

appetite returns; the diarrhoea ceases, and is replaced by constipation; the flatulent distention of the abdomen subsides; the spleen shrinks; the urine becomes more abundant and limpid, and there are copious perspirations for several days, occurring especially during sleep.

Course, Duration, and Termination.—The course of the fever as described is the usual one of a perfectly developed case. But there are many variations due to individual peculiarities, to surrounding influences, to complications which may be most conveniently studied under this head. The principal cause of a fatal termination is the prolonged high temperature, and hence, in any prognostic estimate, this must be considered. Thus Liebermeister shows that, when the temperature was under 104° Fahr., the percentage of mortality was 9.6; if the temperature reached and passed 104° , the mortality was 29.1; if the temperature rose to 105.8° or over, the mortality was greater than one half. Next to the height is the duration of the fever; and, consequently, the longer the maximum of the fever is maintained, the greater the mortality. The point to which the fever attains at the end of the first week, as a rule, indicates the range of temperature to occur, for in uncomplicated cases it is then at the maximum. Furthermore, the greater the daily fluctuations of the fever, the less severe it will prove. Treatment has exercised great influence on the mortality, especially treatment based on a recognition of the importance of reducing the temperature. Age has a great influence over the termination of typhoid—in the young the mortality is proportionally less; in the aged proportionally greater. The individual constitution has an undoubted effect in increasing or diminishing the mortality; the nervous and excitable bear the disease poorly, and the phlegmatic better; the lean and muscular also endure the strain of the disease better than the fat. But the habitual indulgence in spirits has a more unfavorable influence than any of the conditions named. In every epidemic there are many cases of much milder type, and there are also irregular and abortive forms. In the milder cases, the temperature rarely exceeds 103° in the axilla; there is no delirium, only confusion of mind on awaking from sleep, and hebetude of mind; the diarrhoea is slight, and the different periods are short, so that the whole duration may be comprehended in twenty-one days. Those are regarded as abortive in which there are no prodromes, the symptoms begin abruptly, often with a distinct rigor, the temperature rising in a day or two to the maximum of 104° Fahr., and, without the weeks of continued fever, assuming the remittent and intermittent form of the fourth week at the end of the first, and terminating within two weeks. While the mild form is extremely common in this country, the abortive forms, according to the author's observation, are infrequent. The course, duration, and termination of typhoid are much influenced by the complications. Hæmorrhage of the intestines is one of the

most important. This takes place at various times in the course of the fever, and the quantity of blood lost is very different in different cases. The blood may be pure, partly fluid and coagulated, or blackish, or converted into a tar-like mass. The second week is the most usual period for the hæmorrhage; next, the third week; but it may occur at any period. The proportion of cases of hæmorrhage to the whole number is about five per cent. When it occurs during the first week, it is a result of the increased pressure in the intestinal vessels—a necessary product of hyperæmia; if it occur in the second and third weeks, it is caused by the sloughs, a vessel being laid open by their detachment; if later, vessels are eroded by the spread of ulceration. Any considerable hæmorrhage, if no part escape externally, is announced by sudden depression, coldness of the surface, pallor, faintness, weakness of the pulse, lowering of the temperature. Unless repeated, the effect of the hæmorrhage subsides in a day or two, the pulse rises, the delirium and stupor, which may have been lessened by it, assume their former characteristics. The more severe the hæmorrhage, the more injurious. The notion has been entertained by some that a considerable hæmorrhage might have a favorable influence over the progress of a case, but the statistics are opposed to such an opinion, those of Liebermeister, for example, showing that the mortality is three times greater in those having this complication, but statistics on this point are not altogether conclusive, since usually those are the most severe cases, in other respects, in which hæmorrhage occurs. The introduction of hydrotherapy has in Germany diminished the frequency of intestinal hæmorrhage as a complication of typhoid.

