troops on the outward voyages has been remarkably good as a rule, and they have been singularly free from enteric fever. Although the period of incubation may be longer than that ordinarily assigned to it, it may be confidently assumed that many cases will manifest symptoms of the disease in a month, to say nothing of the great improbability of nearly every detachment of troops bringing out with it the germs of a specific disease ready for development at a given season.

It would be impossible to say that all sources of infection had been eliminated during the journey of the troops up country from Bombay to their various destinations, and *en route* from Deolali to Allahabad. Personally I do not think that too much reliance should be placed on filters to secure pure water.

They are generally in use, however, at the rest camps, and previous to the trooping season all the stagnant water in the wells is pumped out so as to secure fresh water from the springs. The Indian Government and military authorities take great pains to provide a good and effective sanitation. Whether they always succeed is obviously more than anyone can say.

The conservancy arrangements in India are very different to anything of the sort in Europe. A military cantonment is, as a rule, maintained in a very cleanly and sanitary state. With the exception of drains for the purpose of carrying off rain water and the overflow of bath and ablution rooms, there are no sewers in India, no soil pipes to get out of order, nor waste pipes connecting cisterns with drains, no cesspits to admit of soakage into the surrounding soil and contamination of the water supply.

The latrines in a well kept barrack or hospital are models of cleanliness; the dry earth system is in general use, and the soil is promptly removed in air-tight iron receptacles and buried at a distance from the cantonment, the ground utilised for the purpose being ploughed and cropped.

The disposal of the stools and excreta of typhoid fever patients does not, however, seem to me to be perfectly satisfactory. The ordinary method is to

disinfect the dejecta and then to bury them separately.

In hot countries, where unreliable native labour is employed, there can be no certainty that directions are invariably attended to, and that the dejecta are buried at a sufficient depth in a suitable site where they cannot contaminate water courses, be blown about by the wind, or otherwise become a possible cause of danger; moreover, so much depends upon the nature of the soil and the source of the water supply at any given place. Were it practicable it would be far better to burn the dejecta. Of the ancient elements—earth, air, fire and water—fire is the most direct and reliable agent for the purpose. We are still without any precise information as to the length of time during which dejecta may retain morbific properties, or the limits within which the stools of a typhoid fever patient may be capable of imparting their properties to other organic materials with which they may come in contact.

There is probably no subject that demands the exercise of more care and sanitary supervision than an efficient system of conservancy at our hill stations in India. Their sites soon become fouled by continued occupation.

The wells in cantonments are surrounded by a

good parapet, and filtration of water is not omitted. It is undoubted, however, that water is apt to become foul in wells, and that an increase in the amount of organic matter often occurs; and the prevalence of such diseases as typhoid fever and cholera, under these circumstances, might be fairly attributed to the use of such waters.

When all is said and done, however, the state of the native towns, villages and bazaars is often filthy enough, the habits of the natives are left unchanged, and, notwithstanding that the native is an excellent cook, no one knows what he eats in India, and perhaps it is just as well he doesn't.

So that, after all, it comes to this, that if ordinary filth causes be adequate to produce the disease, such causes are abundantly present in India; and if they do this through the agency or instrumentality of specific pathogenetic micro-organisms, or a specific poison, it seems to follow that these must either be the product of some parent stock, originally derived from a human source—but capable of independent existence from generation to generation, and occasionally of wholesale reproduction in congenial soils and circumstances—or that the cause is capable of spontaneous origin. In our present state of knowledge the only thing we can do is to direct our efforts towards removing or modifying the soil and

circumstances, by thorough sanitation on the one hand, and by lessening or combating the vulnerability or susceptibility of the individuals exposed to their influence on the other. And if there is a variety of typhoid fever in India and hot climates whose origin is autogenetic and dependent upon the slower operation of a number of conditions of a prejudicial kind, rather than upon a specific poison or entity from without, the practical lesson is still the same, viz., to ascertain the range of modifiable conditions affecting health, and apply the knowledge, that is, sanitation in the extended sense of its meaning.

As far as India is concerned, it seems to me that the best way of accomplishing this comprehends the following :—

I. The obvious thing to do is to avoid sending young and very immature men to India. Unfortunately, however, this is easier said than done ; for the system of reliefs required to keep up the European force in India to its full strength causes a heavy annual drain on our Home establishments, and our army is a young army. It is somewhat questionable, too, whether the *mortality* from typhoid fever in India would be very materially diminished if no soldier under twenty-four or twenty-five years of age were sent there, although the inefficiency from

sickness would be. As far as statistical evidence goes, it would appear that of the two factors—age and recent arrival—the latter is as powerful as the former, and it would not make any great difference whether a soldier landing for the first time in India were twenty or twenty-five years of age, so far as his chances of dying of typhoid fever were concerned. Still, there is no doubt that recruits should not be sent to India under twenty years of age, nor until they had learnt their drill.

II. We have next to inquire whether any measures can be adopted in India for obviating or diminishing the annual inefficiency from typhoid fever among the class of men we are compelled to send there.

Although we have no sufficient data to warrant us in saying that the location of troops in the hills would confer an absolute immunity from typhoid fever, there can be little doubt that it would materially diminish its prevalence, as well as sickness from other causes. On the grounds of physiology, and common sense alike, it would seem that, the nearer the climate is to that of the country he left, the better for the young soldier arriving in India. By subjecting his constitution gradually to climatic changes, it acquires the power of physiologically accommodating itself to them, and the

experience which a soldier gains of Indian life is of great advantage to him. Unfortunately, the statistical evidence we have of hill stations is not a very trustworthy index of their advantages in this respect. These stations are sometimes credited with sins not their own; that is to say, men of already infected or sickly regiments are often sent to the hills, to manifest there the symptoms of a disease really contracted in the plains, and it is consequently difficult to gauge accurately their sanitary effect. When I was in India it was strongly recommended, as an experiment, to send one or two regiments newly arrived in India to the hills. Unfortunately the prolongation of the Afghan war prevented the recommendation being properly carried out; but I think I am correct in saying that, in the case of one regiment at any rate, it was adopted, and successfully as regards the prevention of typhoid fever.

I still think the experiment worth trying, and for that purpose would suggest that a small hill station might be selected, to which a regiment should proceed on its arrival at Bombay. A good water supply should be provided, and steps taken to ensure the maintenance of its purity; and the conservancy, drainage, washing and cooking arrangements should be practically made as good as they

can be. The co-operation of the commanding and other officers should be obtained in carrying out the experiment by explaining the object of it; and the corps should be placed in medical charge of an officer specially selected for his intelligence and practical acquaintance with the fever in question.

It is only right to add that the Indian Government is doing its best to utilise hill stations, and that year by year the number of troops quartered in the hills is increasing. One of the benefits of a short service system is that there are fewer married soldiers, and that, consequently, a larger amount of accommodation in the hills will be at the disposal of the government.

III. The supply of water to rest-camps is, in principle, the same as to barracks.

The arrangements for water-supply to troops at these camps, and on the line of rail, demand the exercise of vigilant supervision, and it is probable that they admit of improvement. I have no confidence in the use of filters; they are but strainers; to keep them absolutely clean and wholesome involves a good deal of care and attention, otherwise the water passed through a filter is likely to become more impure than that which is put into it; and we know that to depend upon human agency in this respect is to introduce an element of error

and possible danger. The only safe and sure way of obtaining pure water is to see that the source of its supply is good and pure, and that the water is kept so until it reaches the consumer.

As regards the milk supply, no precautionary measure would be of any avail, short of having the cows brought to barracks and milked there, an arrangement to which the cow-keepers might object. The feeding of cows, during the dry season especially, requires careful supervision. I am bound to add, however, that typhoid fever is not confined to any one barrack or group of buildings, nor limited to any particular company or battalion. The married women and childen suffer, as I have said, less than the soldiers and officers; and the contrary would be the case if milk were a common vehicle for distributing the cause of the disease.

IV. It has often occurred to me that our dietary arrangements for the European soldier, during the hot season, are not sufficiently based on physiological and common-sense principles. They should be more adapted to the climate, and assimilated to the customs of the native. The British soldier consumes too much meat and beer in the hot weather, and the former is necessarily tough and indigestible. But I am afraid that any alteration would be a difficult and unpopular measure. The British soldier is

very conservative, and resents any interference with his habits or those common to the class of life from which he came.

V. The hot seasons of April-May, and the end of the Monsoon, August-September, being those in which typhoid fever especially manifests itself, too much consideration and care cannot be given to the young soldier at those times, in the way of avoiding all unnecessary drills, exposure, etc.

