cord runs from the sigmoid flexure to the cutis, which may be regarded as a rudimentary rectum, and renders important services in searching for the blind extremity of the bowel.

(4.) The rectum does not terminate externally, but in the vagina, bladder, or in one of the ureters, conjointly with which an anal depression may or may not be present (Figs. 8 and 9). In this condition the meconium is not absolutely retained, but passes off with the urine in one case, and by the vagina in the other. The diagnosis may be made with ease by examining the bladder with a silver probe or small catheter, and by collecting the urine that contains the meconium; and still more easily when the orifice of the rectum is discovered in the vagina. Various are the effects of this malformation. In cases where the rectum communicates with a ureter or with the bladder, the urine always becomes alkaline, constantly irritates the mucous membrane of the bladder, and causes cystitis, atrophy, and death. But, when the rectum terminates in the vagina, it produces a disgusting infirmity, from the continuous flow of the fæces, which are not retained, on account of the absence of the sphincters. The child is always soiled about the thighs and always emits an odor of fæces, yet it is by no means incapable of living. Instances have occurred where the rectum has been established by an operation, and then the connection between the bowel and vagina became occluded.

(5.) Finally, there are cases in which the rectum does not exist at all, or only in a rudimentary form. A portion of the large intestine is only present, and that terminates in the umbilical region, as a result of the embryonical *ductus omphalo-entericus* having remained open, a condition that has been denominated *anus præternaturalis* or *Ectopia ani.*

Treatment.—The treatment, naturally, can only consist of an operation. In the cases spoken of in sec. 1, the operation will be, as already indicated, to make a simple crucial incision through the outward bulging integument, when the meconium will be speedily evacuated. A pledget of lint with cerate is introduced into the wound after every evacuation from the bowels, for the first few weeks, in order to prevent union of the lips of the wound.

In the cases mentioned in sec. 2, a cautious attempt should be made to find and puncture the rudimentary rectum by the aid of an ordinary large trocar, such as is commonly used in paracentesis abdominis. The soft, fluctuating tumor will materially aid us in discovering the cloaca. An elastic catheter cut off at the top is then introduced through the trocar canula, and through it warm water is injected three or four times daily to liquefy the fæces. After several days the catheter should be replaced by one of larger size, and this practice is

persevered in till the defecation can take place regularly and without any difficulty. Generally the sphincters of the anus exercise their functions tolerably well, but a disposition to constriction often remains, which must be combated by the use of bougies.

In the form of atresia ani described in sec. 3, a crucial incision to the depth of one inch must first be made over the spot where the anus normally occurs; the blind extremity of the rectum may then be sought with the finger, and, when found, is treated with the trocar in the same manner as in the cases described in sec. 2. That these operations frequently prove fruitless, and even when the rectum is opened often terminate fatally, might be anticipated from the feebleness of the newborn child.

In cases where the rectum communicates with the bladder, the effort must likewise be made, as rapidly as possible, to secure a passage for the fæces by some other channel, because, if not done, a fatal result is inevitable. But, in the cases where the rectum terminates in the vagina, there is less urgency for an operation, as this condition may be tolerated for a very long time; indeed, instances are known where children have grown up with this malformation, without any surgical assistance. As soon as the child has acquired sufficient strength, an attempt should, however, be made, even in these cases, to establish a proper anus. The communication with the vagina will then either become occluded of itself, or it may be very easily remedied by a small operation.

If, in such cases as are described in secs. 2 and 3, it be not possible to find the rectum, then, according to the laws of surgery, an artificial anus should be made in the left lumbar, or in one of the inguinal regions. That children may recover from such an operation has often been shown, but whether they thrive and grow up I am not able to say. At least, I have never seen an adult in whom an artificial anus had been established in any of these places in the early days of life.

(15.) Infectious Diseases with Predominating Localization upon the Intestinal Canal. (A. *Typhus Abdominalis.*)—Abdominal typhus is much more frequent in children than is commonly supposed, but the diagnosis in many cases cannot be made with certainty, and, on this account, many physicians attribute to children great resistance against this disease. Their liability to infection, if such can be assumed, is an extremely small one, and is not at all to be compared with the other infectious diseases, measles, scarlatina, and pertussis. While it often happens that the children of several families in one house are simultaneously attacked by typhus fever, usually of a mild form, still it more frequently occurs that only one child out of a numerous family is seen to fall sick with it, all the rest remaining well, al-

though all have occupied the same room, and none of them have been protected by previous fever. Typhus fever is extremely rare in children before the completion of the first year of life; still individual cases are found recorded of nurslings who perished by this disease, but it is observed that no *typhous intestinal ulcerations*, simply *infiltration* of Peyer's patches and of the mesenteric glands, are spoken of in the reports of the *post-mortem* examinations afforded by these cases. In the second year of life, and after the completion of the dentition in the third year, abdominal typhus becomes extremely frequent, and is attended by tolerably characteristic symptoms, and from this age onward it may occur at any age and at any season of the year.

