

deep, apathetic listlessness soon come on, when the patient lies on his back, oblivious to all about him; his eyes are half closed, and are dull and glazed; his mouth is half open, the lips dry and cracked, the teeth covered with sordes; his face is dusky, which is the general tint of the skin, and the malar protuberance has a reddish-brown color. Toward the end of the first week the characteristic eruption of typhus makes its appearance on the back between the scapulæ in males, on the chest and abdomen in females, and spreads thence over the rest of the body. They are a half line to a line in diameter, reddish-brown in color, a little elevated above the general surface, disappearing on pressure, to reappear when the pressure is removed. They may be very numerous, so that a dozen will be contained in a square inch, or they may be sparse and larger in size. Successive crops appear, and the duration of the eruption stage is from five to seven days, so that it may be expected to disappear from the twelfth to the fourteenth day. Prognostications may be drawn from the appearance of the eruption. If it is rose-colored, the general tint of the skin being good, the condition is favorable; if a dusky-brown, rather livid color, the skin also dusky, the condition is unfavorable. Trousseau\* formulates the significance of the eruption as follows: "The gravity and duration of the malady are in relation to the abundance and depth of color of the eruption." Besides the measles-like eruption, which is characteristic, there are in some epidemics spots and patches of purpura, of varying size, and the larger extravasations known as vibices. Both of these indicate a low form of the disease, and are, therefore, symptoms of evil augury. Sudamina also occur, but these have no special significance, unless differing from ordinary sudamina in the character of their contents, which, if bloody, or having a putrescent odor, show a bad state of the tissues. At the close of the first or beginning of the second week, instead of there being a merely clouded state of the mental faculties, active delirium may ensue. It may be very violent, the patient difficult of control, striking and fighting all who approach, trying to get out of bed, etc. This condition, which has been happily designated *delirium ferox*, may continue for days and nights, the patient sleeping none, there being at the same time intense fever, rapid action of the heart, injected conjunctivæ, great intolerance of light, and contraction of the pupils. But this active and violent delirium is much less common than low-muttering delirium in which the illusions and hallucinations form the topics of the unintelligible rambling. The patient usually lies in an entirely passive state, taking food mechanically, sleeping but little, although in a constant soporose state, the pulse ranging from 120 to 140, double-beating, easily compressible, the surface of the body presenting a dusky, cyanosed

\* "Clinique Médicale," tome i, p. 299.

appearance, and the actual condition being that of profound and increasing prostration. There is usually some dry cough. The bowels are at first rather confined, and during the height of the disease the dejections are scanty, rather infrequent, but consist of somewhat loose, offensive, dark stools. There is no distention of the abdomen. The spleen is enlarged, and can be made out projecting downward. The urine is scanty, high-colored, specific gravity high, and usually contains albumen. During the stupor, urine and fæces are passed involuntarily. A very peculiar and distinctive odor is maintained by many to exist. Trousseau regards it as *sui generis*; but we believe it to be similar to that which is to be detected about all fever-patients so oblivious to their natural wants. During the second week the prostration is so profound that patients die, without any special complication, from failure of the heart. The temperature of the skin falls; the purpuric spots enlarge; parts exposed to pressure—the sacrum especially—soften and ulcerate; the pulse becomes small and irregular; the impulse of the heart is scarcely perceptible, and the first sound is no longer audible. In this condition the patient may remain for a day or two, even longer, suspended between life and death—the stupor may deepen into fatal coma, or death may be induced by sudden engorgement of the lungs, or the heart fails, the pulse becomes imperceptible at the wrist, and the surface cold, and covered with a cold sweat. Instead of a fatal termination, a large proportion recover. About the fourteenth day, if a change for the better is to occur, phenomena of a rather critical character supervene. The patient falls into a quiet sleep lasting several hours, and he awakes refreshed, and with consciousness restored, but oblivious of all that has transpired, and feeling an extreme degree of feebleness. The pulse lessens in frequency, but gains in volume; the tongue begins to clean and is moist; the skin is covered with a warm perspiration, and a little appetite is felt. The critical phenomena which may accompany this change for the better consist of a free sweat, a diarrhœa, or an abundant urinary discharge, with large deposits (Murchison\*).