VI. But the more men are, as a rule, occupied in the open air, dispersed instead of being aggregated together, the better will be their health. This can only be done when the conditions of climate admit of it. The experience obtained in the employment of troops in road making is a case in point. It should be practicable to utilise the services of soldiers in hutting themselves in hill stations, and in occupying them in various duties connected with the internal economy of a regiment. It is to painstaking on the part of the regimental officers—the commanding officers, quartermasters and captains of companies—in regard to the internal economy of a regiment, that we must look for the health and contentment of the men of a corps.

CHAPTER VI.

Tropical Life and its Sequelæ.

Professor Virchow, in his address before the Congress of German Naturalists and Physicians at Strasburg, in September, 1885, called attention to a sphere of research in which, he alleged, neither the French nor the English had hitherto accomplished anything of importance—namely, the modifications of the organism, and particularly of the special alterations of each organ, connected with the phenomena of acclimatisation.

Whether Professor Virchow's estimate of English or French labours in this field of scientific investigation be correct or not, the subject is one of much importance from a political and scientific point of view; and it is full of practical every-day interest to a country like England, in constant communication with India and the colonies, with the consequent interchanges of climate that are nowadays taking place among the inhabitants of the British Empire. The problem, as stated by Virchow, embraces, however, a very extended field of inquiry; and even its approximative solution, supposing the materials for

it to exist, would involve a considerable expenditure of labour, time, and space. In order to circumscribe the inquiry within the narrower limits of special interest to the medical profession, I propose to gather up and summarise, as succinctly as practicable, such impressions as have been derived from my own observations and experience. Still, it seems necessary to say something on the general, as introductory to a consideration of the special and limited, aspect of the question.

The subject is, as I have said, not without practical interest, and, by way of illustration, it may be remarked that changes incidental to the action of various climatic and seasonal conditions are not sufficiently taken into account. With a large number of persons returning from a tropical climate in ill-health, or in different degrees of depressed health, time is an essential element for their recovery, apart altogether from the administration of drugs. It is the experience of all travellers that change of climate is followed by a certain amount of change or disturbance of the physical health—sometimes of a favourable nature, sometimes the reverse, and frequently of an insignificant kind; but we are sensible of the change, nevertheless. On the arrival of an immigrant in a new climate, whether it is to agree with him or not, his organism appreciates and

probably manifests some difference until it is again in equilibrium—that is to say, until, by a new adjustment, as it were, in the play of his animal mechanism to the new conditions, his constitution accommodates itself to them. From such small beginnings it is easy to trace our way up to those greater, more slowly induced, and more appreciable modifications, the aggregate outcome of which is embraced in the term "acclimatisation." When a young soldier lands in India, we may observe the effects on the human body of changes incidental to the different periods of its own development, together with those incidental to the action of climatic conditions; and similarly, on his return home, the changes brought about by a different environment.

It has been doubted whether there is any such process at work at all as is comprehended in the term "acclimatisation" in the case of an individual newly arrived in a foreign climate, except that which is comprised in the gradual physiological and structural modifications slowly induced in the races of men and animals by climate; whether, in fact, individuals who survive the changes prejudicial to health do not do so by their constitutional powers of resistance to such changes rather than by their adaptation to them, representing the operation of the law of survival of the fittest, the interval through

which they have passed being characterised as a process of "seasoning." Be this as it may—and it must obviously be very difficult to draw a line of demarcation between conditions which would form the proper study of the naturalist and physiologist on the one hand, and those which would bring them within the purview of the practical pathologist and physician on the other—it is the latter which more directly concerns us. It is the increased susceptibility to disease or vulnerability of constitution engendered by the unstable state of the system whilst it is accommodating itself to its new surroundings, and the dominating influence of old climatic conditions and habits whilst these still persist, that are of medical moment.

It is pretty well known that the Semitic peoples possess a power of acclimatisation, or adaptability to climate, superior to that enjoyed by the Aryan races; and among the latter the inhabitants of the South, the Spaniards, Portuguese, Maltese and Sicilians, are superior to those of the North. Next to the Jews, the gipsies are the most cosmopolitan. The admixture of a foreign blood in a remote past confers a resistance to the prejudicial effects of climate; and half castes also, if a degenerate race, manage to survive.

It is not very easy to say how much of the excess

of mortality of Europeans in tropical countries is of an inevitable kind, and the effect of climate uncomplicated by malaria, or how much it could be reduced by improved sanitary laws and improved personal hygiene and habits of life. Contrast the following with the present state of things in India. In 1865 a gunner belonging to the Royal Artillery depôt was about to be discharged the service. He applied to have thirty shillings, which had been stopped from his advance of pay on embarking for India, refunded, as he had not required his coffin nor incurred any expense for his funeral obsequies. The matter was referred to the India Office, the soldier's claim was found valid, and the sum was refunded. It appears that we are consequently within measurable distance of the time when the mortality among troops arriving in India was so great as to require the Government to safeguard itself against the expenses attending soldiers' funerals.

What are the causes or conditions which produce the deterioration of health, the degenerative and other changes, and the sequelæ and more remote effects of disease noticed in Europeans who have resided in tropical or subtropical climates, and how should they be treated? The effects of the direct influence of the sun's rays have not yet been scientifically and exhaustively determined. It would

appear that if the heat of the blood of vertebrata exceeds 113° F., the myosin begins to coagulate; and that the effect of an increased temperature applied to nerves causes the electrical currents through them to be lessened, and finally to stop; and if the nervous currents be interfered with the vessels and amount of secretion, on any hypothesis of the relation of the nervous system to the phenomena of heat, must be interfered with too. The pulmonary function is diminished, and with it the elimination of carbonic acid and water in those subjected to heat—at any rate, according to the experimental observations of most authorities; and the heart's action under great heat is increased. The skin acts much more freely, its increased physiological function often giving rise to "prickly heat" and boils; and the amount of urine is diminished in a remarkable but varying degree, inversely as the action of the skin. In addition to the positive results of Rattray's observations, it is a matter of everyday remark that youths increase in height but lose in weight, colour and strength in the tropics. I am not acquainted with any reliable data for estimating the amount and condition of the liver-work in tropical climates.

The most reasonable explanation of the cause of the blackness of the skin of the tropical man has

been afforded by my friend Surgeon-Major Alcock in his paper on the subject published in *Nature*—viz., that it is to protect the peripheral nerve terminations against undue excitation by light, and not against heat; for its properties in this respect would obviously be unfavourable in proportion to the depth of skin colouring. We use smoked glass in looking at a solar eclipse for a similar purpose—to protect the retina.

We have to notice: the effects of exposure to climatic heat on the nervous system, as illustrated by repeated observations on officers and others appearing before medical boards; anæmia and increased "wateriness" of blood, in varying degrees, from that commonly witnessed after any ordinary illness up to conditions of tropical anæmia, mimicking very closely that known as pernicious anæmia; the condition known as "psilosis" or "sprue" and its allies, some cases of which improve on, and can only be cured by, strict adherence to milk diet, and others which do not, but are rather injured by it; some curious forms of chronic gastro-intestinal disorder, attended with stomatitis or a condition resembling scurvy, but not attributable to the absence of vegetables or curable by the employment of any special article of diet; and, lastly, cases of malarial cachexia, together with morbid conditions of the liver and spleen.

As regards the effects of heat on the nervous system, there is no need to dwell upon the distinction that should be drawn between heat exhaustion, heat stroke, and heat apoplexy; or upon the efficacy of temperate living, good ventilation, clothing light in colour and in weight, and so loose-fitting as to admit of the freest respiration and perspiration and sufficiently permeable to the air to allow of the removal of the heat accumulated beneath it. It is the sequelæ that concern us, such as the tendency that is acquired to the occurrence of increased and erratic temperatures, insomnia, loss of "nerve," acute neuralgic headaches, and other neuroses, the inability to take any alcohol without undue excitement or headache, and occasionally, though rarely, even short attacks of mania. If a man has suffered from any form of sunstroke, or even if he has served continuously for some time in a tropical or semi-tropical country, or been exposed to great heat, as was the case with our troops in Egypt and the Soudan, he is very likely to manifest many curious and more or less distressing neurotic symptoms. For instance, I have known young men after a return to England from those climates complain of insomnia, great depression of spirits, proneness to emotion, to an irritability or mobility of the nervous system, attended with great loss of "nerve,"

