of the age of the child should be given; thus, to a child three years of age, two drops, to one four years, three drops, etc.; and this may be repeated twice or thrice daily. I have never yet seen any of the bad effects attributed to opium, such as collapse, profound sopor, depression of the pulse, cyanosis, etc., from this practice, but have always noticed that children obtained several hours' rest, refreshing alike to themselves and their attendants, without any untoward change in the course of the fever.

Against the great exhaustion, feeble pulse, cool, bluish skin, indicating supervening splenization of the posterior parts of the lungs, a tonic and stimulating treatment will have to be employed, in which I give to coffee the most prominent position; wine, which, in adults, justly plays such an important rôle, must be used very carefully in children, because alcoholic drinks affect some infantile brains very unfavorably, inducing furious delirium. Internally, it is best to give a few drops of valerian, camphor, or acetic ether. Nothing praiseworthy can be said of the tonic effects of quinine in these cases; dry cups, applied several times a day to the anterior and lateral parts of the thorax, are not only theoretically rational, but practically exercise a tolerably favorable influence upon the splenization.

Moderate epistaxis always brings about relief and rest. The nurses should be instructed to allow the blood to flow into an empty vessel, one that does not contain any water, because otherwise the amount of blood lost is usually estimated too high, and we might hasten to arrest the hæmorrhage, which usually ends quite soon enough. The tampon is indicated, as a rule, only when the amount of blood lost exceeds two or three ounces. It is generally sufficient to push a small piece of ice into the nasal cavity and then plug it with some charpie. It will scarcely ever be necessary to tampon the posterior nares by the aid of *Bellocque's* tube, an operation which annoys and frightens the child very much. To determine that the hæmorrhage has really been checked, the child, after the tampon has been applied, should be laid upon the face, or the head should be held forward a little, as, otherwise, the bleeding may continue, and the blood may flow backward and be swallowed.

Typhous diarrhœa cannot be completely arrested by any remedy; opium controls it a little; astringents and mucilaginous agents usually have no effect upon it. In general, however, the diarrhœal discharges in children are seldom as profuse and persistent as in adults.

Constipation is sometimes a disagreeable symptom in the course of typhus fever, occurring at certain times almost epidemically. It should never be relieved by purgatives, but only with clysters. If the latter have proved ineffectual, calomel is the only remedy which

may be given internally, for the aqueous extract of rhubarb or castor-oil is difficult to administer to children. In conclusion, I feel it a duty to admonish against the use of all debilitating measures, to spare the strength of the child as much as possible under all circumstances, and to carefully avoid the practice of active antiphlogistic measures.

B. *Cholera Asiatica.*—The history, epidemic character, manner of propagation, and etiology of epidemic cholera, have of late been so thoroughly investigated, that we may very properly omit them altogether here, especially since cholera Asiatica in children has manifested no peculiarities. But the symptoms which attend it in children differ materially from those manifested in the adult, and it is this difference only which we will here consider.

Since diarrhœa in general is extraordinarily frequent in small children, and is constantly reproduced by the irritation of improper food or dentition, it is therefore still more difficult to decide in them than in adults whether a diarrhœa originating during the prevalence of an epidemic of cholera is to be attributed to cholera-poison or to the above-mentioned ordinary causations. It is certain that, during an epidemic, all children, even nurslings, are more predisposed to diarrhœa, and that it is more difficult to arrest it, than during periods free from epidemic influence. Diarrhœa thus induced may either continue as such for a long time, and be arrested after many weeks, without any additional serious symptoms having become superadded, or it may pass into real cholera. In many cases, however, no diarrhœa at all precedes, and very healthy children are suddenly attacked by profuse purging and vomiting, and in a few hours display the most perfectly-developed cholera, with profuse bright-yellow discharges, cramps, disappearance of the pulse, algor, cyanosis, and suppression of urine. The discharges are seldomer of the rice-water character than in adults.

Two stages may also be distinguished in children: (1.) The stage of the attack, and, (2.) The stage of reaction. Few children, however, reach this stage, most of them perishing during the attack. The secondary processes and the exhausted condition belong to the phenomena of reaction. In general, however, three principal classes of phenomena may be distinguished in cholera: (1.) Those belonging to the intestines; (2.) Those of the circulation and respiration; and (3.) Those of the kidneys.

(1.) By far the most important are the derangements of the intestinal mucous membrane; they are invariably the first to appear, and probably are the causation of the alterations of the circulation, and very certainly of those of the kidneys.