As the plan of this treatise presupposes a thorough knowledge of special pathology and therapeutics derived from other sources, hence only the deviations peculiar to the infantile age can properly come within its scope. Nor does a critical examination of the present prevailing opinions regarding contagious diseases, and the connection of the local with the general affection, belong to it. But this much must be said in this connection: (1.) That the conditions found in the alimentary canal do not stand in exact relation to the general disease; and (2.) That no qualitative nor quantitative alterations have ever yet been found in the blood of typhous patients. The changes in the blood of typhous patients, who have been ill for many weeks, are the effects of protracted disturbances in the textural metamorphosis, and of the circulation; and the so-called typhous blood, by which a dark, violet-colored liquid blood, with soft, loose coagulæ, is understood, is not invariably found in the typhus cadavers, but yet in the cadavers of most patients whose diseases were combined with disturbances of respiration and assimilation.

Post-mortem Appearances.—In general, a first and a second period can be distinguished in the typhus corpse.

If death takes place in the *first period*, the typhous morbid changes will only be found in the small intestines, in the mesenteric glands, in the spleen, and upon the bronchial mucous membrane.—The cadavers are not emaciated, have deep-blue *post-mortem* spots, and the muscles are dry and dark colored. The brain is firm and dry. The bronchial mucous membrane is reddened, swollen, and everywhere coated with a tenacious, yellowish-white mucus, so that in some places the bronchi of the third order are completely filled up with it. The infallible consequences of this overfilling of the bronchi with mucus, especially posteriorly and inferiorly, are disturbances of circulation in the pulmonary organs, hypostasis, and ultimately splenization. The heart is extremely feeble, contains very loose coagulæ, and its muscular structure at some places is blanched. These pale spots exhibit,

under the microscope, commencing fatty degeneration. The spleen is enlarged, and the enlargement affects particularly its long diameter. Its capsule is tensely distended, its structure very dark and soft, and often of a semi-fluid consistency.

The abdomen is distended, the bowels are tympanitic, and contain a large quantity of intensely-offensive fluid; almost the whole mucous membrane of the small intestines is in a state of acute catarrh, and Peyer's patches, as well as the solitary follicles, are peculiarly infiltrated. The hypertrophy of the glands just mentioned is produced by a deposit of a grayish-white medullary mass, which principally fills up and swells the capsule of the glands, but involves also the submucous and even the mucous tissue itself. The morbid changes and course of these infiltrations in children deviate somewhat from those observed in the adult. While the great majority of typhus cadavers of the adult display ulceration of the glandular patches, in children this is only an exceptional occurrence, for the infiltration, in most of these cases, seems to undergo a retrograde metamorphosis, or at least a simple bursting of the capsule and evacuation of its contents without any cicatrization. Although, in rare instances, true cicatrization or ulceration has been found, they are nevertheless but isolated instances in which one or more patches only have been implicated. The majority of Peyer's patches always stop at the stage of the brain-like infiltration, and this, in fact, also explains the reason why intestinal hæmorrhage and perforations are so extraordinarily rare in children. The younger the child, the less frequently are ulcerations met with. I have never yet found them in children under four years, although I have dissected many children, of from two to four years of age, which died from undoubted typhus fever.

The mesenteric glands become affected in exactly the same manner as Peyer's patches. They enlarge to three or four times their normal size, and, when cut into, are seen to be yellowish gray and brain-like. Their size appears to depend upon the amount of infiltrating material deposited into them; Peyer's patches are to be found opposite the ileocæcal valve; so also the mesenteric glands opposite this valve are most hypertrophied.