and this state would perhaps be accompanied by some tremor of the lips, tongue, and the facial muscles of expression in talking or describing their symptoms. A man would allege, for instance, that he could not concentrate his attention or take any interest in anything; that he would go through a picture gallery without being able to recall any painting he had seen there, or attend a theatre and be unable to follow the plot of a play or recollect the characters in it; that he was afraid to cross a street in front of an omnibus; that the noises of London or of a railway station distressed and confused him in a way they had never done before; that, although a good horseman, he was afraid to ride; that he was irresolute and nervous, liable to headaches coming on suddenly and often without apparent cause, and disappearing as suddenly; that he had to avoid the heat of the sun, crowded rooms or theatres, and was easily fatigued; that a trifling excitement gave rise to palpitation, and that, in effect, his inhibitory nerve centres were enfeebled, and no longer under his control. Sleeplessness was commonly complained of; the patient would assert strongly that he never slept, while his relatives possibly urged that he did—more than he believed. But refreshing sleep depends much more upon its quality than its quantity. The patient probably slept lightly, or if the con-

sciousness to external impressions were lost or dulled, still some centres were active and automatically "functionating" in a train of thought of which the subject was dimly conscious all the while. There was often either no physical cause or no adequate cause apparent; the sufferer was not wasted or markedly anæmic; his appetite was good and his general health also. In many cases, however, there was something wrong with the health, generally of the nature of dyspepsia with some anæmia, and in some of them the amount of urea in the urine would be found to be increased. In some cases, moreover, especially in those in which malaria forms a factor in their medical history, neuroses are common enough, the liability to them diminishing according to the length of residence in this country. In the case of three officers of my acquaintance returning about the same time from service in India or Egypt, two suffered from "shingles," preceded and followed by severe brachial neuralgia, and one from this form of neuralgia for some months without any concomitant skin affection.

An officer of gouty diathesis, who had been invalided from the Mauritius from the effects of malarious fever, suffered from various anomalous symptoms of depressed health, all of which were, in my opinion, entirely attributable to malaria together

with the acclimatising effects of a change to a new climate. He consulted different physicians and surgeons of eminence. At one time he had symptoms referable to his heart, at another to his spine, and he remained in bed at perfect rest for many weeks at the suggestion of a consulting surgeon, under the assumption that he had disease of the spinal column; and later on he was told and was himself convinced that he had some disease, probably tuberculous, of the lungs. Time was the main element in his cure, and in two or three years after his return from the Mauritius he had quite regained his health and strength.

Sciatica is also not at all uncommon. It is well known how very frequently the subjects of Mediterranean forms of fever (including enteric fever) are attacked with a peculiar kind of rheumatism, in which the neuralgic element preponderates; but I have seen cases in which symptoms resembling those of locomotor ataxy were present, or other morbid conditions referable to spinal cord trouble, which were doubtless attributable to malaria. At any rate, they completely disappeared in time, and with remedies prescribed on that assumption. Two cases of paralysis or paresis implicating the nerves of the eye, and giving rise to slight squint or double vision, were under my care, in which the absence of any

history of syphilis or of any central nervous affection led to the belief that the lesion, whatever was its exact nature, was attributable to malaria to which they had been exposed. They both recovered.

In connection with this subject of disordered innervation, that of perverted heat function is intimately associated. This field is a tempting one, but too wide to enter upon here, seeing that Dr. Ord, in his extremely interesting and suggestive paper on the "Causation of Pyrexia," has had recourse to experimental observations connected with thermometrical phenomena manifested by growing plants and ripening fruit for the purpose of elucidating constructive and destructive metabolism in our own bodies when supplemented by the dominating influence and *rôle* of a nervous system. Be the explanation of the relation of the nervous system in the causation of pyrexia what it may, there can be no doubt of its being an important factor. I have seen quite a large number of cases of fever—uncomplicated fever—which could not properly be assigned a place in the published official nomenclature of disease. The increased heat apparently constituted *the* disease, and it went on from day to day and week to week with a sort of regularity that was monotonous, nor was it necessarily correlated with an increased pulse ratio. Patients, after having

manifested in hot climates, even for months together, a range of temperature above the normal, have continued to do so, in many cases after return to a temperate or cold climate. Of course, in those coming from India the phenomenon may have been due to a malarious form of fever or to the action of a malarious element; but in the case of persons returning from Egypt, Malta and Gibraltar, where ague and malarious fever are certainly not commonly prevalent, this explanation will hardly suffice; and it is a noteworthy fact that, judging from my own experience, neither quinine nor arsenic exercised any curative or beneficial influence. Frequently muscular rheumatism, sciatica, intercostal, brachial, or facial neuralgia, and occasionally orchitis or inflammatory enlargement of some of the lymphatic glands appeared, and retarded the patient's convalescence.

I have seen many cases of officers and men who, after their return from Egypt, the Soudan, Mediterranean, or India, have been liable to erratic and abnormal temperatures of temporary duration, provoked by trifling exciting causes, or by none at all, that could be traced at least; and the individual was often not himself even aware that there was anything wrong with him, apart from the evidence afforded by a clinical thermometer. If a patient be anæmic, he may even feel better on the days on

which there is an increase of temperature than on those during which it is normal. In the case of a lady I saw in consultation in Egypt we found that she invariably declared herself to be "quite well" on the days of increased temperature, and "not feeling well" and complaining of headache on those of normal temperature. The explanation was, I suppose, that the increased force and frequency of the circulation under the excitement of fever served to compensate for the anæmia and feeling of depression otherwise present.

In the treatment of these cases one great thing is time—time during which the system is accommodating itself to a new environment, and gradually shaking off, as it were, the effects of prejudicial climatic conditions to which it had been previously habituated. The medical treatment mainly consists in finding out what is wrong, and for that purpose it is necessary to tap at the door of every organ. The more the patient is in the open air the better, and a sea voyage, a trip to the north of Europe or Scotland, may do good; but residence at the sea-side, particularly in a relaxing place, generally does harm, notably in cases where there is an inactive liver. The patient feels mentally jaded, and to secure sleep he requires to go to bed physically, and not mentally, tired. Sometimes, when the bowels

are irregular, and there are slight dyspeptic symptoms attended with flatulence, an ordinary dinner pill or frequent small doses of mercury (the tenth of a grain of calomel) will do more to procure sleep than all the opiates in the world. The indiscriminate use of narcotics or sedatives, or that of tonics, is often very injurious. In cases in which the liver is somewhat enlarged, the bowels irregular—and especially if there is any gouty or rheumatic complications also—great benefit will occasionally be derived from a course of waters at such places as Carlsbad, Ems or Homburg, but the patients require to be carefully selected, otherwise only injury will result.

If the patient is anæmic or has a malarious history, but no organic disease, and a clean tongue, the use of quinine, arsenic, and iron is indicated; and Blaud's pills (if they do not irritate) are an excellent preparation; or a mixture of the perchloride of iron and arsenic, or Easton's syrup may be used. If the patient is physically restless at night—constantly changing his position—a combination of the bromides of sodium and ammonia with hyoscyamus proves very useful; but when there is depression of spirits, bromides have generally an injurious effect. The diet should be varied, simple, and wholesome. Beer and spirits are better avoided. Burgundy and the Australian wines are preferable, and generally

agree. Fresh fruits of almost any kind are useful, if not taken at night.

The condition in which some of these patients find themselves is more distressing than is commonly imagined, and out of all proportion to its danger or gravity; the sufferers are often thin, jaded, and anæmic-looking, introspective and depressed, but they almost invariably recover in time. Every temperament is liable to go down before these climatic conditions, but those of a nervous or nervo-bilious temperament suffer most; and it is needless to remark that pleasant and cheerful society helps them over the time necessary for their recovery.

The remaining conditions of ill health arising from tropical life are more serious, and have still to be considered.

More or less anæmia, like debility, occurs, of course, after every ordinary, or every serious or protracted illness, but it is more observable in hot climates, because in the case of a febrile attack, for example, the deteriorating effects of the fever heat have been supplemented by those of climatic heat. Anæmia embraces a wide range of degree. It is not necessary to dwell upon those simple forms which occupy a sort of borderland between health and disease; nor is it my intention to speak of the

anæmia which may be reasonably expected to ensue in consequence of previous sickness, or of that which can be accounted for by the presence of some organic or other disease; but rather of those varieties in which anæmia seems to be the disease—cases in which it may be regarded as primary and not secondary in character. The number of individuals that appear in the course of a few years before medical boards who are suffering from different varieties and degrees of anæmia is considerable.