Course, Duration, and Termination.—There are great variations in the course of cases of typhus during the epidemics. In the mildest cases the pulse may not exceed 100, the tongue may never become dry and brown, there may be only temporary confusion of mind, and somewhat troubled sleep. There are extreme cases, in which the patient is stricken down with the intensity of the poison, and at once passes into a state of profound prostration, with disorganization of the blood; and, without any complication to account for it, life is extinguished in a few days after the onset of the disease. Usually, however, the fatal result may be referred to the rise of some complication. Some of the

\* Murchison "On Fevers," *op. cit.*

most important are the pulmonary: bronchitis, hypostasis, pneumonia, gangrene of the lung, and pleurisy. During the course of typhus, frequent examinations should be made of the thoracic organs, since the insensibility is so profound that the patient may not present any indications of the complications. Especially should an increased rapidity of breathing become manifest, or the alæ of the nose labor, or the lividity of the face deepen, attention should at once be directed to the state of the thoracic organs. The most usual of the thoracic complications is bronchitis, and it is not always shown by cough, but only by moist *râles*. The danger consists in an extension to the smaller tubes, and the association of hypostatic congestion with capillary bronchitis. When the adynamia is very deep, the tubes may become paretic, and can not expel the accumulating mucus, death occurring in asphyxia. The association of hypostatic congestion with bronchitis is the most usual cause of death in typhus, taking the general order of cases. Pneumonia is uncommon, but gangrene is comparatively frequent in famine-typhus. Thrombosis of the femoral artery sometimes occurs, but the chief complications on the part of the blood are those due to its disorganization: purpuric spots, hæmorrhages by the nose, bronchial tubes, stomach, intestines, and kidneys, and a more or less extensive general cyanosis. Imbecility and mania are sometimes sequences of typhus, but there are complications of a paralytic kind occurring during the course of the fever, or during convalescence, such as hemiplegia, paraplegia, or affections of the special senses, amaurosis, and especially deafness. These are usually temporary, and due to the extreme degree of anæmia produced by the fever, but some of them are more permanent, as the deafness due to suppuration of the middle ear. Complications on the part of the skin are often very severe, notably the extensive bed-sores, gangrene of the skin, and furuncles. A whole extremity may become gangrenous. Erysipelas of the scalp and face, suppuration of the parotid gland, and buboes, are also encountered. All of these complications increase the gravity of the case, and in proportion to their importance. The duration is also more or less influenced by the complications. The ordinary duration of a mild, uncomplicated case is about three weeks. The Germans recognize an abortive form of typhus, terminating by crisis about the seventh day, but such cases, it seems to the author, belong to a different order. A case of typhus may be protracted by complications four, five, or six weeks. Even in the severer epidemics the majority recover. Much depends on the type of the cases. Those characterized by intense fever and active delirium are called *inflammatory*; those in which the merely nervous symptoms, as delirium, stupor, subsultus tendinum, predominate, are designated *ataxic*; and those in which a profound prostration comes on are known as *adynamic* (Murchison). In the severe epidemics which have visited Ire-

land and India one fifth have proved fatal, and this was the mortality at the London Fever Hospital for fourteen years. In some epidemics, the mortality has risen to forty per cent., and even higher, and in others has fallen to eight per cent. The type of the epidemic, as well as of individual cases, is, therefore, a large factor in determining the mortality. The mean mortality is from fifteen to twenty per cent. The disease is more fatal in males than in females, and is less fatal in childhood, the mortality increasing with age.

**Diagnosis.**—Stokes is the only author of any prominence advocating the identity of typhoid and typhus. The prodromic stage is more usual and protracted in typhoid; the onset of stupor and delirium is earlier and more pronounced in typhus; in typhoid there are meteorism, gurgling in the right iliac fossa, and diarrhœa—in typhus these are wanting; in typhoid there is a roseola eruption of a small number of spots; in typhus there is a petechial eruption, which is abundant over the body; the duration of typhus without complications is about two weeks, often terminating with crisis—of typhoid, four weeks, by slow decline of fever; on *post-mortem* examination, thickening and ulceration of Peyer's patches and of the solitary glands and enlargement and softening of the mesenteric glands are seen in typhoid, while no similar or corresponding changes take place in typhus.