It is a remarkable circumstance that the stools of children seldom become as white as those of the adult, but almost always retain a

yellowish tint; in other respects, they present neither chemical nor microscopical modifications worthy of note. They are rarely very copious, but five to six thin evacuations in an infant suffice to induce the most dangerous collapse. In previously marasmic children, collapse may supervene even after the first thin passage, followed by a few convulsions, and in a few hours by death. When the stools become pink red, a coloring due to a small admixture of blood, the prognosis may be set down as absolutely hopeless.

No child under one year of age is able to resist a profuse cholera purge longer than forty-eight or at the utmost sixty hours, death taking place in consequence of the enormous loss of the fluids of the body. But when the discharges are seen to grow less and more infrequent, then more yellowish, more solid, and assume an intense but not an actually fetid odor, a favorable prognosis may be given.

As respects the vomiting in the cholera of children, there is a marked difference from the adult. In the latter, it is observed in nine-tenths of the cases, in the majority of cholera children not at all, or at the most once or twice, and the profuse vomiting of every thing shortly after it has been introduced into the stomach scarcely ever occurs in such children, a fact that is the more remarkable, as children in health vomit oftener and easier than adults. The act of vomiting is accomplished by a very slight exertion only: the food last taken is first thrown up, and soon followed by the real transudation from the gastric mucous membrane, generally mixed with the drinks, which, on account of the tormenting thirst, are constantly swallowed in large quantities. In regard to the chemical properties of the matter vomited by cholera children, but little, so far as I am aware, is known, because it is always ejected on to the garments or bed, and cannot therefore be obtained in sufficient quantity for proper chemical examination.

The absorbing function of the gastric and intestinal mucous membrane is very much diminished during the attack, and for that reason large quantities of toxic substances, such as morphine, strychnine, belladonna, etc., may be administered without producing their normal effect; sometimes, however, when the transudation already happens to be undergoing spontaneous diminution, dangerous absorption suddenly takes place, and attention on this account is here called to that point. As this class of remedies is repeatedly selected for new therapeutic experiments, it is well for the experimenter to know that, deceived by the first dose, appearing to be inert, he may suddenly find it to have produced a poisoning, and to have destroyed the last hope of the recovering child.

Soon after the commencement of cholera, the abdomen quickly collapses, and becomes so soft and flabby that the intestinal coils may be recognized. Percussion shows that the stomach contains a tolerably large quantity of gas, while the whole intestinal tube is filled with transudation, and therefore a perfectly dull sound is produced. The patients seem to suffer less from true colic than from a feeling of incessant nausea, which they manifest by frequently opening the mouth, protruding the tongue in a peculiar manner, and an anxious expression of the countenance.

It is a remarkable fact, that the most profuse diarrhœas of cholera Asiatica do not redden the anus, while, on the contrary, in enteritis folliculosa, or the effects of thrush, it becomes red and eroded after a few evacuations.

The next effect of this transudation, and the complete abolition of the function of absorption, is, naturally, a marked diminution of the whole volume of the blood, and a disappearance of the fluids from the parenchymatous organs and serous sacs. Whether all subsequent symptoms are induced by this diminution of the blood and fluids, or whether the poison of cholera produces a specific action, in some other place besides the intestinal canal, are still undecided questions. The course is so extremely rapid in children, that a direct action of the cholera-poison upon the heart and pulse seems probable, as sometimes the pulse and the diastolic sound of the heart disappear almost with the first liquid passage.

(2.) During the first few hours of the cholera attack, the *circulation* is said to be increased in activity, accompanied by violent palpitation of the heart, and intense beating of the arteries; usually, however, the impulse of the heart, and of the radial pulse, become weaker hourly from the very commencement, and the latter soon disappears altogether, while the cardiac sound continues to grow weaker and duller, till the diastole alone is heard over the large vessels, even after it is imperceptible over the apex itself.

The pulse, in children under one year old, retains its normal frequency; generally it is about 100 in the minute; soon, however, it becomes thready, and then disappears altogether. The observations which *J. Meyer* made in the adult—to the effect that the pulse, in cases of spontaneous reaction, remains absent for a long time, but after it has once returned does not readily disappear again; and that, on the other hand, in cases where reaction was induced artificially by stimulants, the pulse acts reversedly—are equally true of cholera of children. Very frequently it is possible, by a high temperature, a mustard-bath, or a camphor-powder, to restore the pulse, it is, however, very seldom possible to preserve it; it soon disappears again, never to return. On the whole, it may be observed that pulseless children, when this state

has existed for several hours, are generally lost, while there are many instances recorded of adults who have been pulseless for from twelve to twenty-four hours, and even longer, and have nevertheless recovered. In cholera typhoid, various anomalies of the pulse, such as intermittent and extremely-rapid pulses, occur; a very slow pulse, even forty to fifty in the minute, the like of which is only met with in hydrocephalic children, is not a symptom inconsistent with a favorable prognosis.