There is no very clear practical line of demarcation between the simpler and graver forms, that variety of essential anæmia, for instance, which is progressive and generally fatal. The graver kinds of climatic anæmia, those which in some degree mimic the pernicious variety, differ from the latter in some important respects. In regard to age—the sufferer from climatic or tropical anæmia may be of any age; he differs in not having the peculiar yellow, waxy, cachectic appearance; in the absence of retinal hæmorrhages; and in his recovering, instead of the disease progressing to a fatal issue as in the pernicious form. The sufferers from climatic anæmia are often young men; they do not, as a rule, exhibit signs of much wasting, but they are often very debilitated; there may or may not (generally not) be signs of structural heart disease. The mo-

tions are usually natural in colour; the urine, though of low specific gravity, is rather high-coloured than otherwise, and the amount of urea is relatively large, which would point to increased hæmolysis. The anæmia is not so much due to a diminution of quantity as deterioration of quality of the blood. I have no observations, however, as to the extent to which the red corpuscles had decreased, nor any regarding an increased quantity of iron in the hepatic tissue. As to the pathology of this climatic anæmia, whether it has any points of identity or close alliance with that of pernicious anæmia or not, I have no special information.

It is astonishing how anæmic some individuals become after residence in hot climates, without having actually had any disease to account for it. They may or may not have suffered from intermittent fever, but they have commonly been exposed to malarious influences, although, as a rule, there is no marked splenic or hepatic enlargement. Some of these cases exhibit slight febrile disturbances—that is to say, the evening temperature reaches 100°.

There is one factor always present in the medical history of the cases under review; they have all been exposed to the effects of climatic heat. It is very difficult, if not impossible, to apportion the influence of the separate causes or conditions present; but the

patient need not necessarily have been exposed to malaria. Even where climatic heat seems to have been the cause of the anæmia, it is difficult to say how much was directly attributable to heat *per se*, and how much to the constitutional depression, increased perspiration, diminished appetite, and depressed digestive and nervous functions caused by it.

An officer of about forty-five years of age, after having spent some years in the plains of India, and enjoyed excellent health, went to Simla. At the latter station he began to lose strength, weight, and colour, without any appreciable disease. There was no history of his having suffered from ague, still, I suspected that a malarious cause was at the root of his symptoms. After a time he noticed that he became subject to an attack of vomiting daily in the morning whilst his stomach was empty; the vomited matter consisted entirely of a small quantity of bile, never of food. There was no fever, the tongue was clean, the appetite good; physical examination elicited nothing; his bowels were regular, but rather loose; urine acid, non-albuminous, free of sugar, generally of rather low specific gravity, and of somewhat high colour. I had the curiosity to compare the amount of urea it contained with that of a healthy individual, after making the specific gravity of the two samples of urine the same. I found the

urea in the former somewhat in excess. This officer's health went from bad to worse; he became extremely pallid and much wasted, and was sent home in a very grave condition of health. After some considerable time he began to improve in this country, under the influence of the change of climate, quinine, arsenic and iron, and good living with plenty of bottled stout; and his health eventually became fairly re-established, but not quite.

The condition of an officer whom I saw after he had returned from Egypt, where he had enjoyed excellent health, notwithstanding that he had been exposed to much hardship and extreme heat, resembled that of a chlorotic girl. He had never suffered from fever of any kind. But for his anæmic appearance and for a train of nervous symptoms—very much like that already described—there was nothing wrong with him. At first remedies appeared to have no beneficial effect, but after some months spent in this country he gradually improved, and ultimately quite recovered. His treatment, in addition to remedies to improve his digestion and regulate his bowels, consisted of preparations of iron and arsenic, good food, and a liberal allowance of wine with it.

There are some morbid states of constitution induced by residence in tropical or semi-tropical

climates that are noteworthy in this connection. One is a condition resembling, and constantly mistaken for, scurvy or purpura. It has nothing to do with the former disease; the sufferers have had plenty of fresh vegetables in their dietary. It is, in reality, somewhat allied pathologically to the hæmatogenous forms of jaundice occasionally witnessed in malarious subjects; or to that condition which produces congestive paroxysmal hæmaturia, with the *débris* of red corpuscles in the urine, and to disordered constitutional conditions, running up in order of gravity to those forms of remittent fever accompanied by jaundice or hæmatinuria respectively, or with icteric urine combined with jaundice and hæmatinuria, and disintegration of the red blood cells.

There are several undetermined points of great interest connected with the relation of bile and bile pigments to digestion, blood and urine. Only a very small part of the bile which is daily poured into the intestine leaves it in the alvine evacuations. The exact nature of the interchanges between the fluid contents of the bowel and the blood, and the subsequent metamorphoses and disintegration of the blood cells in relation to the bile and urine pigments, have yet to be satisfactorily determined. But their consideration is quite beyond the scope of a clinical paper.

The subjects of anæmia may have suffered or not from some of these diseases whilst resident abroad. They are anæmic-looking, somewhat wasted, and generally suffering from atonic dyspepsia; the gums look spongy, and the tongue is occasionally red, raw, and sore looking at the edges; the circulation is weak, the extremities feel cold, and the patients suffer much from the cold of winter and spring after their return to this climate; occasionally there are ecchymotic spots on the skin, and they "bruise" easily. The heart's action is weak, but the sounds are clear and normal. The urine is acid, non-albuminous, and normal as regards specific gravity. It occasionally happens that these patients suffer from hæmoglobinuria, particularly the paroxysmal variety, after exposure to cold and wet, or after great fatigue. There are no physical signs of disease of the liver or spleen in these cases. When these symptoms are attributable to disease acquired in tropical climates, the patients recover in process of time by residence in this country. They appear to do better at inland places than by residence at the seaside, and are benefited by steel, arsenic, and large doses of pepsine with vegetable bitters, provided attention be given to regulating the bowels; and for this purpose saline purgatives should be avoided, but remedies like iridin or euonymin, in combination with rhubarb,

or aloes and ipecacuanha, are very suitable. The patients are the better for a good varied diet, with Burgundy or Australian wine, and, if warmly clad, by open air, but they are unequal to much physical exercise.

Some of these cases are of a mixed kind; the anæmia is the result of diarrhœa or of the condition known as "psilosis" or "sprue," or some complication is present, in which case great care may be required in the diet and a rigid adherence to milk may be essential, or the complication, whatever it may be, will require special treatment; and I have even found small and repeated doses of the extract of opium to act as a tonic and nutriment.

I was consulted by a middle-aged officer who had been in the Abyssinian War and much exposed to the heat of the Red Sea. A little more than a year afterwards he noticed that he was gradually getting much paler and slowly, almost imperceptibly, losing strength, but not flesh. At the time I saw him he was bloodless-looking; his lips and mucous membranes were almost as pallid as his face, and the anæmia was peculiar—of a dirty yellowish kind, resembling a dead leaf in colour. He noticed that his appetite for meats and nitrogenous articles of food had gradually declined until it finally disappeared. His case at first appeared to

me to be one of well-marked progressive pernicious anæmia. Nothing did him any good and everything was tried, and he soon died. My friend Dr. Samuel Fenwick, who was kind enough to see him, had an opportunity of examining the stomach after death, and he told me that the condition was one of marked atrophy, the gastric glands having for the most part altogether disappeared. I allude to the case, because it seems to illustrate some points of difference between the pernicious form and other varieties of anæmia, although it apparently had a climatic origin.

As regards the condition known as "psilosis" or "sprue," in which an intestinal disorder attended with a chronic and peculiar form of diarrhœa forms the most characteristic feature, we are in great need of precise information about its morbid anatomy and the results of a thorough investigation of the morbid lesions attending it. It is a common disease in India, China, and elsewhere. It sometimes appears to be the result of a more or less depraved state of health induced by long tropical residence, and begins insidiously as a looseness of the bowels, which at last amounts to diarrhœa—a diarrhœa that proves to be of a very chronic kind; sometimes it begins on a change from the hot plains of India to the cold climate of the hills in individuals whose health and

constitutional powers have been lowered by residence in the former, although they may never have been sick there; and sometimes it dates from an attack of hill diarrhœa.

En passant, I may remark it has always seemed to me that there are at least two kinds of so-called hill diarrhœa. One might be termed "physiological." A man leaves a climate where the action of the skin is excessive and out of all proportion to that of other organs, and where the appetite is at a minimum, and the daily amount of urine passed is extremely small. He goes to the hills, and in the course of a few hours arrives in a cold climate. The blood is determined to the internal organs and mucous membranes, and their increased physiological activity has to make up for the inactivity of the skin. The change is a sudden and remarkable one, to which the system has to accommodate itself, and it is no wonder that he gets affections of the liver, diarrhœa and diuresis. A Turkish bath at large hill stations would be an excellent institution, and the use of it by individuals newly arrived from the plains would in all probability save them from much sickness. The other form occurs frequently as localised epidemics, some of which would prove most interesting and profitable studies in epidemiology and pathology. The prevalence of diarrhœa in

some of these outbreaks has no more to do with the drinking water or milk than these have to do with the prevalence of influenza. It is quite possible, however, that their occurrence may be attributable to the presence of some pathogenetic germ. The phenomena attending one of these outbreaks are not inconsistent with that assumption, and the administration of minute doses of perchloride of mercury sometimes proves very efficacious.