Perforation, as a cause of death, occurs in from five to fifteen per cent. The period is from the third to the fifth week, although it may occur as early as the first, and is due to the extension of ulceration, the opening in the peritoneum being made at last by some hardened fæces, undigested food, sudden distention of the bowel by gas, and, it may be, by ascarides, which are often found in the peritoneal cavity afterward. The shape of the ulcer is an inverted cone, the opening in the peritoneum, the apex, having the size of a pin-head to a small pea. The ilium is the part usually perforated, but the ulcer may be situated high up in the small intestine, or it may be in the colon, especially the appendix vermiformis. Very often it is the ulcer of a solitary gland. Although the more extensive the ulcerations the greater the danger of perforation, yet it has happened that a single ulcer has opened the peritoneum. The immediate result of the perforation is shock. The surface grows cold, the temperature falls several degrees, the pulse becomes excessively feeble, and death may ensue in a condition of extreme exhaustion. Usually, however, the patient rallies, reaction ensues, and acute peritonitis rapidly develops. It sometimes happens, when the rupture may be produced by accumulation of gas, that the

abdominal cavity is greatly distended by it, the epigastrium rendered prominent, and the diaphragm pushed up, impeding respiration. At the moment rupture takes place, intense pain is experienced, beginning in the right inguinal region, and radiating thence over the abdomen. The temperature rises again, after some preliminary chills, and the phenomena of peritonitis are added to the ordinary symptoms. Recovery very rarely takes place, and death occurs usually within four days after the perforation, unless, indeed, the first shock of the accident paralyzes the heart. In a few cases, with profound coma, perforation has occurred without causing any objective evidences of the complication. Perforation is much more apt to occur in men than in women. Peritonitis may be due to other causes than perforation—by the extension of ulceration to the peritoneum, by rupture of the gall-bladder, rupture of the spleen, etc. The author has met with a fatal case of rupture of the spleen, occurring during convalescence, and caused by a not violent blow on the side. Examination of the splenic region should be made with care after the second week, because of the ease with which the spleen may be ruptured. The chief complication on the part of the circulatory organs is granular degeneration of the heart-muscle already described, thromboses from cardiac weakness, forming in the heart or in the great vessels. In the respiratory system there are various changes, some of them of great importance. Epistaxis and bronchitis have been already mentioned as symptoms of the disease proper, so constant are they in appearing. Diphtheritic exudations in the fauces and ulcers of the larynx, due to diphtheritic infiltration of the mucous membrane, are occasional and very important complications. Death is sometimes unexpectedly due to œdema of the glottis, and this may be produced by a laryngeal ulcer. Atelectasis, hypostatic congestion, splenization, hæmorrhagic infarctions, and œdema, are all complications arising in the lungs from feebleness of the heart's action. Caseous pneumonia, pleurisy, and acute miliary tuberculosis are sequelæ, sometimes the outcome of the above-mentioned diseases due to stasis. Œdema of the brain is a frequent condition, which seems a necessary part of the morbid anatomy of typhoid. Besides this, there are various complications growing out of the changed state of the solids and fluids. Cerebral hæmorrhage and acute meningitis are very rare. Derangements of the mental faculties are by no means uncommon, and are due to the anæmia and the functional torpor of the gray matter. The derangement may assume the form of exaltation, or of depression and melancholy. When an hereditary tendency exists, the case assumes a higher degree of importance, those due merely to the condition of the brain, the result of the typhoid disease, recovering with less or greater promptitude. The condition of the kidneys which occurs in many cases, represented objectively by a trace of albumen in the urine, passes into well-developed Bright's disease in a small proportion of them. These go through the usual course, and terminate

in recovery. Hæmorrhagic infarction occurs in a few cases. The menses frequently appear during the course of typhoid, and exercise a rather favorable influence over the course of the disease. Abortion is apt to occur, and of course adds to the gravity of the situation. On the part of the skin, the most important complication is that of *bed-sores*. The parts subjected to pressure are those which slough—the sacrum, nates, great trochanters, and the crest of the ilium. In some subjects, so depraved is the condition of the solids, that any part subjected to pressure sloughs. The depth and extent of the sloughing vary from redness, inflammation, and abrasion of the skin, to destruction of the skin, fascia, and muscles, extending to the periosteum. The effect of this complication depends on the extent of the injury done. When there is considerable sloughing, suppuration, and decomposition, fever will be excited, and systemic infection, septicæmia, and pyæmia result. Falling out of the hair and arrest of the growth of the nails are usual complications.