**Treatment.**—The same means of treatment pursued in typhoid are equally applicable here, except that the adynamic condition appears sooner, and is more profound, requiring a somewhat earlier resort to stimulants. The alimentation should be carefully prescribed from the beginning, and should consist of milk, eggs, animal broths, and a moderate quantity of wine, which should be changed to whisky or brandy as the prostration increases. Still more than in typhoid is it necessary in typhus to keep the temperature within safe limits by the use of antipyretics. Cold baths, or the wet pack, quinine, and digitalis, are used as in the treatment of typhoid, under the same rules and regulations. As certain critical phenomena may ensue at or about the end of the second week, it is important to be prepared for them, lest the revolution which then takes place may tax too heavily the vital resources. As typhus is distinctly contagious, isolation of the patient is demanded by every consideration, and all of the patient's excretions should be disinfected and removed without delay.

#### RELAPSING FEVER.

**Definition.**—This is an acute, infectious, febrile disease, self-limited, and characterized by the occurrence of a febrile paroxysm, lasting about one week, succeeded by an entire intermission of four or five days' duration, which is in turn followed by a relapse like the first seizure, although shorter.

**Causes.**—Relapsing fever is a distinctly contagious affection. Some excellent illustrations of the modes in which it may be communicated have been narrated by Parry,\* and every epidemic furnishes examples. The poison acquires the greater activity the more filthy, crowded, and unhealthy the population amid which it prevails. The larger the number of sick, ill with the disease, crowded into a given locality, and the more unhygienic the local conditions about the sick, the more virulent becomes the poison. Articles of clothing which have been about the sick will retain the contagious principle for a long time, and those who have been in the presence of the sick can convey the poison to the healthy at a distance. It seems in a high degree probable that drinking-water may be contaminated and spread the poison. So rapidly are members of a family attacked, after one case has been introduced, that some general cause might be supposed to act on all simultaneously. The disease attacks by preference the young, the liability lessening after thirty, and apparently ceasing after fifty. In this disease we seem nearer than in almost any other to a correct knowledge of the nature of the morbid principle, since the discovery by Obermeier in 1873 of a minute organism in the blood of relapsing-fever patients. Unlike most of the other fevers, the occurrence of one attack of relapsing fever does not purchase an immunity against subsequent attacks; indeed, the liability to it seems rather increased by previous attacks. An intimate relation apparently exists between relapsing fever and typhus, for Lebert has ascertained that, of fifty-three cases of relapsing fever, all were attacked with typhus within a few weeks to several months. Although the natural home of relapsing fever is Ireland, it has spread over England, on to the Continent, and has reached this country, distinct epidemics having occurred since 1850 in New York, Philadelphia, and other cities. It occurs at all seasons.

**Pathological Anatomy.**—The alterations produced by relapsing fever are by no means characteristic. During life minute organisms are found in the blood, but, according to Lebert,† “they were searched for in vain in the spleen, lungs, and other organs.” During the primary attack and relapse these organisms are present, but they disappear, or usually do, during the period of intermission. These bodies consist of minute spiral filaments, constantly in motion. They never exceed 0.001 mm. in diameter, and 0.15 to 0.2 mm. in length (Lebert). The very lively, twisting, and elongating motions of these spiral bodies cease as the blood coagulates, and those observed in the serum of the blood are often embraced in a granular substance, probably albuminous.‡ The

\* Dr. J. S. Parry, “The American Journal of the Medical Sciences,” October, 1870.