But to return to the subject of "psilosis" and chronic diarrhœa (the "diarrhœa alba" of old writers), for the two diseases, although very similar, do not appear to be perfectly identical. Psilosis, for one thing, seems to affect more women than men; whereas, with tropical diarrhœa, which so frequently begins as a hill diarrhœa, it is the reverse. The first symptom is abdominal tympanites in the early morning, which passes off after the bowels have been relieved of a copious and soft evacuation; but the symptoms soon become more urgent, and the patient on awakening has to relieve his bowels at once, passing very copious, light-coloured, frothy evacuations. Once the disease is established, it is liable to go on and is very difficult of control, especially if the patient is not extremely careful as to diet, restricting himself, in fact, to a milk diet. Sometimes it is not until the patient has left India

and gets on shipboard on the voyage home, or after his arrival there, that he suffers from this diarrhœa.

There is no need to describe the stages and symptoms of either "psilosis" or tropical chronic diarrhœa. They are well known. Those of "psilosis" or "sprue" have been fully described by Dr. Manson, Dr. Thin, and others; and Sir Joseph Fayrer has discussed the subject of diarrhœa generally. The patient may go on suffering for some time, until he becomes much emaciated, enfeebled, and anæmic. The mouth and throat become sore; the tongue has raw, red, and glazed patches, devoid of epithelium, and is frequently fissured. Mastication and swallowing are often painful. This state of the mouth and tongue is but indicative of that of other parts of the mucous membrane lower down. The stools, at first large, yeasty and frothy, become like dirty mortar or cream, and undigested articles of diet may frequently be detected in them. The frequency and amount of the alvine discharges increase, and the appetite generally becomes voracious.

The results of a post-mortem examination in one case were:—The liver was pale and atrophied, like the rest of the body, and the gall-bladder empty. The fact was that the liver had nearly ceased its functions for want of blood. The coats of the intestines were very thin and pale, almost diaphanous;

the glands generally atrophied, except the mesenteric glands, which were comparatively large; the mucous coat of the small intestine seemed to have lost much of its epithelium; and it was noticed that the greater part of the intestinal tract, especially about the villi and atrophied glands of the small intestine, gave an amyloid or lardaceous reaction to the iodine test—a phenomenon which I have since learnt, on Sir William Aitken's authority, is not at all uncommon in cases of chronic diarrhœa. In the case of a child who died at Malta a considerable time after it had apparently recovered from an attack of typhoid fever, the same effects, together with the thinning and atrophy of the intestines, were observed as in the fatal case of chronic diarrhœa.

As regards the treatment of these cases, it may be summed up in one word—milk. Sometimes fresh milk agrees better than boiled, sometimes the reverse; occasionally, and as a temporary measure, only peptonised milk will suit. As progress is made other things may be carefully tried. Some patients cannot take milk, and to all a time arrives when such a monotonous diet becomes very distasteful and fails to do good. Under such circumstances the use of underdone meat with a small quantity of stale bread or biscuit will sometimes prove very satisfactory. Pepsine in large doses is often very useful, and

occasionally opium. I prefer the extract of opium in half-grain doses frequently during the day, or Captain Jeremie's preparation, or the liq. opii sedativ. Alcohol in any form is usually injurious.

But there are some cases of chronic diarrhœa which do not fall exactly within the category of those described, and milk either does them no good, or the patients rapidly lose weight and strength on it. It is not always possible in practice to tell beforehand the subjects in which milk will not be productive of any benefit, but they are mixed cases and non-comformable in all respects to the foregoing description. The patients bring a history of long residence in a tropical or semi-tropical climate; they have either suffered from malarious fever or been exposed to malaria, but their health has been fairly good until their arrival in England. Shortly after this they begin to go through a process of acclimatisation, and the effects of conditions to which they had been elsewhere exposed also begin to manifest themselves. Their organs are sound; the tongue is clean, though perhaps looking rather red and raw at the edges; the gums are possibly tender, and look spongy; the appetite is good; but they become the subjects of more or less chronic diarrhœa, attended with abdominal fulness, followed by loss of flesh and strength and anæmia. The motions are

rather too copious, loose and light-coloured, but are not those characteristic of "sprue," or dirty white and creamy. The urine is of low or average specific gravity, high-coloured, and containing an excess of urea, and sometimes giving an indication of the presence of indican. The digestion is impaired; the sufferers sleep badly or too much, and the sleep does not refresh them; they are rather irritable and despondent. Now, time is the great and important element in these cases. They do best by residing in the country, where it is dry and warm, but not close to the sea, and they should be warmly clad. Milk and meat juice, essence of beef, or underdone meat; a limited allowance of fluids, especially of hot fluids, the avoidance of hot soups and vegetables, particularly potatoes, should be enjoined, but cauliflower and a little ripe fresh fruit occasionally do good.

As regards drug treatment, the use of opium in small and repeated doses is commonly very beneficial. Orezza water is useful as a drink, and later on, as soon as the patient can take them without irritation, Blaud's pills are very useful, together with a good French Burgundy (Chambertin) or a sound Australian Burgundy. In the earlier stages the patient's condition requires a careful, unirritating, bland diet, and alcohol and tonics cannot be taken; and occasionally even a mild aperient, with euonymin or

iridin to stimulate the hepatic function, may prove useful. But, do what we may in these cases, they are going through a process of acclimatisation in a new climate, and the constitution is also gradually ridding itself of the effects of prejudicial conditions acquired in the old one; and time, sometimes a year or two, is essential to their perfect recovery.

A few words in conclusion about albuminuria. It is not at all uncommon to find albumen in the urine —and occasionally in rather considerable quantity— of persons who have returned from the tropics, in the subjects of malaria, and in those who have suffered from climatic fevers. Its presence has not the same significance that it has under other circumstances. Provided casts are not present, the albuminuria generally disappears in time and the patients recover.

CHAPTER VII.

Observations on Abscess and other Diseases of the Liver.

The following observations were mainly written, but not published, many years ago; at a time when soldiers invalided home from tropical or subtropical climates, who were found on arrival too ill to proceed to Netley, had to be disembarked at Portsmouth and admitted to the garrison hospital there. Such additions have been embodied as have been derived from subsequent experience on the Army Medical and Indian Medical Boards respectively and in India and elsewhere; but no special reference has been made to the various and valuable books which have appeared on the subject. I have simply attempted to describe the impressions derived from my own personal experience and observation.

Imprimis, there are a few anatomical considerations which are not without practical interest, and deserve to be borne in mind. The liver is by far the largest gland, and its vena portæ and vascular system are sufficiently capacious to contain pretty

nearly all the blood in the body. It measures from ten to twelve inches in its transverse, and from six to seven inches in its antero-posterior diameter, and it is about three inches thick at the thickest part of the right lobe at the back. At its right extremity it is large and rounded; thin and flat at its left; and its position is such that a needle inserted directly backwards from the middle line in front would easily pass quite through its substance. The position occupied by the liver and the limits within which this varies according to the posture of the body and the action of the diaphragm, as well as the way in which these limits may become altered by conditions affecting the capacity of the thorax; the relation of its more bulky part (and its convex vaulted shape) to the under surface of the diaphragm on the one hand, and to the large vessels, stomach, and intestines on the other, are anatomical considerations which obviously have a very direct bearing on diagnosis, on the frequent site of an abscess and the course it may take, as well as a very practical one on surgical treatment—for instance, as to how the abscess can be best reached with least risk of injury, and the relation of a drainage-tube to the cavity of a liver-abscess after it has been reached.

Suppuration of the liver may arise under one or other of the following conditions:—First, what may

be called metastatic abscess, in connection with an ulceration, sloughing or allied morbid process in the intestines, and most commonly of the large intestine, the result of dysentery, where from the introduction of septic or other vitiated materials into the tributaries of the portal vein—as pointed out years ago by Dr. Wm. Budd—embolic abscesses ensue. Secondly, as one of the pathological products of that general contamination of the blood known as pyæmia or its congeners, where the presence of pus in the liver is associated with abscesses of other parts, such as the lungs, joints, &c. This is comparatively rare. Thirdly, and lastly, but from a curative point of view the most important, where there is an affection of the liver of which abscess is the result, irrespective of and unconnected with dysentery or other diseased action in other parts of the body.

