

erysipelas, so called, is a deep-seated inflammation, with suppuration, spreading along the connective tissue and by the intramuscular planes from a wound or injury, and does not take the course along the integument as erysipelas. So characteristic are the appearance and behavior of erysipelas that it would seem impossible to mistake it for any other disease. The diagnosis by anticipation should not be overlooked—the occurrence of enlarged lymphatics in the neck in the case of erysipelas of the scalp, and of enlarged submaxillary glands in the case of erysipelas of the face.

Treatment.—The perturbing treatment formerly used is now no longer employed. The mildest cases require only a laxative, a suitable diet, and the local application of some vaseline to abate the heat and burning. In the more severe cases there can be no doubt of the value of quinine, especially if combined with belladonna. To avoid the complications which may arise in even simple cases, the author gives the tincture of belladonna, or preferably a solution of atropine (atropina sulph. gr. j, aqua ʒj. M. Sig. One drop every four hours in some water). As the effect of the atropine accumulates, the interval between the doses is enlarged. In the more severe cases quinine should always enter into the treatment, and in full medicinal not antipyretic doses (℞ Quinina sulph. ʒij, ext. belladonna gr. iij. M. Ft. x pil. Sig. One every four hours). The delirium of anæmia, the usual form, especially in those addicted to alcoholic excess, is best relieved by alcoholic stimulants, and morphine and belladonna, if the latter does not enter into some other combination. The systematic use of milk and beef-essence is necessary in all severe cases, especially under the conditions named above. Tincture of chloride of iron, in half-drachm doses every four hours, is much commended by the English physicians, and with good reasons. In traumatic erysipelas Mr. Higginbotham's mode of applying a solution of silver nitrate in nitric ether is most serviceable. The surface must be carefully washed and dried. Then the following solution is brushed over the inflamed area, and for a short distance beyond on the healthy skin. On drying, should any part of the skin appear untouched, the solution is reapplied to these parts. The usual strength is about as follows: ℞ Agenti nitrat. ʒj, spts. ætheris nitrosi ʒij. M. Sig. Apply with a brush. An aqueous solution of two drachms to the ounce may be employed instead. The topical applications recommended are almost innumerable—a fact which indicates the uncertainty of value of any article. As a rule, irritating applications do more harm than good. To this dictum must be excepted the application of nitrate of silver, in the traumatic form of the disease. The author has seen mercurial ointment, diluted ten times with lard, very successful. Probably still better is the following: Vaseline ʒj, acid. carbolic. ʒ ss., or less, which should be brushed over the inflamed area three or four times a day. Above all remedies and

applications is the use of a nutritious diet. From the very beginning systematic feeding should be carried on. When the patient can retain nothing else, lime-water and milk may be retained. But, when the stomach becomes quiet, milk, eggs, animal broths, etc., should be given at regular intervals, and, when necessary, stimulants. Trousseau (*op. cit.*) used no remedies except a laxative, but he pushed the administration of food, and of the great number of cases treated by him only three died.

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## FEVERS.

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### TYPHOID FEVER.

Definition.—*Typhoid fever* is an acute febrile affection, self-limited, feebly if at all contagious, and characterized by a peculiar eruption on the abdomen, by a form of diarrhœa, by stupor and low delirium, by thickening and ulceration of Peyer's patches, by infiltration and softening of the associated mesenteric glands, and by swollen spleen. Various names have been applied to this disease. In Germany\* and France,† and on the Continent generally, it is now called "abdominal typhus"; in England and this country it is usually designated *typhoid*—rarely *enteric fever*, the term which was originally proposed by the late Professor George B. Wood. Notwithstanding the term *typhoid* is excessively faulty, it is so universally used in this country that the author has adopted it.

Causes.—Typhoid owes its origin to a peculiar poison, whose source and nature have thus far eluded investigation, but is associated with the decomposition of animal matter under certain conditions. It is never produced by mere decomposition of animal matter, fæces, or the contents of sewers; it is essential to the formation of the poison that the typhoid germ be present, and this germ finds in these decomposing animal matters a suitable soil for its growth and development. It does not originate *de novo*, but there must be present some typhoid matter furnishing the material for a new growth. There are sound reasons for concluding that the poison is contained in the excrements, but it seems necessary for some change to go on in them to develop the activity of the poison, for when in the fresh state they manifest

\* "Handbuch der Pathologie und Therapie des Fiebers," von Dr. C. Liebermeister, Leipsic, 1875, p. 690.