† Ziemssen's “Cyclopædia,” vol. i, *op. cit.*

‡ Dr. Paul Guttman (“Verhandlungen der physiologische Gesellschaft zu Berlin,” No. 7, 1880) has examined the blood of more than two hundred cases of relapsing fever, and finds the characteristic spirilli of Obermeier only during the pyretic period. These

relative proportion of white blood-corpuscles is increased. The spleen is usually considerably enlarged, and may be either firm or soft. “Miliary aggregations of a dull-yellow color, and containing granular detritus, with occasionally cell-elements and free nuclei,” are found in the spleen in some cases, and in other cases “wedge-shaped infarctions.” These may be supposed to have their origin in embolisms formed by masses of the spiral organism. The liver is also somewhat enlarged, and the acini are in many instances pale and clouded; and there are, rarely, it must be admitted, minute deposits like those mentioned as present in the spleen. The gall-bladder is full. The kidneys, like the liver and spleen, are somewhat swollen; the cortex is pale, and cloudy swelling and granular infiltration are to be seen in the tubules. In the intestinal canal some thickening of the solitary glands and patches of Peyer occurs, also in the mesenteric glands; but these changes are trivial as compared with those of typhoid fever. Sometimes in various parts of the mucous membranes minute extravasations of blood are found. The only change in the heart is a granular condition of its muscular tissue, such as occurs in febrile affections, and a similar change is to be seen in the muscles, generally due to the same cause.

**Symptoms.**—From the period of exposure, or of reception of the morbid material, until the first phenomena of the disease are manifest—the incubation—about five to seven days elapse. This is not invariable, and must therefore be regarded as a close approximation only. There is no real prodromic period. Just as the disease is about to appear the patient experiences a general *malaise*—some pains in the head and limbs, wakefulness, loss of appetite, etc. The malady begins rather abruptly with fever, in only one half of the cases is there chilliness, and in a much smaller number a distinct rigor. In some epidemics there are irregular chills, and occasional sweats for the first two or three days, simulating an intermittent fever. In many cases the fever is high and the symptoms severe from the beginning; in other cases the patient keeps about for the first few days. With the initial fever there are usually nausea and vomiting, and, if not in the beginning, in a very short time there is a marked degree of debility. The fever is of the remittent type, with a morning remission and an evening exacerbation—the morning temperature being at 102° to 103° Fahr., and the evening temperature at 104° to 105°. The pulse corresponds, ranging from 110 in the morning to 130 in the evening, and is rather weak, usually dicrotic, or wanting in tension. The tongue is coated and soon becomes very dry and sore; the bowels are constipated. The chief source of suffering at the outset is the pain in the back and limbs, but all the muscles of the body soon become the seat

new observations confirm what is stated in the text. Dr. Guttman further shows that the spirilli are genuine parasites. (See also Virchow's “Archiv,” Band lxxx, s. i, 1880.)

of very violent grinding, piercing, lancinating pains, and these pains are increased by movement or pressure. The most aggravated of these pains are those felt in the calf of the leg. The headache, which was so pronounced in the beginning, lessens somewhat in severity as the muscular pains develop. About the second day a painful sense of weight and pressure is experienced in the right and left hypochondrium, especially in the left, and is caused by enlargement, with congestion, of the liver and spleen. The spleen especially enlarges very considerably, projecting below the ribs. The area of hepatic dullness is also much increased, and the margin of the liver can be felt several fingers' breadths beyond the ribs. This increase in the dimensions of these organs begins on the second day, and increases day by day, to diminish during the interval or intermission. Besides the increase in volume, these organs become very sensitive to pressure, and continue tender as long as they are enlarged. There is no tympanitic distention of the abdomen, no diarrhoea, no rose-spots, but more or less vomiting persists during several days, the vomited matters consisting of a greenish, acid fluid. There is no delirium, the nights are much disturbed by pain, but the mind is unclouded. The urine frequently contains albumen, but its composition in other respects is that of the urine of febrile diseases in general. More or less sweating occurs, but no amelioration of the fever is produced, for the skin continues hot, while there is a general moisture of the surface. The fever, the pains, the nausea and vomiting, the tumefaction of the liver and spleen, continue up to the end of the paroxysm. It is not surprising that, under these circumstances, there should be weakness and emaciation. In a small proportion of cases jaundice appears at some period during the first paroxysm. Toward the end of the first week, on the fifth, sixth, or seventh day, all of the symptoms attain their maximum and the case looks truly formidable, when a sudden defervescence takes place, and with it a remarkable diminution in all of the symptoms. Profuse sweating sets in, and the temperature falls to normal and below, a variation of five or six degrees taking place from night to morning. The pulse also descends from the high point at which it had been at the maximum, to the normal, or even below. Corresponding changes ensue in the other symptoms. A feeling of comparative comfort is substituted for the severe pains; appetite replaces nausea or disgust for food; the bowels act normally; the swelling and tenderness of the liver and spleen disappear, and the jaundice, if present, begins to fade; the tongue clears off; sleep is restored, and the strength gains rapidly, so that in a day the patient is disposed to get up and regards himself as well, although somewhat weak. The improvement continues, and hence it is a matter of extreme surprise to the patient, if unfamiliar with the nature of the malady, to be attacked with a relapse. The period of intermission is not a fixed period, and varies from four days