Although dysentery and liver disease (including abscess) generally march together, it must be conceded that hepatic abscess often takes place from the operation of causes which lead primarily to a congestion of the liver *per se*—venous and biliary congestion—irrespective of dysentery. On the one hand, cases of hepatic abscess occur in tropical countries—in India, Ceylon, and elsewhere—without any dysenteric disease; and on the other, dysentery

often runs its course without any hepatic mischief; and even when the two coexist—dysentery and hepatic abscess—their relation to one another is not invariably and necessarily, although it is commonly no doubt, one of cause and effect; the size, solitary nature, and peripheral thickening of the liver abscess sometimes indicating an origin antecedent and not subsequent to that of the dysentery.

Of the frequent association and casual connection of dysentery with hepatic abscess, however, there can be no doubt whatever. The evidence of it has been accumulating from the days of Dr. William Budd to the present time. Indeed, cases of hepatic abscess met with in this country usually possess a history of dysentery, or some of the anatomical signs of that disease after death. I am indebted to my friend Dr. John Anderson, C.I.E., Physician to the Seamen's Hospital (late *Dreadnought*), for the following information:—From the post-mortem records of that institution it would appear that, out of seventeen fatal cases since 1880, twelve occurred in connection with dysentery and five without. Of the former no less than seven were instances of single abscess, and five multiple. In addition to the above there was one case that could not be classified as regards dysentery. My experience abroad, however, would lead me to infer that cases of abscess of the

liver, independent of and unconnected with dysentery, were quite common; and when such is the case we can generally discover some anatomical characters which distinguish this form of hepatic abscess from the metastatic variety. The former are commonly large and solitary, containing a considerable quantity of purulent fluid, with cells like true pus cells, and the abscess is shut off from the liver substance by a more or less tough fibrous enveloping wall. The metastatic variety, on the other hand, consists commonly, but not invariably, of multiple abscesses of very different dimensions, from the size of a pea, walnut, or hen's egg, to that of a large abscess, containing the detritus of broken-down and necrosed liver tissue mixed with a puriform fluid rather than true pus, and more rarely confined by any limitary membrane; the walls of the abscess consisting rather of the softened spongy or necrosed substance of the liver itself.

My observations are corroborative of those of Dr. F. N. Macnamara on the morbid changes which apparently precede the formation of pus. The liver presents certain drab-coloured patches which contrast with the somewhat engorged aspect of the gland generally, and retain their colour after the liver has been incised and the blood has escaped. There is a peculiar granular degeneration of the liver

cells in the drab-coloured patches, which soften in their centres and become puriform in appearance, with ragged, spongy-looking parietes.

A liver abscess may burst into the intestine, lungs, or other contiguous parts; or it may be opened naturally or artificially, of course, through the integuments, the pus sometimes taking less common channels or making curious tracts and sinuses, the causes of which generally admit of anatomical explanation.

The patient suffers, perhaps, at first from symptoms of inflammatory enlargement of the liver, with or without fever and subsequently rigors and hectic, the latter being probably the effect of pent-up pus, and of a sort of chronic subacute pyæmia—the chronicity of the symptoms and the less rapid fatality of the disease being due to the fact that the amount of blood poisoning induced is never far in advance of the eliminative action it sets up. The metastatic form is the more dangerous to life; it more rarely terminates by rupture and discharge of the abscess and the return of good health. These descriptions are necessarily drawn more sharply and defined in outline than we must expect to meet with them in practice; for we cannot always determine during the lifetime of the patient to which variety the hepatic disease belongs. Still, the distinction is

not without practical advantage in connection with the question of the advisability of opening an abscess of the liver or of exploring that organ in cases where its existence is suspected. The cure of an abscess by operation is more likely to occur in the case of an idiopathic large solitary abscess. In those of dysenteric origin, it occasionally happens, however, that an embolus in the liver gives rise to a single abscess, or several abscesses unite together and form one. Where there are numerous abscesses it is scarcely necessary to add that little benefit can be anticipated from opening one of them; indeed, there is a risk of contributing something to the danger of the case by the infliction of a surgical injury. In a patient who had been suffering from the symptoms of hepatic abscess, there appeared a fluctuating tumour projecting from the liver beneath the ribs. It was very properly suggested that the right course was to open this and evacuate its contents. It would certainly have been easy to have done this, as was proved shortly afterwards on the dead body of the patient in the post-mortem room; but, on further examination, the abscess was found to be one of many in the substance of the liver. An opinion adverse to the operation in the patient's lifetime was arrived at mainly from the fact of his having suffered from severe dysentery, which favoured the view that

the liver was the seat, not of one, but of many metastatic abscesses; and this proved to be the case.

Unfortunately the symptoms of hepatic abscess are frequently so slight and so little urgent that there may be no suspicion of its existence on the part of the patient himself or his attendant. Everybody who has had any experience of this disease knows this. There may be a complete absence of all subjective symptoms, or only a feeling of illness, with or without some dyspeptic symptoms; and the subject of hepatic abscess may have returned from the tropics, resided for some time at home, and followed his usual occupations, and yet eventually die of that disease, his health having apparently been good in the interval.

It is obvious that, as regards surgical treatment, a great deal turns on the early diagnosis, for the longer the abscess has lasted the greater is the destruction of the tissue involved and the greater the risk of symptoms from pent-up pus, or of grave constitutional disease, or of some untoward accident.

It goes without saying, that the possibility of liver abscess should always be suspected in the case of persons who have resided abroad in hot or malarious countries. There is no symptom, or group of symptoms, by which the diagnosis can be established with absolute certainty short of the discovery of pus.

In the case of an officer in India to whom I was called in consultation there appeared, in addition to symptoms pointing to liver disease of some kind, a distinct prominence of the abdominal parietes over the site of the right lobe of an enlarged and tender liver. An abscess was diagnosed, and it was proposed to evacuate it then and there. Something occurred to cause us to postpone the operation. The swelling, whatever its exact nature, together with his other symptoms, soon disappeared. The officer went home and remained there for many months, during which his health became sufficiently re-established to warrant his returning to India, which he did, and long subsequently died there of some disease, the exact nature of which I did not learn. Unfortunately there was no post-mortem examination, and it is possible that he had liver abscess after all.

In any case where the symptoms are of a more or less anomalous character, but not inconsistent with the assumption that they are due to this cause, we can commonly reach a correct conclusion by attention to the following:—1. Careful examination of the liver from time to time to ascertain its size and the presence or not of any tenderness. 2. The systematic use of the clinical thermometer, for the detection of any febrile changes. 3. Examination of the chest—especially of the right chest—to detect

any signs of disease in the lung or pleura. 4. A consideration and comparison of the results of such examination with those of the patient's medical history, past and present, as regards his complexion and facial expression, the presence of diarrhœa or dyspeptic symptoms, rigors, hectic, inability to lie upon the left side, emaciation and depression of spirits. It cannot be too strongly urged that, in any case, the best way is always strongly to suspect abscess.

En passant, I may remark that jaundice is frequently absent in cases of liver abscess, and it is somewhat remarkable what an amount of liver substance may be destroyed without the appearance of any jaundice. Anasarca may result from pressure on the vena cava, as I witnessed in a case which Dr. J. Anderson was good enough to show me.

An investigation into the causes of liver abscess is attended with some difficulty. As everybody knows, it is a disease of hot countries; still, it is not the heat *per se,* for, while hepatic disease is common enough in the East Indies, it is comparatively rare in the West India Islands, notwithstanding that dysentery occurs there. This fact did not escape the attention of old observers, who pointed it out as a remarkable thing that in the East Indies, at Madras and Bombay, under nearly the same latitude

as Jamaica, hepatic disease was so much more prevalent among the European population than at the latter station. During the five years 1883-87 the amount of dysentery among the troops in the West Indies equalled an average ratio of 9 per 1000, considerably lower certainly than the Indian average ratio for the same period. Inflammatory affections of the liver, including abscess, were, however, altogether more frequent in the East Indian stations. Again, liver abscess is not equally common in the three Presidencies, and considerable differences exist in this respect between different districts of the same Presidency; but the admissions for liver diseases for the eastern district of Madras and Burmah, the Allahabad and Presidency districts of Bengal, and the Presidency and Poonah districts of Bombay, always keep high. Hepatic abscess is common enough, too, in Ceylon and China. Speaking generally, it is rather a disease of hot moist climates than of hot dry ones, and of places on or near the seaboard than of others more inland. Considerable diurnal variations of temperature leading to chill predispose to its occurrence, but there is something more than this; neither can it be said that the presence of malaria or dysentery and the liability to hepatic abscess are quite conterminous expressions. Children have large, voluminous livers, aud are

liable to attacks of dysentery, but liver abscess is rare among children resident in India. During the five years ending 1887 there were only eight cases returned as hepatitis (including abscess) among the children of the British Army in all India. Women suffer more than children, but less frequently than men, from abscess of the liver.