† "Traité de Pathologie Interne," par S. Jaccoud, Paris, 1871.



no activity. Admitted to the cesspool, or to the sewer, or thrown on the ground, the germ becomes active and multiplies, so that the excretions of a single patient may develop sufficiently to poison a large community. The germ of typhoid is extremely viable, and preserves its activity for a long time, so that, should typhoid occur in a given locality and then disappear for a long time, another epidemic may develop without the introduction of a new case. How long the poison may remain in the body before the advent of symptoms can not be very definitely established. The average duration of the incubation period may be stated at three weeks, although it may be as short as one week, or as long as four. The vehicles by which the disease-germs reach the body are air, water, articles of food, etc. In the gaseous exhalations from the sewers and privies, the *materies morbi* is carried up and is inhaled; dissolved in drinking-water or in milk, it is conveyed into human stomachs, and it may be deposited on other articles of food to be similarly disposed of. That the *materies morbi* does not infect a larger number is probably due to the insusceptibility of many persons receiving it. Susceptibility to the poison is developed by various influences. The seasons have the power to modify the prevalence of the disease. In this country the fall and winter are seasons of the greatest prevalence of typhoid. Loomis\* says it is most prevalent in autumn, whence it is known as "autumnal fever." The condition of the water-supply, as to its elevation, Buhl has shown for Munich, is an important element, and that typhoid decreases as the water rises, and increases as the water falls. Age affects the predisposition to typhoid, and the tendency to it is greatest from fifteen to thirty years; it is almost absent in children under one year and in the aged. Men are rather more susceptible than women, and the disease selects by preference the most vigorous and able-bodied, and passes by those suffering from chronic diseases. One attack furnishes exemption against those in the future, but this rule is frequently violated. Recurring typhoid, however, like recurring scarlatina, is not uncommon.

**Pathological Anatomy.**—The lesions of typhoid fever are eminently distinctive. The extent of the changes, although, as a rule, indicative of the violence of the attack, is not always so; for with comparatively few lesions there may be formidable symptoms, and *vice versa*. As it is probable that the poison enters the intestinal canal, and there begins its ravages, it is most appropriate to begin the sketch of the morbid anatomy with the intestinal lesions. The title *dothiëntérie*, first given to this disease by Bretonneau, and adopted by Trousseau,† was intended to emphasize the importance and particularity of the intestinal lesions. Conforming to the method of Trousseau and of Liebermeis-

\* "Lectures on Fevers," by Alfred L. Loomis, A. M., M. D., New York, William Wood & Co., 1877, p. 403.