to one week, very rarely to two weeks. Complete recovery has not therefore taken place when the relapse occurs. Quite suddenly, in the afternoon, in the evening, or more frequently at night, the relapse comes on with a chill which is rather exceptional, or a sense of chilliness, or with fever only. The relapse, as a rule, repeats the symptoms of the initial seizure, except that its course is less severe and of somewhat shorter duration; but the pains, nausea, and vomiting, enlargement of the liver and spleen, are very much the same. The fever has more of a remittent type, and the sweats have a somewhat critical aspect, for more relief is afforded by them than during the primary paroxysm. An attempt at critical phenomena may be made a day or two before the real crisis; there may be a considerable sweat and a marked fall of temperature; but the effect is not maintained and the temperature rises again. The final defervescence occurs from the third to the fifth day, and usually at night, when a profuse sweat occurs, and the temperature and the pulse-rate fall below normal. The crisis may be postponed to the seventh day, but this is not usual. A second, a third, even a fourth relapse has been noted in some epidemics. The symptoms are the same, but the more numerous the relapses, the more reduced must the patient become by a repetition of the suffering.

**Course, Duration, and Termination.**—The whole course of an ordinary case of relapsing fever is concluded within three weeks, unless there be several relapses. At the conclusion of the relapse, the patient lies in a condition of great comparative comfort, but much emaciated and quite exhausted. The anæmia is very marked, there is more or less œdema of the ankles, the eyelids are puffy, and the sclerotic pearly white. The convalescence is very slow. Much, of course, depends on the violence of the seizures, and the number of relapses. Age appears to have an influence, for, in children under twelve, Parry observed that the course of the disease was shorter and milder. There are also differences in different epidemics in respect to the duration and severity of the disease. The usual termination is in health, the mortality being about two to three per cent. Complications may have a very great influence over the result. Bronchitis, catarrhal pneumonia, and pleuritis, occur in some epidemics, and laryngitis has required tracheotomy. At the period of crisis, hæmorrhages may occur, notably epistaxis and local paralyses—of the deltoid, for example—have been observed. Diarrhoea has occurred at the crisis instead of a sweat—in some epidemics increasing the mortality. A pregnant woman ill with relapsing fever is almost certain to abort, and hence this must be regarded as a serious complication. At the period of crisis, fatal syncope has occurred without any apparent reason. The extraordinary revolution which then takes place may impose too great a strain on a weak heart. The persistence of changes in the liver and spleen, after recovery from the fever, must place these affections among the

sequelæ. In the same category is a form of ophthalmia which has occurred after certain epidemics.