It is an old notion, but physiologically a true one nevertheless, that in hot climates the hepatic function is exalted because that of the lungs is lowered. My own observations would lead me to think that, as regards climate, heat and moisture; as regards personal causes or conditions, an excess of, as well as an improper diet, consisting of too much meat and alcohol; and as regards the exciting or determining cause, chill, causing engorgement of the abdominal viscera—form the main factors making up the pathological *rôle* of acute hepatic disease. In a hot, dry temperature, where the products of perspiration are rapidly carried off, there is less tendency to passive and continued visceral engorgement than in conditions of the atmosphere where these are less freely carried off, and the individual lives in a kind of steam bath, the functions of the skin fluctuating, however, with even slight fluctuations of temperature.

If it cannot be said that we can guarantee

Europeans going to a tropical climate an absolute immunity from liver abscess by the exercise of any amount of personal care, I have no doubt that a high degree of immunity can be secured by a little attention to personal hygiene—to wit, by adjusting the diet in quantity and character to the nature of the climate, by guarding against chill, and by attention to the maintenance of a regular state of the bowels. It is astonishing how short a residence in the tropics may sometimes be productive of hepatic abscess. For instance, many years ago a medical officer went from England to India just at the end of the hot weather, and returned to this country, after about six weeks in India, in apparently good health. He remained at home, and believed himself to be, as he appeared, in excellent health; but he died quite suddenly of peritonitis and collapse, caused by the bursting of a liver abscess into the peritoneal cavity.

In past times, when longer service in the British Army was the rule, and less care of the health of the soldier was exercised than is now done, there were unfortunately frequent opportunities for tracing among the invalid soldiers landed at Portsmouth from India, China, and elsewhere the inimical effect of a tropical climate on the constitution. Invalid soldiers had an anæmic and asthenic aspect, and

they possessed relatively little rallying power. But what told the tale most plainly was the premature appearance of age.

With regard to the surgical treatment of hepatic abscess, I may mention that upwards of a quarter of a century ago it was the practice of some military surgeons serving in the Mediterranean and other stations to explore the liver for abscess in cases in which they suspected it; and this was notably the case at Ceylon. Occasionally one would see on invaliding boards soldiers with several cicatrices over the region of the liver, showing where the punctures had been made.

It is well known that, in cases where an abscess has not been reached and evacuated, the patients have experienced relief after puncture of the liver; and this liver phlebotomy has been proposed and successfully practised. The explanation of this relief may be the depletion of the gland, for in some cases the hæmorrhage is so considerable as even to be alarming. Happily it can commonly be restrained by direct pressure. But hepatic depletion can hardly be an adequate explanation of other cases, where the loss of blood has been relatively insignificant and bore no proportion to the relief experienced. In cases where a liver abscess has been fully opened the hæmorrhage has been sometimes considerable,

but I have never heard that it has been fatal. Still, the fact should be borne in mind, together with another practical point:—

When a liver abscess has been evacuated, and a drainage-tube inserted between the lower ribs and maintained *in situ* for some time in connection with the sac of the abscess, the relation of the latter to the outside opening may alter very much, and the tube may cause erosion of an intercostal artery and internal hæmorrhage into the sac of the abscess. An instance of this occurred within my observation.

Mr. R. J. Godlee has recently published in the *British Medical Journal* (January, 1890) some very excellent and practical papers on the surgical treatment of liver abscess. Not only should the cavity of the abscess be opened and drained, but the edges must sometimes be stitched to the abdominal wound.

It is unnecessary to describe the operation. The points to be recognised and met are—that it should be done as early as practicable; that an abscess, if found, should be opened antiseptically and freely; that the drainage-tube should be of a calibre equal to the requirements of the case; that the abscess should be systematically washed out with an antiseptic fluid to keep it sweet and clean (if bile finds its way into the cavity it acts as an antiseptic, although it is better not to rely upon it for the

purpose); that attention be given to the relation of the drainage-tube to the abscess cavity, for an opening through the abdominal wall into the liver may as the case goes on occupy, as I have said, a very different position to that which it did originally; that the possibility of what may be termed secondary hæmorrhage should not be lost sight of; and that the subsequent progress of the case may render resection of a rib very desirable.

As regards the treatment of hepatic disease when there is reason to apprehend the possible occurrence of abscess, I think that the following line of treatment will be usually attended with excellent results. The patient should take no alcohol whatever, except under very special circumstances, but be put upon a milk diet, or milk alternated with whey, and the blandest food. If there are symptoms of congestion of the liver, any tenderness on digital pressure, or feeling of uneasiness or nausea on lying on the left side, it is a good plan to apply a number of leeches to the anus, especially if the mucous membrane is congested or hæmorrhoids are present. The bowels should be at once relieved by an aperient, and their regular action maintained by the exhibition of saline aperients taken in hot water early in the morning. The best for the purpose are the effervescing form of sulphate of soda, sulphate of magnesia, or the phos-

phate of soda in frequently repeated doses during the day if necessary; and, later on, a pill composed of aloin or compound rhubarb and euonymin, or iridin, at bed-time. There is no satisfactory evidence that the chloride of ammonium has any specific action in causing the absorption of an abscess, but it is an excellent medicine in congestive and quasi-inflammatory diseases of the liver, and its merits in this respect were long ago recognised in Germany. As the patient's progress becomes assured, he will be the better for a varied diet—chicken, essence of beef, boiled fish, and fresh fruit (grapes, baked apples, pears, prunes, lemons, &c.); and he may apply nitro-hydrochloric acid locally, or take it internally with a vegetable bitter, followed by Easton's syrup.

Where there is a history of malarious disease, and it has been followed by enlargememt of the liver and spleen, with more or less anæmia and malarious cachexia, with a bronzed or mahogany kind of complexion, and a tendency to the recurrence of short and sharp fever, or what the patient sometimes terms bilious attacks, the following practice will often be attended with much advantage. Let the patient provide himself with a wooden tub, and every night at bedtime take a hot acid bath, made by pouring nitro-hydrochloric or nitric acid into a

sufficient quantity of hot water to make a hip bath. The patient sits in this and thoroughly sponges himself, but not his face. He then rises and stands in the bath whilst he roughly dries himself with a coarse towel. Stepping out of the bath, he dries his feet, puts on a pyjama suit of light flannel, and goes to bed. He is to continue taking this bath at night for some time—for weeks together if it does him good. There is, of course, no reason why he should not be employing at the same time any other remedies that appear to be indicated.

Upon cases of chronic enlargement of the liver it is not intended to dwell at the present time; but a brief summary of the results of my observations may prove interesting, though they can scarcely be said to add much to existing information. In those instances which I have had an opportunity of examining post mortem, it appeared that the hepatic enlargement was always associated with disease of other organs. The fatty large liver was commonly connected with tuberculous disease of the lungs. In an acute form I have seen it, but associated with atrophy, in acute yellow atrophy of the liver; the patients were adults, but young; one a sailor at the Royal Naval Hospital, Haslar, many years ago; another a soldier, and the third a woman, both residents at a Mediterranean station. There was no

reason to suppose that phosphorus poisoning existed. The symptoms were jaundice attended with very active, almost maniacal delirium in one case, and all proved fatal. Secondly, in a peculiar form of so-called bilious remittent fever, where the symptoms during life were clinically identical with those of yellow fever, the liver had apparently undergone an acute process of fatty degeneration and the duodenum was inflamed. Graves published years ago a report of some cases of acute duodenitis in which the symptoms closely mimicked those of yellow fever. The large, passively congested nutmeggy liver was usually the result of impeded circulation through the right heart from valvular disease of its left side—mitral disease and notably contraction of that orifice. The somewhat large, light-mahogany-coloured liver, with thickening of Glisson's capsule on its surface, was probably an early stage of cirrhosis, the result of intemperate habits and climate. The heavy, lardaceous, firm liver, giving a reaction with the iodine test, is sometimes, but not invariably in my experience, associated with a syphilitic history.

So many cases of abscess of the liver have now been recorded in which the abscess has been successfully evacuated and the patient's life saved, that there is no need to add to the list in order to de-

monstrate that it is the proper line of practice; but I append some notes of a few cases of abscess and other diseases of the liver in illustration of the subject. The first case shows that it is not necessary to have a history of previous residence in the tropics to be the victim of hepatic abscess.