† "Clinique Médicale," tome premier, Paris, 1865, p. 212, *et seq.*

ter, who pursued a chronological arrangement, we may divide the appearances into periods of weeks. In the first week there are more or less hyperæmia and swelling of the mucous membrane in the ileum at its lower part, and especially around the patches of Peyer. Coincidentally, a few of Peyer's glands and some solitary follicles are swollen by infiltration, especially those glands near to the ileo-cæcal valve, and by the end of the first week the infiltration has become general. The congestion is not limited to the mucous membrane, but often extends to the peritoneal surface, which is intensely hyperæmic (Lyons\*), to the mesentery, and to the spleen. In the second week occurs the infiltration of the glands of Peyer, and the hyperæmia lessens. Stimulated, we may suppose, by the typhoid-poison, the cellular elements of the glands, agminated and solitary, undergo a rapid proliferation, by multiplication of their nuclei and by division. This increase of their contents causes them to swell in all directions, so that they rise above the general surface of the intestine, and appear dark or reddish. The solitary follicles vary in size from half a line to a line in diameter, to the volume of a small pea, and may even reach the dimensions of a bean, while the patches, oval in shape, are elevated above the surface, from one sixteenth to one quarter of an inch. The new cells are not confined to the glands entirely, but wander forth, infiltrating the neighboring mucous membrane, and, passing through the muscular, penetrate to the subserous layer. At and near to the ileo-cæcal valve, a number of the patches cohere and unite, forming oblong masses, and even surrounding the valve with a ring. The patches also coalesce at the extremity of their long axis, parallel to the long axis of the intestine, and thus attain extraordinary length. The number infiltrated is not always the same; they may all be involved to a greater or less extent; there may be but three or four. The same differences exist in respect to the number of solitary follicles infiltrated. The rapid and large production of new cells imparts to the glands and follicles a soft, spongy character, and soon leads to a necrotic softening and sloughing. It is, however, in the more pronounced cases that the patches become necrotic. They have usually a greenish color, from the presence of bile-pigment, or are stained a brownish color by the intestinal juices. The sloughs are cast off during the second week, leaving an ugly excavation which reaches to the muscular coat, and often to the serous. These ulcers have the shape and size of the involved patches, and are elliptical in form, their long diameter parallel to that of the intestine, and their margins are thick and sharply defined. Enormous ulcers may form in the neighborhood and around the valve, by the union of many; indeed, this part may be a mass of ulcerations, with small bits of mucous membrane between them. The process of ulceration and

\* "Treatise on Fever," Philadelphia, 1861, p. 362.



necrotic sloughing may be postponed to a much later period. Several months, indeed, may be occupied in the process of typhoid infiltration, without ulceration taking place (Lyons). But such examples are clearly exceptional. When extrusion has taken place, the process of healing goes on in favorable cases. The floor of the ulcer is soon covered with granulations, and, a gradual contraction taking place, the ulcer is ultimately closed, a cicatrix marking the site. A restoration to the normal is accomplished in many patches and follicles without ulceration. The new cells disintegrate and disappear, the hyperæmia subsides, and the original state is resumed. It is probable that this is the course of the lesions in the mildest cases. The two processes are usually mixed. Amid more or less extensive sloughing and destruction of substance, there will be seen patches and follicles that do not ulcerate, and whose new elements degenerate and are absorbed. The part of the intestine affected has an influence on the result—the sloughing and ulceration taking place below, and the retrogression by degeneration and absorption occurring above. The process of sloughing and repair may go on together, and at a very advanced period, so that perforation may result when healing is far advanced.

It has already been mentioned that the initial hyperæmia involved the mesentery as well as the intestines. Other changes occur in the mesentery, following in the wake of those going on in the intestine. The glands swell, are congested, reddish, and succulent. They enlarge very considerably by an accumulation of their contents, and attain the size of a bean, an almond, or a pigeon's-egg. They presently soften, and many become diffuent and are barely retained within the capsule. When retrogression takes place the soft material is absorbed, the congestion disappears, and the glands shrink to their normal size. Sometimes a purulent collection remains behind, and a slow, cheesy transformation is effected. It not unfrequently happens that other lymphatic glands are infiltrated to some extent, such as the retroperitoneal and bronchial glands, etc., but in the mesentery the glands usually attacked are those immediately related to the diseased part of the intestine, although in severe cases all may be swollen and infiltrated. The spleen is affected in a similar manner. When the hyperæmia begins in the intestines the spleen enlarges, and by the end of the first week the enlargement is sufficient to be recognized through the abdominal wall, and at the maximum the organ is two or three times larger than normal. The change consists in a multiplication of the cellular elements, which at first increases the firmness of the organ, but ultimately it becomes exceedingly soft, so that it almost falls to pieces by its weight. The retrogression occurring in the spleen consists of a degeneration and disappearance of the new elements; the capsule contracts, the trabeculæ become more firm, and the pulp more compact. The lesions thus far considered are peculiar to typhoid. We have