If the cadaver of a child which died in the *second stage* be dissected, the first thing that will attract the attention is the extreme emaciation. The skin is pale and flabby, the *post-mortem* spots are not so intensely violet, the muscular system is pale and œdematous, and infiltrated with serum. The integument often exhibits bed-sores, pustules, sudamina, and ecchymosis; sometimes the lower extremities are somewhat dropsical. The parotid gland may be swollen and permeated by purulent sinuses. Perichondritis and necrosis of some

of the laryngeal cartilages are sometimes observed in the larynx; the lungs reveal a still greater amount of splenization than in the first period, and the bronchi are filled with mucus. The spleen is swollen and corrugated, the mesenteric glands are enlarged, and abscesses are sometimes formed in them. Peyer's patches and the solitary follicles are slightly tinged with a grayish pigment; the capsules are mostly ruptured, giving the whole glandular surface a reticulated appearance; and when, in older children, solitary ulcerations have occurred, they will be seen undergoing cicatrization. If the children have succumbed to pyæmia, the well-known purulent effusions and embolic formations will be found in the serous sacs and parenchymatous organs. If they have perished from anæmia and scorbutus, marked serous effusions in the cavities of the body and in the subcutaneous tissues will be found. In scorbutis the morbid condition of the gums will have become superadded. The brain, in contrast to the first period, is extremely moist and soft, and is with difficulty removed entire from the cranial cavity. The rarity with which ulcerations of Peyer's patches occur makes it easy to confound this pathological condition with that found in enteritis folliculosa. But the hypertrophy of the spleen and the state of the lungs are sufficient to distinguish typhus fever from follicular enteritis.

Symptoms.—As may already be inferred from the description of the *post-mortem* appearances, the morbid alterations and destruction which typhus fever brings about in the infantile organism are not so decided as in the adult; and, correspondingly, the symptoms are usually also less intense and threatening, and the prognosis in general favorable. The symptoms are seldom so violent and characteristic that the diagnosis of typhus fever may be formed with certainty at first sight, as an experienced observer may usually do when he approaches the bedside of an adult patient seriously sick with it. The diagnosis is very liable to vacillate between typhus fever and acute hydrocephalus, and upon this difficulty in the differential diagnosis many of the recoveries from supposed acute hydrocephalus rest. In most of the cases, however, children have so mild a form of typhus fever, that it is confounded with gastrocismus or dentition troubles, and consequently less apprehensive parents do not seek any medical assistance at all. Physical diagnosis furnishes little, if any, aid in this mild typhus fever of children. The spleen does not become materially enlarged, the abdomen is not much distended by gas, and the bronchial catarrh attains to no alarming degree. The diarrhœa is moderate, the children are quiet, do not complain of pain, and sleep a great deal. The marked and protracted lassitude, the continued loss of appetite, and the tedious convalescence, during which the hair always falls out, and is at first replaced by a thinner, lanugo-like crop, are the most characteristic symptoms of a lingering febris typhoides, which in Munich is popularly called "mucous fever."

Yet it cannot be denied that individual children, especially after they have completed the first dentition, may display very severe and complete symptoms of typhus fever, and it is therefore necessary to subject them to a special analysis.

First of all, as regards the *chronology*, there is no acute disease in which it is so difficult to decide the period of invasion as in typhus fever; nevertheless, this is usually easier in children than in adults, since their tenderer organism is much more violently disturbed by an infection, and its commencing action. And, besides, they are neither compelled by necessity nor occupation to struggle against the disease as long as possible, notwithstanding its growing severity, and therefore their early symptoms are unmodified. The day on which the child loses its accustomed spirits, and lies down and falls asleep at unusual hours, when followed by the more characteristic symptoms, is to be regarded as the commencement of typhus fever. The child sometimes retains its appetite up to the same day, but usually it vomits the whole undigested meal at the end of a few hours, when the symptoms of typhus fever, as a rule, come on quicker and are severer than when no vomiting has taken place. I have never observed any distinct chills, and consequently can place no value upon them in deciding the day of invasion. When typhus fever develops itself during dentition, it will scarcely be possible to decide its commencing period, for here the almost physiological diarrhœas and congestions of the head pass over very insidiously into the typhous symptoms. Typhus fever in children may, as respects its duration, run a course as irregular as it does in the adult, and therefore no definite conclusion can be formed, as to its course and duration, from the violent appearance of the first symptoms. Some children recover quicker from an intense typhus fever than others do from a very mild, lingering febris typhoides. In general, however, it may be assumed that a child, which has recovered completely in less than three weeks without marked emaciation, *has had no typhus fever, nor even a febris typhoides*, because children affected by those diseases are retarded in their development and nutrition for more than three weeks.