Case I.—Gunner L——, Royal Artillery, aged twenty-five, had served in Malta, and subsequently in the Channel Islands. He was a pretty free liver and had, according to his own account, suffered from dyspeptic symptoms. On admission he had fever, foul tongue, anorexia, irregular bowels, and more or less abdominal tympanites. The liver was enlarged, its edge reaching downwards for three or four inches below the ribs, and there was dulness on percussion as high as the right nipple. It was rather tender on deep pressure, which also gave him a feeling of nausea. There was uneasiness in lying on the left side; no shoulder pain. The fever assumed the hectic type, the evening temperature sometimes reaching 102° to 103°. The febrile exacerbations terminated usually in rather profuse sweating. Hepatic abscess was suspected; symptoms referable to pulmonary disease supervened, and a pleuritic friction sound was audible over the right base. He was subsequently seized with a violent and incessant cough, and expectorated a large quantity of a dirty-

red coloured pus, which was so profuse as "nearly to suffocate him in coming up." After a few days this was succeeded by a still larger quantity, and the liver tenderness and other symptoms greatly improved. The hepatic dulness diminished to such an extent that its limits became nearly normal. On another occasion the pus had a very bitter taste, and was distinctly yellow and bile-stained. After several months' illness, during which he emaciated and suffered from a hectic kind of fever and occasional attacks of hæmoptysis and purulent expectoration, he began to recover, only complaining of a sense of "dragging" while lying upon the left side. He was eventually discharged the service in apparently good health, the liver having so contracted as to occupy, if anything, less than its normal site as determined by percussion, and when last heard of he was well.

Case II.—Private H. F——, 38th Regiment, aged thirty, invalided from India, was admitted into the Portsmouth Hospital. His history was one of acute dysentery followed by hepatic abscesses, one of which formed a swelling in the right hypochondrium below the ribs. He was much emaciated, slightly jaundiced, suffered from hectic and diarrhœa, and was occasionally delirious, and finally died. Post-mortem examination revealed one large abscess in

the right lobe, with a pint and a half of fluid in it, and numerous other abscesses of various sizes in different parts of the liver, together with the marks of severe ulceration in the colon and rectum.

Case III.—Private J. G——, aged thirty, invalided from India, with the history of dysentery and probable abscess of the liver, was admitted in a semi-collapsed state into the Portsmouth Hospital. He died with the symptoms of peritonitis attributed to a liver abscess having burst into the peritoneum. Post-mortem examination revealed numerous abscesses in the liver and in the lungs, especially in the lower lobe of the right lung, which was consolidated. The convex and upper surface of the liver was destroyed by large abscesses in the hepatic substance, the walls of which were spongiform and without any limiting membrane. One of the abscesses had burst into the peritoneum and set up peritonitis. The large bowel presented the signs of a past dysentery of severe type, and the mucous membrane of the ileum was of a dirty crimson colour and covered with a pasty mucus; Peyer's glands were not affected. The spleen was large and unusually soft; the kidneys amyloid.

Case IV.—Sergeant W——, Royal Artillery, aged thirty-three, was admitted to Portsmouth Hospital. This man had not served in the tropics, and his

medical history sheet contained no entries, but he stated that he was very liable to "severe bilious attacks." Shortly before his admission he was seized with symptoms somewhat resembling an attack of English cholera. He had the aspect of a man seriously ill. Temperature 101·5°; pulse 110. Surface of trunk of body felt hot, but the extremities were cold. Tongue foul; yellowish-white fur. The abdomen was prominent and rather tympanitic, apparently from flatus in the small intestine. There was some fulness and decided tenderness on pressure of the right iliac region. He occasionally vomited. His bowels were loose; the stools dark coloured. In the course of a few days he became jaundiced, and the irritability of the stomach increased. The thoracic organs were healthy. The liver became enlarged, especially upwards, and its edge rather tender on pressure. The urine was portery from bile pigment, of high specific gravity, acid and non-albuminous. Not to be tedious, I may say that the most obvious and pressing symptoms during his illness were: Vomiting, abdominal tympanites, with fulness and tenderness of the right iliac region, jaundice, hectic type of fever, with evening exacerbations and profuse sweating. The history and symptoms pointed to typhlitis or ulceration of the appendix vermiformis, and some form of

blood-poisoning allied to pyæmia. The abdominal tenderness, especially about the right iliac region, and the tympanites increased, and he became delirious and ultimately comatose before he died. Two or three days before this happened an eruption, closely resembling that of scarlatina, appeared on the neck and chest, with petechial ecchymosed looking spots on the extremities. The post-mortem examination revealed the following. The cæcum, about the situation of its appendix, with the right extremity of the omentum, were found to be closely adherent to the abdominal parietes, and the adherent portions of a very dark colour. The intestine at this part was ulcerated and thickened, and the appendix was traced with difficulty, from its being embedded in a mass of semi-gangrenous tissue. A small clot of half putrid blood, with some decomposing and highly fetid fæces, were discovered on slitting up what appeared to be the vermiform appendage. Upon opening the superior mesenteric vein, it was found to contain some blood-clots. In some places these were so intimately adherent to the coats of the vessel, and had been so tunnelled out by the blood circulating through them, that the adhering fibrine looked like the lining membrane; but it was easily peeled off, and the epithelial coat below was found to be unaltered. As the epithelium presented the

usual microscopic appearances, it was evident that the vein itself was not the cause of the coagula. In some places portions of decomposing blood-clot still remained, with a fluid exactly resembling pus. The liver, which was large and discoloured, was found to be full of small abscesses, from the size of a millet-seed to that of a walnut. These metastatic abscesses were in intimate connection with the various branches of the portal veins, spreading out from them like leaves from the twigs of a tree. The portal veins were laid open, and the main divisions to the right and left lobes contained a quantity of pus, or a fluid like it to all appearance. The blood in the smaller branches was in a similar state, and here and there appeared as a long white streak, lying parallel to the section. The lobules, at the least affected parts, were surrounded by a dark ring of congestion. These abscesses had no limiting membrane; but were, in fact, composed of the disintegrated elements of the necrosed hepatic tissue. No abscesses existed in the lungs or other organs, the liver apparently having acted as an effectual filter in preventing the passage of the decomposed elements into the general circulation.

The diagnosis of hepatic abscess is occasionally attended with great difficulty.

Case V.—Private J. P——, 9th Regiment, aged

thirty-six, looks older, arrived at Portsmouth invalided from China. He had previously served for several years at St. Helena. At the former station he had been treated for "hepatitis." On the voyage home he suffered from the symptoms of acute dysentery, succeeded by pain in the region of the liver and right shoulder, frequent attacks of vomiting, constipated bowels, and jaundice. No doubt seemed to be entertained on the part of those who had treated him of the existence of hepatic abscess; but, as will be seen, considerable doubts soon arose as to the correctness of that diagnosis. On admission he was deeply jaundiced; the urine was dark, portery, and of high specific gravity; he was much emaciated, and had a cachectic appearance; he complained of a burning pain in the stomach about four hours after food, succeeded by vomiting. In the right hypochondrium, about an inch and a half to two inches below the ribs, there was a tumour, somewhat pyriform in shape and corresponding in site to that of the gall-bladder. It evidently sprang from the liver, as far as could be determined by palpation and percussion; it moved slightly with the movements of the patient's body and with deep inspiration. The stomach was much distended and very tympanitic. On careful palpation of the abdomen, a deep-seated circumscribed hardness could also be

felt between the ensiform cartilage and the umbilicus, but nearer to the latter. This was altogether distinct from the former tumour, but was not always to be detected, sometimes disappearing altogether when the stomach and intestines were distended. The swelling persisted after clearing out the bowels by enemata, and did not apparently arise from scybala in the colon. Looking to the age of the patient, his emaciation, the character of the pain, the nature of the swelling and its situation, the diagnosis suggested was malignant disease of the stomach involving the lesser omentum and its enclosed common duct, and giving rise to a dilated gall-bladder. The patient died, and the post-mortem examination revealed the following:—Lungs: pneumonic consolidation of the right lower lobe, with what, seemingly, were cancerous tubercles about the roots of the lungs and bronchial glands. Abdomen: great distension of the stomach; the gall-bladder projecting as a large oval tumour from beneath the edge of the liver; cancerous disease of the pylorus and the parts in its immediate vicinity, involving the lesser omentum and its enclosed vessels and head of the pancreas, the whole together forming a mass of disease. Some of the glands in the pelvis and along the vertebral column were also enlarged and hardened. The gall-bladder was greatly dis-

tended with a dark treacle-like fluid. The common bile-duct was traced with great difficulty; for a short distance it was dilated, but it was impervious to the passage of a blowpipe beyond, nor could air be made to pass through the blowpipe into the duodenum.

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