now to discuss changes due to a persistent elevation of the temperature, and known under the designation of parenchymatous degeneration of organs—the liver, kidneys, muscular tissue of the heart, the nervous system, and muscular system of animal life in general. Parenchymatous degeneration is a granular and fatty change affecting the proper gland elements. In the liver the cells become clouded with fat-granules and the nuclei disappear, and when the change is most advanced they break down into granular fragments. The effect of this process is to diminish the firmness and consistency of the organ, to change its color to a grayish or yellowish-red, and to materially diminish the blood in the small vessels. The degree of the change varies chiefly in accordance with the range of temperature; it may be very slight or very considerable, and the right lobe is usually further advanced in the change than the left. In the kidneys the epithelium of the tubes, first of the cortex, then of the pyramids, becomes granular, cloudy, and the contour indistinct, the nuclei disappearing, and at last breaks down into granular fragments. The effect of these lesions is to diminish the firmness of the organs, and to change their color. In the kidney, as in the liver, the amount of the change varies, and is determined by the range of temperature. Albuminuria results when the alteration is at all extensive. Very important are the changes occurring in the cardiac muscle. The granules appear in large numbers, arranged in parallel rows, filling the fibers, and ultimately causing a disappearance of the striæ. The result of this change is very injurious. The tissue of the heart is soft, flabby, and easily torn, and the organ in advanced cases can not maintain its shape when laid on a table, but flattens out like so much mush. In the muscles the degeneration takes the two forms of granular and waxy. In the brain the changes due to parenchymatous degeneration have not been, as yet, adequately studied, but the naked-eye alterations are very definite, the chief change consisting in anæmia, œdema of the brain, the sub-arachnoid spaces, the perivascular lymph-spaces, and the ventricles containing a good deal of fluid. Some parts of the brain are less firm than normal, and more or less atrophy occurs, the convolutions flattening and the ventricles enlarging, etc. Rarely the lesions of an acute meningitis are superadded to those of typhoid. In the respiratory organs there are various lesions, which, if not essential to typhoid, are at least usually associated with those that are peculiar. Not unfrequently the larynx is attacked with ulceration; but the most characteristic change is that of catarrh of the bronchial mucous membrane, which is swollen, deeply injected, and coated with viscid mucus. The access of air being cut off from some of the vesicles, they collapse, or pass into the state of atelectasis. The dependent portions of the lungs are in the condition of hypostasis, with or without œdema, and in rare cases lobar or lobular pneumonia.



**Symptoms.**—As a rule, a prodromic period ushers in a case of typhoid. For a week or ten days, or even longer, a lack of the usual vigor and a disposition to tire easily are perceived. Headache, epistaxis, tinnitus aurium, a poor appetite, and a slight diarrhœa, are also noted. The mind is dull, and mental application is very fatiguing; sleep is disturbed by dreams and is unrefreshing. Presently some chilliness is felt at different times and for several days, and the fever begins; the strength is exhausted, and the patient betakes himself to bed. In other cases, the prodromic period is characterized by the development of an acute catarrh of the stomach; there are disgust for food, nausea, and a heavily coated tongue; temporary relief is afforded by spontaneous or contrived vomiting, but the symptoms are soon resumed, the nausea continues, some diarrhœa occurs, great weakness is felt, headache, hebetude of mind, and disturbed sleep are experienced, and gradually the fever lights up. In still other cases—and they are relatively very numerous in the malarial regions of this country—an attack, apparently of intermittent fever, precedes the fever proper; there may be several distinct paroxysms, but the fever soon assumes the remittent type, and the phenomena of typhoid gradually develop. A few cases begin without any prodromes. A person, apparently in full health, is unexpectedly seized with some chilliness, followed by fever, languor, headache, etc. On the next day there is more chilliness, the fever is more pronounced, the mind is already becoming dull, and the other symptoms of typhoid come on immediately. The disease is held to originate with the first chilliness or the first elevation of temperature, and from these data is computed the duration of the different periods. As the appearance of fever marks the onset of the disease, so its decline and disappearance establish convalescence.