The extent of febrile phenomena in children cannot be so readily expressed as in the adult, such as the pulse, temperature of the skin, and the amount of urine excreted. The restlessness of a typhous child interferes with the use of the thermometer to determine the temperature of its skin, because, as is well known, the instrument must be entirely surrounded by integument, and allowed to

lie quietly for from fifteen to twenty minutes. It is, therefore, better to observe the warmth of the forehead, trunk, and extremities, with the hand, previously warmed, no matter under what disease he may be laboring, and this kind of examination, practised a few hundred times, gives such an amount of skill, in distinguishing the different degrees of temperature, that thermometric measurements, always requiring a certain amount of time, and often totally impossible, will be entirely unnecessary for any practical purpose. As to the pulse, upon whose condition and frequency in adults so great value is justly placed, it gives less positive indications in children. It is always extremely rapid, up to 160 and 170 beats in the minute without being attended by corresponding danger, or rendering the prognosis particularly unfavorable. During convalescence it may be compressed with the utmost ease; in the mortal agonies it becomes uncountable and imperceptible. An intermittent pulse seldom occurs in children, and I do not remember to have ever met with a dicrotic pulse in children under ten years of age.

Of the subjective febrile symptoms, the prostration, the excitability, and the lethargy, are always the most important. Hardly ever do children suffer any decided chills; the head is always flushed, the eye heavy, and in patients greatly excited presents a peculiarly glistening appearance. The expression of the face is either that of apathy or of great excitability, or, in the most violent cases, of confusion.

Very soon the *assimilative functions* assume an extremely unfavorable condition. The loss of appetite, and the uncontrollable, profuse diarrhœas on the one hand, and the urine, rich in excretive material, on the other, explain sufficiently the rapid emaciation of typhous children. I have often endeavored to extend, in the case of children, my investigations of the urinary substances, which, for years, I have carried out on a very extensive scale in adults. But all my efforts foundered on the impossibility of obtaining the urine which children under ten years of age pass in the twenty-four hours. Isolated opportunities for the investigations of the urine always showed in typhous children 2.5 to 3.5 per cent. of solids. As, judging by the eye, they pass a tolerably large amount of urine, it may be fairly inferred that, in typhus fever, children, as well as adults, lose a large quantity of urinary solids. It is a remarkable fact that the emaciation progresses and only attains its climax when the appetite has already fully returned and the patients are steadily convalescing. If sequelæ, such as tuberculosis, scorbutis, phlebitis, in various cutaneous veins, or large abscesses, supervene, the child will often be reduced to a mere skeleton, but the prognosis need not on that account necessarily be assumed as absolutely desperate, for such children occasionally manifest a wonderful resisting power, and finally, after many months, recover. After every intense typhus fever, children lose their hair almost completely. It returns slowly, first very thin and lustreless; ultimately, however, it grows stronger, acquires its original color and fulness. In the usual milder forms, in which the prevailing typhous symptoms are only imperfectly developed, the falling out of the hair is less marked.

The most important alterations always take place in the *digestive* system. Anorexia is one of the most constant symptoms, usually complete, but sometimes attended by peculiar longings, such as for rye-bread, fruit, etc., articles which, in fact, may be allowed the child without any great danger, so long as the precaution is taken not to indulge it with too large quantities at a time. Generally it plays with the food placed before it, carrying a little to the mouth from time to time, but, in most instances, does not swallow even that, but spits it out again, and so the craving for food is appeased. The anorexia lasts as long as the febrile symptoms continue, during which time the greatest difficulty will be experienced in supporting the children in any manner, fluid food being almost exclusively available. After a while the appetite returns, and in a few days becomes a ravenous hunger, the indiscreet gratification of which often causes serious relapses.

In children the tongue seldom becomes as dry as in the adult, because they almost always sleep with the mouth shut, and thus the main cause of the dryness of the tongue is wanting. In most instances it is rather thickly coated, and the papillæ are seen to be dark red, but in grave cases the characteristic brown, dry, furred tongue of typhus fever is present.

The *lips* desquamate and bleed a good deal, especially in older children, who pick almost incessantly at them. The so-called sooty coating of the lips is the result, in this disease, of the blood drying upon their surface. The fetor of the mouth, which in adults is so fearfully disgusting, is less intensely marked in children.

The *parotid* gland occasionally swells up in typhous children, and is always to be regarded as a most dangerous symptom. It is not possible to say with any certainty whether all kinds of parotitis are of a metastatic nature, for the catarrh of the mouth may indeed be directly propagated to the Stenonian duct and even to the salivary gland itself. But the dangerous character of this complication and the fatal termination that ensues in most instances make it probable that, in the majority of cases the cause of the parotitis is an actual metastasis, and not a simple propagation of the catarrh. It invariably terminates in suppuration, and, if life continues sufficiently long, the gland undergoes purulent degeneration. In the cadaver a number of small

abscesses, of the size of pins' heads, are always found associated with larger ones.