Relapses.—Increased fever, due to some complication, may be confounded with a genuine relapse, but the latter pursues the ordinary course of the fever, except that it is more rapid in its course and shorter in its duration. There occurs in the relapse a similar range of temperature, the spleen enlarges, roseola appears, and the other symptoms in their order come on. Of itself the relapse is milder, but the subject enduring it is enfeebled by an illness, so that the danger must be regarded as greater. The number of cases undergoing relapse varies from six to twelve per cent.

Treatment.—Although for typhoid, a specific disease, we have no specific remedy, a treatment has originated in Germany which is known as the specific treatment. Mercury and iodine are the specific remedies. There is no doubt, if statistics may be depended on, that calomel, in large doses during the first week, favorably modifies the disease. Ten grains in a single dose, on alternate days, is about the average of the quantity given by various therapeutists. If the temperature is high, it may be given on successive days, but the danger of inducing salivation is great, when it is administered at short intervals. The effect of the mercurial treatment is to lower the temperature, to diminish the severity, and apparently lessen the duration of the case. The treatment by iodine consists in the administration of Lugol's solution—from three to five minims in water three times a day, and continued during the first two weeks certainly, and probably up to the beginning of convalescence. Taking the figures of Liebermeister for illustration, they show that while the mortality under ordinary treatment reached 13·2, under calomel it was 8·8, and under iodine 10·9. The author's experience is, that the administration of iodine has a favorable effect on the course of the disease. He has used, with apparently decided success, the combination of iodine and carbolic acid (℞ Tinct. iodinii ʒ ij, acid. carbolic. ʒ j. M. Sig.

One to three drops three times a day). Nitrate of silver, sulphate of copper, arsenic, and turpentine, each has an advocate of its usefulness—all being directed against the intestinal complication or lesion. As, however, the main point in the management of typhoid is to keep the temperature within safe limits, the treatment directed to that end is the most important. The antipyretics available for this purpose are hydrotherapy, quinine, antipyrin, the salicylates, benzoates, etc. The method of hydrotherapy consists in immersion in water at a certain temperature, the wet pack, and local abstraction of heat by special appliances. As private houses are unprovided with the means of administering baths to fever-patients, this method can be utilized only in hospitals. The method of gradual reduction of heat we hold to be preferable. The patient is put in the water at 98°, and then by the addition of cold water the temperature of the bath is brought down to 60° Fahr. The thermometer must be constantly in position to observe the effect, and the duration of the bath ought not to exceed ten to fifteen minutes. The temperature requiring the bath is any considerable elevation above 103° Fahr. (axillary), and the repetition of it is determined by the effect—every two to every six hours, night as well as day, may be regarded as usual. If the patient is made faint or depressed, some stimulant should be given before, during, or subsequent to the bath, according to the result. If the bath is impracticable, the wet pack may be used with equal effect. The bed is protected by a gum cloth; a sheet is wrung out of cold water; the patient is thoroughly wrapped in it, and then covered up with blankets for a few minutes, when the process is renewed if necessary. The same rules hold good with regard to the repetition and management of the pack as of the bath, and the results achieved are equally beneficial. The temperature of the body may also be reduced by ice-bags applied to the abdomen, and by ice-water injections in the rectum, but these latter can not be utilized in typhoid. There are several contra-indications to the use of cold baths. The first and most important is hæmorrhage from the intestines, the next is great weakness of the heart's action, and the third is coldness of the surface with high internal heat. Next to hydrotherapy, and probably superior as a remedy for reducing abnormal temperature of the body, is quinine. Notwithstanding the good results which have been obtained from baths, it is probable that quinine will always be preferred by many, because of the readiness with which it may be brought to bear on the production of heat. Indeed, Liebermeister, a strong advocate for hydrotherapy, says, if he "were forced to the unpleasant alternative of adopting only one or the other of these two means—cold water or quinine—I should, in the majority of cases, choose the latter." To reduce the abnormal temperature, antipyretic doses are required, from twenty to forty grains. A decline of several degrees, and lasting a number of hours, will be caused by a sufficient dose, and a less effect than this will not justify

the employment of the remedy. It is a good plan to prescribe a scruple every four hours, until a decided reduction of temperature takes place, then its use should be suspended until the temperature begins to rise again.