*First Week.*—The symptoms of the prodromic period are more pronounced: there are violent headache, a sense of confusion and mental weakness; singing and drumming in the ears; some bleeding at the nose, often but a few drops escaping; the eyes are intolerant of light, the ears of sound; the patient may still get on and off the bed, but, when he attempts to stand erect, his limbs tremble, and he is seized with vertigo. The appetite is gone and the suggestion of food is repugnant; there is a bad taste in the mouth, and the thirst is excessive. The tongue is at first large, pale, indented at the margins with the teeth, but it becomes dry and smaller by the fifth day; the coating peels off with the epithelium in patches, leaving a very red, dry, and glazed surface, and it is also somewhat tremulous. Some diarrhœa may have existed during the prodromic period, and there is often a tendency to constipation during the first week, but, when this is the case, it is found that a light purgative acts with unwonted violence. More or less diarrhœa exists during the first week. At first

the stools consist of thin, brownish fæces, having a rather strong odor, but they increase daily in number and change in character toward the end of the second week, when they assume the yellow ochre color, the well-known "pea-soup" appearance. When they are permitted to stand, they separate into two distinct strata: the upper one liquid, holding salts, extractives containing bile, epithelium, ammoniaco-magnesian phosphate, and fat, finely emulsified; the lower one, more consistent, containing analogous ingredients to those in the upper layer, but, in addition, a quantity of soft, yellow concretions made up of fat, albumin, pigments, and phosphates (Jaccoud). Great interest attaches to the microscopic examination of the stools, since it is generally conceded that the typhoid matter exists in the stools, but the results thus far attained can not be regarded as conclusive, although various microbes have been described by Klebs\* and others as the specific infective element, or typhoid germ, but until their infective power is demonstrated their relation to typhoid fever must continue conjectural. Gurgling in the right ileo-cæcal region has been classed among the symptoms of this period, but, as it is present in diarrhœal affections, there is no great value to be attached to it alone. Tenderness, as well as gurgling, makes a more significant impression, especially if, as there ought to be, at the end of the first week, some fullness, even distention of the abdomen. At this time distinct increase in the area of splenic dullness can be made out, and the enlarged spleen may be often felt. Enlargement of the tonsils, follicles of the pharynx, and of the large follicles at the base of the tongue takes place coincidently with the development of the intestinal glandular appendages. Catarrh of the bronchial tubes, shown by some dry and moist râles over the dependent portions of the lungs especially, comes on at this time, but its intensity varies in different epidemics and in different individuals. At the end of the first, or at the beginning of the second week, appear the very characteristic disorders of the nervous system. The restlessness, the complaints about the aching in the back and limbs cease, and instead there is a condition of apathy and indifference. The patient becomes somnolent, but is easily aroused, and does not sleep well at night. Some of his indifference and stupidity of expression is due to dullness of hearing, and hence he must be spoken to somewhat loudly. When roused he responds correctly, and expresses himself as feeling very well. From the seventh to the tenth day some disturbance of mind is noted; it may be toward evening, or at night only, or when roused, and ordinarily it is nothing more than a tranquil muttering, or, as it is commonly expressed, "low-muttering delirium." Sometimes the delirium takes a more active character: it is wild, furious

\* For an account of the more recent discovery of Klebs, see "Der Ileotyphus eine Schistomycose," "Archiv für experimentelle Pathologie und Pharmacologie." Zwölften Bandes, s. 231. He gives the results of examination of twenty-four cases.