The veins are turgid with semi-fluid, grumous blood, on account of the tardy venous circulation, resulting in part from enfeebled *vis a tergo*, and in part also from the suction-power of the right side of the heart having become enfeebled. This stasis of the capillaries is seen in the lips, fingers, and eyelids, as cyanosis. In cholera, well-nourished children only become cyanotic, while emaciated and marasmatic children acquire only a correspondingly yellowish-gray discoloration.

The *respiration* during such sudden and profound disturbances of the circulation very naturally becomes affected. By physical examination, nothing abnormal can be detected in the lungs, but, in the performance of the respiratory act, changes are soon observed. The child breathes irregularly, frequently sighs deeply, and suffers intense dyspnœa. But the most remarkable phenomenon of all, is the coolness of the breath, which may be distinctly perceived by holding the hand, especially its dorsal surface, over the mouth. Prognostically this coolness of the breath is of the greatest importance, and is palpably the most distinctive sign of the arrest of the metamorphosis of the tissues. With this, the coolness of the extremities always stands in direct relation. Palpation of the nose, forehead, hands and feet, as well as the temperature of the expired breath, with a warm hand, will be sufficient to enable the experienced physician to form an opinion as to the severity of the disease, and its probable termination.

(3.) The morbid changes of the kidneys are as constant in children as in adults. The autopsy discloses the signs of stasis and acute Bright's disease. It is, however, impossible in most cases to discover these facts by an examination of the urine during life, because the patients either do not pass any urine at all, or it dribbles away from them into the diaper, and cannot be obtained for examination. When children recover from a severe attack of cholera, as they occasionally do, albuminuria and casts will be found. How long the secretion of urine may be arrested, and yet recovery follow, it is difficult to say, for the diapers are incessantly wetted with the profuse stools, so that an admixture of urine cannot easily be recognized.

In consequence of the arrest of the secretion of urine, a violent revolution in the entire metamorphosis of the tissues very naturally

ensues, and the retention of the urates must be regarded as the main effect of this condition. The tonic and clonic spasms, at least of the face, by which all cholera children are attacked, are most probably attributable to it, while the great exhaustion, the rapid collapse, and the aphonia, are due more to the speedy loss of the serum than to any other cause.

When children recover from an attack of cholera, the first urine passed contains albumen, and is rendered opaque by the urates; a cholera typhoid then develops itself, in which the skin becomes hot and dry, the pulse hard and extremely frequent, the tongue inclined to dryness, and the symptoms of cerebral congestion come on. In many cases, however, death is caused by convulsions, while in others marasmus develops itself, from which but few children escape with their lives.

If we subject the symptoms of cholera in children to a *résumé*, we find the following variations from those of the adult:

(1.) The stools remain yellow for a long time. (2.) Collapse comes on very rapidly in feeble, atrophic children, and death ensues before many colliquative stools have passed. (3.) Vomiting is rare, and in many instances absent altogether. (4.) The comparative mortality is much greater; at least eighty per cent., of the children who become cool and pulseless, perish.

The pathological anatomy, which in cholera is generally very meagre, exhibits nothing peculiar in children. In those who succumbed early in the attack, the following conditions are found, viz.: a peculiar tenacity of the serous membranes, dryness of all the parenchymatous organs, cyanosis of the skin, black masses of grumous blood in the veins and heart, the small intestines filled with a whitish fluid, their mucous membranes a rosy tint and completely denuded of epithelium, the kidneys infiltrated, the urinary tubules revealing extensive desquamative catarrh, and the bladder empty.

If, on the contrary, they died from cholera typhoid, the cyanosis of the skin is less marked, the serous membranes are still glutinous, the brain is œdematous, lobular infarctions are frequently found in the lungs, the small intestines contain a thick, tenacious, greenish mucus, their mucous membranes are less infiltrated and injected, and the solitary glands of the large intestines are swollen or ulcerated. The bladder now contains a little opaque urine, in which generally albumen may be detected.