After extended observation of the practical results of the antipyretic method, as carried out by the administration of the remedies belonging to this group, the author has come to the following conclusions: If the temperature at the maximum of the daily curve does not exceed 103° Fahr., it is better not to interfere by an attempt to lower the body-heat. If the temperature persistently rises above this point, antipyretics least perturbing should be administered at the period of remission, and in sufficient quantity to make the necessary impression, when they should be discontinued until an exacerbation is threatened. Antipyrin, disturbing least the digestive organs, should be preferred after quinine, or to quinine if this remedy fail to have the desired effect. It is not good practice to give quinine in so-called tonic doses (two to four grains) for the following reasons: It disorders the stomach; it increases the headache and the gloom, the hebetude of mind and the muttering delirium, and thus contributes to the wakefulness. There is no benefit derived from it to compensate for these considerable disadvantages.

If, in the treatment of typhoid, the temperature be prevented rising beyond safe limits, there will be less and less need for attention to complications. Nevertheless, we must be prepared to obviate the tendency to death, and to correct complications. Failure of the heart requires stimulants, but otherwise stimulants should not be given in typhoid, except in the case of those addicted to their use, who require a regulated daily amount. Restlessness and prolonged wakefulness are as a rule most successfully relieved by morphine and belladonna. Chloral must be used with caution, because of the weakness of the heart-muscle. If the tongue is dry, if there is great thirst, and the abdomen is much distended with gas, turpentine is highly useful. Muriatic acid also acts well under the same circumstances. If the bowels act too freely, nitrate of silver, with a little opium, Fowler's solution and laudanum, bismuth and carbolic acid, especially the last-named combination, will check them sufficiently. Two or three stools a day are not interfered with, unless copious and exhausting. Careful alimentation best regulates the bowels. If hæmorrhage occur, intestinal movements must be suspended by opium, the flow of blood controlled by ergotin hypodermatically and ice to the abdomen. Tannin, alum, and solution of chloride of iron may be prescribed internally. If perforation occur, opium, especially morphine, hypodermatically, is our one remedy. Stimulants may be given cautiously, and absolute rest should be maintained. Bed-sores are best managed by cold-water bags and the removal of pressure. Before the skin breaks, it should be frequently washed with alcohol and Goulard's extract to harden it. The best dressing for a bed-sore

is a mixture of equal parts of copaiba and castor-oil. A large yeast-poultice is an excellent application, especially when more or less weight is still borne by the sore surface. The alimentary treatment of typhoid fever is very important. The principal lesions being in the intestinal canal, the diet must be arranged accordingly. Dr. George Johnson has shown us that many cases of typhoid need nothing more than rest in bed and milk diet; and Sir William Jenner has pointed out how useful milk is, and how injudiciously it is given in many cases. We learn from these able physicians, that milk is peculiarly adapted to serve as the food for typhoid-fever patients, but that it must be given in moderate quantity, and at suitable intervals. Milk should be administered about every three hours, and from two to four ounces at one time. Or milk may be given in alternation with a little weak mutton, beef, or chicken broth. If milk is not borne well, it may be diluted with barley-water. A little of Scheffer's pepsin solution and muriatic acid ought to be administered immediately after the aliment, if it is rejected by vomiting or passes by stool unchanged. Beef-essence, as usually prepared and given to typhoid-fever patients, is very difficult of digestion, acts as a laxative, and may be seen in the evacuations precisely in the state in which it was swallowed. As the adynamia increases, egg-nogg, fortified by whisky or brandy, comes to be a most useful aliment, of which the patient may partake freely, but at regular intervals. Sufficient time ought to be allowed for the aliment given at one time to be digested, before another supply is turned into the stomach. A moderate quantity of a light wine should be allowed during the first two weeks, and whisky and brandy given in egg-nogg or milk-punch the third and fourth weeks. Half an ounce to an ounce of wine and a half-ounce of whisky or brandy need rarely be exceeded at one time, nor more frequently than once in three hours, unless there be a special requirement. Mild cases need no stimulant. The dejections of a typhoid patient should be at once disinfected by a strong solution of sulphate of iron or chloride of zinc. The patient's bed should be free from all unnecessary appendages, and be placed in the middle of the apartment. Air should be freely admitted. But one person should, as a rule, be permitted in the apartment at a time, and the patient's attention should not be attracted to persons and things about him.