and ungovernable; the patient gets out of bed, resists the attempts to feed him, spits his drink or medicine into the face of his nurse; will not keep any covering on him, talks incessantly, and not only gets out of bed, but will jump out of the window. This condition of wild delirium coincides with greatly elevated temperature, rapid pulse, and the other evidences of extreme illness. Fortunately, these cases are rare. Usually the delirium is a low monotone, mumbling incoherently, and is accompanied by picking at imaginary objects on the bed-clothes, and subsultus tendinum. The trembling of the muscles is seen not only in the subsultus of the tendons of the forearms, but in the protrusion of the tongue. If not too far gone in stupor, the patient may yet protrude his tongue when urged to do so, but he does it slowly, hesitatingly, with much trembling, and he forgets to return it again, keeping it protruded until forced to return it. The urine is acid in reaction, is rich in urea, urates and extractives, and poor in chlorides. The urine frequently contains the urinary indigo, leucin and tyrosin, and in many cases albumen. At the end of the first week, or at the beginning of the second week, an eruption of roseola appears, in the form of small, isolated, lenticular spots, about the size of a pin's-head, disappearing on pressure, to quickly reappear when the pressure is removed. They vary greatly in number, often from five to twenty, scattered over the lower thorax and abdomen. They may be much more numerous, several hundred in number, and may be distributed generally over the body. They may be, and indeed often are, entirely absent, especially in the milder cases. It occasionally happens that a larger, darker eruption, of a pigmentary character, appears before or with the roseola, but these have no special importance. When there has been much sweating, an abundant crop of miliary vesicles known as "sudamina" may appear on the neck, chest, and elsewhere. With the close of the second and the beginning of the third week, the typhoid symptoms develop in intensity. The stupor increases, so that the patient can hardly be roused, and is indifferent to all about him. If liquids are placed in the mouth, they are slowly swallowed. The patient lies on his back, his eyes partly closed, mouth open and black with accumulated sordes, his face is sunken, dusky, with a faint, reddish tinge in the center, the lips, now and then moving with an unintelligible muttering, are dry and cracked, and his strength is so far exhausted that he can not keep his position, but sinks toward the foot of the bed. The fæces and urine may be passed involuntarily, or the urine may be retained and dribble away, the bladder becoming enormously distended. The pulse continues frequent, from 90 to 120, or higher, but its force declines. The impulse of the heart is feeble, and hence a tendency to stasis in the lungs and brain exists. The pulse is compressible, and its tension so low that it has a double beat (dirotic pulse). The fever of typhoid, although called con-

tinuous, is not so; it has a distinctly remittent type. For the first

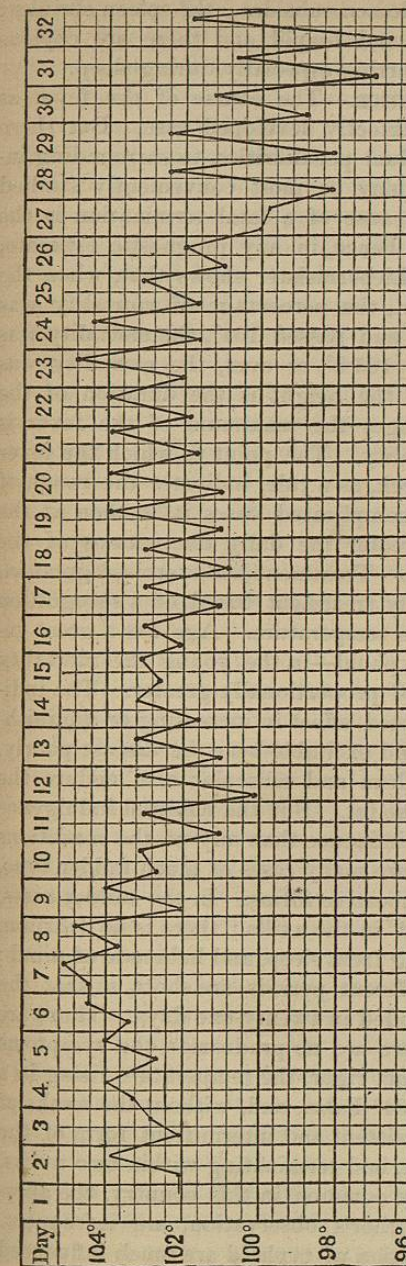


Fig. 55.—Temperature in Typhoid Fever.

week there is a gradual ascension, and, although there is a morning remission and an evening exacerbation, each exacerbation is a little higher than the preceding, until the maximum is reached. During the second week the fever is continuous; during the third it begins to be remittent, and, during the fourth, intermittent, the daily exacerbations lessening regularly until the normal is reached. The fever at its maximum is continuous, because the daily remissions correspond to the morning and evening variations of the daily temperature in health. With the remissions at the end of the third week, there are evidences of a change for the better in favorable cases. During the third week, however, chiefly occur the complications which exercise so unfavorable an influence over the progress of the disease, but these are reserved for separate consideration. In the fourth week the patient is well aroused from the stupor, and is fully conscious of his condition. Instead of indifference, he is full of complaints. His eye is brighter, and the face, though emaciated, begins to have expression again. The delirium ceases, the nights are less disturbed, and, instead of somnolence, the sleep although refreshing is interspersed with periods of wakefulness. The tongue and gums clean, the