The morbid phenomena are usually ushered in with *vomiting;* young children often vomit several times a day during the whole course of the disease, owing to which, when unattended by diarrhœa, it becomes extremely difficult to diagnosticate the disease under consideration from acute hydrocephalus. This obstinate vomiting is due to a profuse gastric catarrh, as is shown by the fact that the patients not only throw up the little fluid nourishment they consume, but also considerable quantities of mucus, through which they become rapidly atrophied and usually succumb to the disease. The vomiting which accompanies perforative peritonitis in the adult is rarely seen in children, for the simple reason that the inducing cause, perforation of the intestines, scarcely ever occurs.

The *abdominal pains* and tenderness which accompany this disease in the adult are hardly ever complained of, and difficult to be elicited, in children under two years of age; they occur only occasionally in older ones, and are not very severe. The importance of *gurgling in the cœcal region*, which was formerly described as a pathognomonic symptom of typhus fever, has deservedly fallen into disrepute, for it is just as frequently found in every intestinal catarrh.

The tympanitis attending those cases in which the ulceration is limited is not very great, and consequently its effects, such as impeded respiration, from the pressure of the diaphragm upward, pulmonary stenosis, and cyanosis, occur only in milder degrees.

The *intestinal evacuations* differ in no respect from those in the adult. Diarrhœa is not usually present during the first few days of the disease, but it always comes on later, though laxatives may not have been used, and constipating drinks may have been given; from twenty to thirty dejections taking place during the day. A collection of all the stools evacuated in the twenty-four hours, in children, is of course altogether out of the question, but it may approximatively be stated that, according to the weight and space, typhous children discharge three or four times as much as healthy ones. The quantity discharged in the twenty-four hours does not always stand in relation to the number of evacuations; some children discharge a larger quantity of typhous fæces in two or three stools, than others do in ten or twelve, the number depending entirely upon the irritability of the rectum.

If the stools are very thin, they will be of a light-brown color, and when allowed to stand quietly will separate themselves into two layers, an upper, clear, and fluid, and a lower, semisolid part. The latter consists of fine white and yellow flakes. True, strong drastic purgatives repeated several times in succession produce stools, which, as regards the color and formation of the layers, cannot be distinguished from those of typhus fever, but such drastic remedies are now scarcely ever employed even in the least rational methods of treatment. We therefore have, in the formation of the layers, an important aid in the diagnosis of typhus fever. The absence of very profuse diarrhœa does not by any means prove the absence of typhus, for it is common to see children, after they have passed the second dentition, who, during the entire illness, are obstinately constipated, and in whom an evacuation has to be produced by clysters. The microscopic investigation of the yellowish flakes composing this lower layer reveals first of all: (1.) A totally formless granular mass, but little susceptible to reagents; (2.) Intensely yellow-tinged scales, of pavement-epithelium (whole cylindrical epithelium cells are but very rarely seen); (3.) Brown, finely-granular corpuscles of various size and without membranes, as may be readily seen by cautiously compressing them; (4.) Large brown, often double-contoured round or oval, and sometimes distinctly rhomboid, refracting bodies; (5.) Triple phosphates; and (6.) Infusoria, the constant accompaniment of every putrefaction. These are objects which also exist in diarrhœic stools, and consequently are not pathognomonic of typhus fever. Nor is chemistry able to demonstrate a peculiar typhous material. Typhous stools generate more sulphohydrogen gas than diarrhœic, a fact which may be proven by paper moistened in a solution of sugar of lead, and that they contain a greater amount of ammonia can be shown by testing them with reduced litmus-paper, which they turn intensely blue.

Nothing can be gathered, to show any difference between typhous and diarrhœal stools, from the quantity of the salts, the various analyses of which I have had an opportunity of presenting more in detail in a former work.

These profuse diarrhœal evacuations generally last from eight to fourteen days; then constipation sets in. Comparatively speaking, it is rare for diarrhœa to last longer than that period in children, as the intestinal complication in them is less intense than in adults. So long as the children are feverish, they discharge the contents of the bowels in bed, but it is necessary to discriminate between simply frequent involuntary discharges, the consequence of inattention, or the blunted state of their sensorium, and the constantly oozing away from them of liquid fæces, owing to the paralysis of the sphincters. The former condition is a common one, and denotes a very severe typhus, but its prognosis may be favorable. The latter, on the contrary, is a symptom of the utmost exhaustion and profound depression of the nervous system, and is to be regarded as an unfavorable sign.