TYPHO-MALARIAL FEVER.

History.—This term was invented by the late Dr. Woodward, of the Army, to express his conception of a hybrid formed by a combination of typhoid fever and malarial fever. As it was used in the medical reports of the army, and hence at once adopted by a large proportion of the physicians of the United States, it came to be regarded as signifying a new disease. This unfortunate misconception was further promoted by Dr. Woodward's published utterances on the sub-

ject. In his work on "Camp Diseases" we find him declaring that typho-malarial fever is a substantive malady, that has a special morbid anatomy. He found, as he alleged, anatomical changes belonging to and characteristic of the new disease. The author of this work was the only one to oppose these doctrines and Dr. Woodward's typho-malarial fever becoming a fixture in the nomenclature of diseases. The author maintained that Dr. Woodward had committed an error of observation, that the morbid anatomy of typhoid was in nowise altered by an existing malarial complication, and that, symptomatically, remittent fever running into a typhoid state was mistaken for true typhoid. The author further maintained that, admitting the existence of a malarial complication, this no more constituted a reason for constructing a new disease than the presence of such other complications as scurvy, crowd-poisoning, rendered the manufacture of new terms necessary to express these relationships. Dr. Woodward, after ten years' silence, at last, in a paper read before the International Medical Congress at Philadelphia, retracted his former statements, and admitted that the morbid anatomy of typhoid fever remained unaltered by any malarial complication. Consequently, his assumption of a typho-malarial fever fell unsupported. Unfortunately, an error of this kind is more easily established than it is destroyed by subsequent refutation. The reviewers of this work, who have only seen that the author did not admit the existence of a typho-malarial fever, and criticised the omission in an unfavorable tone, seem to be totally ignorant of the fact that the author of the term admitted its inapplicability and the error of his observations.

Clinical Aspects of Malarial Typhoid.—Although typhoid fever continues to be typhoid, practical physicians have long known that, when the typhoid germ develops in an organism saturated with the malarial poison, the clinical features of the fever are somewhat modified; but the modification consists in the increased excursions of the daily temperature. Influenced in their conception of typhoid as a continued fever by this term, physicians have too often overlooked the fact that the thermal line of typhoid is that of a remittent fever, and hence the daily remission and exacerbation were regarded as the expression of the malarial infection. It is merely in some increase of the sweep of the thermal wave that the influence of the malarial complication is made evident. After the typhoid process has expended itself, and in a perfectly legitimate manner, the malarial element begins a disturbance. Then it is that a remittent, or more frequently a quotidian or tertian intermittent, comes on to interrupt and prolong the stage of convalescence.

The Role of Quinine in Malarial Typhoid.—If any additional evidence were needed to prove the falseness of the conception which regards the so-called typho-malarial fever as a morbid entity, it is afforded us in the behavior of quinine. All the world knows that

quinine manifests no more power to control this than to arrest typhoid. There comes a period, however, when the use of quinine is indispensable. It is when, after the exhaustion of the typhoid process, the malarial element initiates a characteristic disturbance on its own account. Then, by its timely exhibition, a convalescence that might have been protracted and unsatisfactory is rendered shorter and milder.

The Typhoid State in Remittent Fever.—It is necessary to note another source of error in regard to typho-malarial fever. Cases of remittent fever of severe form, if not arrested by massive doses of quinine, will assume more and more nearly a continued type, and will finally pass into a typhoid state. Very often, no doubt, this typhoid condition is confounded with typhoid fever, but a study of the morbid anatomy will disclose the error.