**Treatment.**—The remedial management of relapsing fever must necessarily be expectant. We possess no agent to prevent the development of the *spirilla* in the blood, and we do not know how this parasite enters the blood, or whence it comes. The treatment of the fever would seem to require the use of antipyretics, but their utility is very limited, owing to the short duration of the paroxysm.\* The best means of relieving the severe pains are the hypodermatic injection of morphia and the wet pack. Opium by the stomach has but little effect, apparently, in this disease. For the nausea, the best remedy, probably, is carbolic acid (half a grain) administered in cherry-laurel water. For the nocturnal pain and wakefulness, a combination of chloral and morphia promises best. The enormous production of *spirilla* during the paroxysms of fever and their disappearance in the intermission are strong arguments in favor of the administration of parasitocides. The use of quinine has been quite fruitless. But a more systematic administration of the sulphites and the disengagement of sulphurous-acid gas in the air of the sick-apartment should be attempted. At the period of crisis, syncope may be prevented by the timely use of alcoholic stimulants. It is especially during the period of intermission that an attempt ought to be made to prevent the new development of the *spirilla* which it is supposed then takes place. Suitable food, iron, and other tonics should be given to improve the quality of the blood; the increased volume of the spleen reduced, and the overproduction of white corpuscles prevented by the administration of quinine and ergotin, and an attempt made to prevent the new growth of the parasite by the free use of the sulphites and other parasitocides.

#### YELLOW FEVER.

**Definition.**—*Yellow fever* is an acute, infectious disease, occurring only south of 48° north latitude, in regions having a mean annual temperature of not less than 70° Fahr., endemic on the seacoast, and sporadic elsewhere under an elevation less than twenty-five hundred feet above the sea-level, the germ being introduced and certain localizing conditions favoring its development.

**Causes.**—Pursuing the plan heretofore followed, the author will not occupy space with controversial questions. The cases (private) seen by the author occurred in the Mississippi Valley, and were encountered at Cincinnati, having come there from infected localities in the South,

\* As this work is going through the press, Dr. Riess, of Berlin, reports that he has found the salicylate of soda remarkably effective in reducing the temperature, and, if given in large doses for some days, will lessen the severity, and even prevent the relapse ("Berliner klinische Wochenschrift," No. lii, 1879).

especially Memphis. It seems necessary to the production of yellow fever that a peculiar germ or morbid principle be introduced from without. For the further development of this germ it is necessary that there be a concurrence of certain telluric and personal conditions. It is needless to discuss here whether the poison ever arises spontaneously in its natural habitat under the necessary conditions. Of the nature, form, and composition of the morbid principle, nothing is as yet known, and the last investigations in regard to it have proved as barren of results as the preceding one. We know that a mean annual temperature of about 72° is necessary to its activity, and that cold—a frost—suffices to destroy it. A fall of temperature short of that necessary to suspend the activity of the poison increases the mortality from it. Yellow fever occurs in maritime cities first, and extends thence to towns and cities having direct communication with them by river or by railroad. Cities and towns, removed, by reason of their situation, from intercourse with infected maritime cities, escape epidemic visitation. The disease does not spread from city to city so rapidly as men move from one to the other. A germ or germs are introduced. Accumulated filth, decomposing animal and vegetable matters, bad or no drainage, crowding, and other hygienic evils, are indispensable to impart the necessary vitality. Lodging thus in a suitable soil, and with the appropriate atmospherical conditions present, the disease-germs grow and infect those in the proper personal state to receive the poison. After a time, from this newly infected locality, germs are transmitted to other localities. The conditions existing on shipboard seem peculiarly favorable to the growth of the poison. Next to the ship, as a nidus for yellow fever, is the large maritime city, situated at the outlet of a great river, subject to annual overflow and filled with all the materials of insalubrity.\* To these must be added the atmospherical peculiarities of July, August, and September. When the disease-germs are introduced, and the localizing conditions are favorable, not all persons are attacked. Some present a peculiar susceptibility, others insusceptibility to the action of the poison. Race exercises a remarkable influence, the pure negro possessing a singular immunity against the infection, provided he has not lived outside of the yellow-fever zone and returned to it just before an outbreak. Any considerable admixture of white blood destroys the protection. Whites are more susceptible the farther removed from the yellow-fever zone they have lived previously. Long residence in the infected locality, especially passing through a period of epidemic prevalence of the disease, and still more effectually passing through an attack, procure more or less complete immunity; but this immunity may be lost

\* See Dr. Woodhull's (Surgeon U. S. A.) account of "The Causes of the Epidemic of Yellow Fever at Savannah, Georgia, in 1876," "The American Journal of the Medical Sciences," July, 1877.