Treatment.—The therapeutics of cholera in children, as may be inferred from the relative mortality, is extremely unsatisfactory, though the most important part of the treatment, the artificial maintenance of

the temperature, is more easily effected than in adults. The general discussion of its prophylaxis may be properly omitted here, as this has lately been very minutely described in various text-books, for example, in *Griesinger's* Infecting Diseases. The treatment of cholera diarrhœa, and of cholera in children, differs but little from that practised in the adult. The attempts to check the purging in any manner, as soon as the stools have become watery, bright yellow, or, still worse, rice-water-like, prove totally fruitless. For simple diarrhœa of teething, which, during the prevalence of an epidemic of cholera, must always excite the greatest anxiety, laudanum will always prove the most reliable remedy; but, if true cholera come on, no benefit whatever, according to my experience, need be expected from it. The tincture of opium may be given in from four to five times the usual doses. Should the diarrhœa, however, continue unchanged, as it often does, or if it have existed for one or two days before the narcotic was administered, it may suddenly be arrested, and be followed by the most violent signs of narcotism. Astringents, and especially all those remedies to which any constipating effect has been ascribed, are useless.

It should be borne in mind that, in consequence of the profuse exosmotic current, which takes place toward the mucous membrane of the stomach and intestinal canal, no absorption whatever probably occurs. In the next epidemic, therefore, I intend to select some other places, which seem to be more disposed to absorption, for example, the bladder, urethra, and vagina, and try different remedies, especially of the class of narcotics. Injections into the veins are very difficult to perform, owing to the smallness of the vessels in children, and this practice will hardly ever be successful, on account of the danger of admitting air into them.

As regards the diet and regimen, it should be clearly stated that the proscribing of drinks, by which it is intended to check the profuse diarrhœa, is totally useless and cruel. Children certainly ought not to be allowed too much at one time, but they may drink as often as they feel thirsty. Large quantities of fluids, when swallowed rapidly, are liable usually to cause vomiting. Children prefer cold water to every thing else, and the nursling will draw actively at the mother's breast as long as its strength will allow; and, when it has become too feeble, will swallow the milk taken from the breast of the mother with avidity. An administration of other nutriment, except plain demulcents or lukewarm milk, is, of course, altogether out of the question; warm chamomile and peppermint teas are rejected by most.

The principal indication is, manifestly, an artificial continuous

warming of the chilled surface of the body, which is best accomplished by placing the child in a hot-water bath of 30° R. (100° F.), in which one or two ounces of ground mustard are suspended. The skin thus reddened should be dried quickly, the child then put to bed, and surrounded by bottles filled with hot water, and the diapers should not be changed oftener than once in two hours. By keeping up a high temperature, the pulse that has totally disappeared sometimes becomes again perceptible, the diarrhœa diminishes, the tip of the nose, the ears, and the breath, become warm, and a reaction sets in, which, even then, very frequently indeed, terminates in a fatal typhoid condition.

The most important indication in the typhoid condition is the frequent administration of drinks, in order to restore the occluded passages in the kidneys, and render them again permeable. The nervines, such as camphor, musk, coffee, etc., and the so-highly-lauded quinine, seem to me to have no favorable effect upon the course of this disease. During convalescence, the utmost caution will have to be exercised so long as any abnormal changes whatever can be detected in the stools. Children at the breast should retain their wet-nurses from six to eight weeks after the attack of cholera, and should be weaned very gradually; those brought up by hand should be fed upon mucilaginous soups for a long time, and slowly habituated to a milk-diet.

Consoling and important as the prompt and efficient services of the physician may be regarded, it is problematical whether all his therapeutic measures are of the slightest use to the child with cholera.

(16.) Entozoæ, Enthelminthes, Helminthiasis (Worm-Disease).—Before we enter upon the discussion of the effect of the single helminthia, it seems proper to give the subject a simple zootomic consideration, for which purpose we take, as a part of our ground-work, *Bamberger's* excellent monograph upon entozoæ, found in his treatise on the diseases of the abdomen. In the alimentary canal of children there are found: (1.) Tænia solium; (2.) Bothriocephalus latus; (3.) Ascaris lumbricoides; (4.) Oxyuris vermicularis; and, (5.) perhaps, also Tricocephalus dispar. Trichinæ, which of late have attracted so much attention, may occur in older children as well as in adults. Small children, so far as I am aware, enjoy a total exemption from the trichina spiralis. This is readily accounted for by the fact that they do not eat the meat of the hog, which is known to be a fruitful source of supply of this entozoon. Since trichinosis of children differs in no respect from that of the adult, a description of it may, therefore, be omitted, as the numerous monographs upon this subject