TYPHUS FEVER.

Definition.—A febrile affection, self-limited, and characterized by profound adynamia, a peculiar petechial eruption, favorable cases terminating by crisis at the end of the second week. Typhoid and typhus are now almost universally regarded as distinct affections. Stokes,* however, takes a different position, and maintains that the points of resemblance are greater than the differences.

Causes.—As a rule, typhus prevails in seaport towns, where it is known as "ship-fever"; but it has under some circumstances ravaged continents, as during the great famine periods: Ireland has been decimated, and, under similar circumstances, Italy and Austro-Hungary have been severely visited.† Typhus now prevails in crowded ships, asylums, and jails—where great numbers are accumulated together, are depressed by poor food and bad air. It is seen in this country only at our seaport towns, and the author's personal experience is limited to cases observed at the Baltimore Infirmary, admitted to the service of the late Professors Power and Chew from ships in the harbor in the years 1850-'53. How evil soever may be the hygienic influences, typhus does not originate spontaneously; the peculiar germ must be introduced from without. Of the nature, form, and condition of the germ we know nothing. The disease is contagious, and the contagious principle increases in virulence the more crowded and numerous the patients within a given area, and the more unfavorable the hygienic influences and the bodily state of those attacked. Hence the terrible force of the poison during the famine periods in Ireland. The disease is more frequent among males than among females, and occurs by preference during the most active period of life, or from fifteen to

* "Lectures on Fever," London, Longmans, Green & Co., 1874, p. 86.

† "Traité de Climatologie Médicale," tome iv, p. 362, *et seq.*

fifty. Like other acute infectious diseases, one attack serves to exempt from future attacks.

Pathological Anatomy.—We do not find in typhus the definite series of changes which so individualize typhoid. The solids and fluids generally are deeply injured. Vascular turgescence is noted in the upper part of the small intestines and the ileum. In the midst of stellate or arborescent injection in the ileum, there are sometimes small spots of ulceration, not all like the ulcerations of typhoid, and occurring in only five per cent. of the cases.* Changes—thickening and deposits—in the mesenteric glands are very uncommon. More or less congestion of the spleen, liver, and kidneys, with granular degeneration more or less advanced, is noted in a portion of the cases. A similar change—granular degeneration—occurs in the heart as well. There is present some serum in the sac of the pericardium. The blood is dark, fluid, and not firmly coagulable, but thrombi are found adherent to the walls of the large veins. There is more or less fluid in the subarachnoid spaces, and the membranes and cerebral substance are more or less injected. The mucous membrane of the bronchi are hyperæmic and sometimes inflamed, and occasionally atelectasis and pneumonia are encountered. The muscles present the changes of granular degeneration.

Symptoms.—There may or may not be a prodromic stage, and, when it does occur, it is of short duration. The patient is dull, heavy, dispirited, experiences a strong sense of fatigue, has headache, is restless and wakeful at night. In a few days the effort to keep up is abandoned, and the patient betakes himself to bed, thoroughly exhausted. In other cases, of which the great Irish epidemics have furnished numerous examples, the patient is suddenly seized, and passes at once into a state of profound adynamia, or he walks to the hospital, is put to bed, and in twenty-four hours he lies helpless, comatose, and sinking. There may be a slight chill at the onset, or nausea and vomiting may inaugurate the symptoms. A very severe headache and pains in the back and limbs are now experienced. The head feels hot; there is much giddiness when the attempt is made to rise; and sneezing, with other symptoms of catarrh, and noises in the ears are also experienced. The fever rises rapidly from the beginning, the pulse ranges from 90 to 120 at once, and the temperature by the third or fourth day has attained to 103° or 104° Fahr. in the morning and 105° or 106° in the evening. Again, it sometimes happens, so profound is the intoxication, that the forces are inadequate to maintain the pulse at or above normal and the temperature above 99°. There may be high temperature temporarily without any special significance; but persistently high temperature bodes ill. Extreme weakness and a

* Lyons, *op. cit.*, p. 142, *et seq.*