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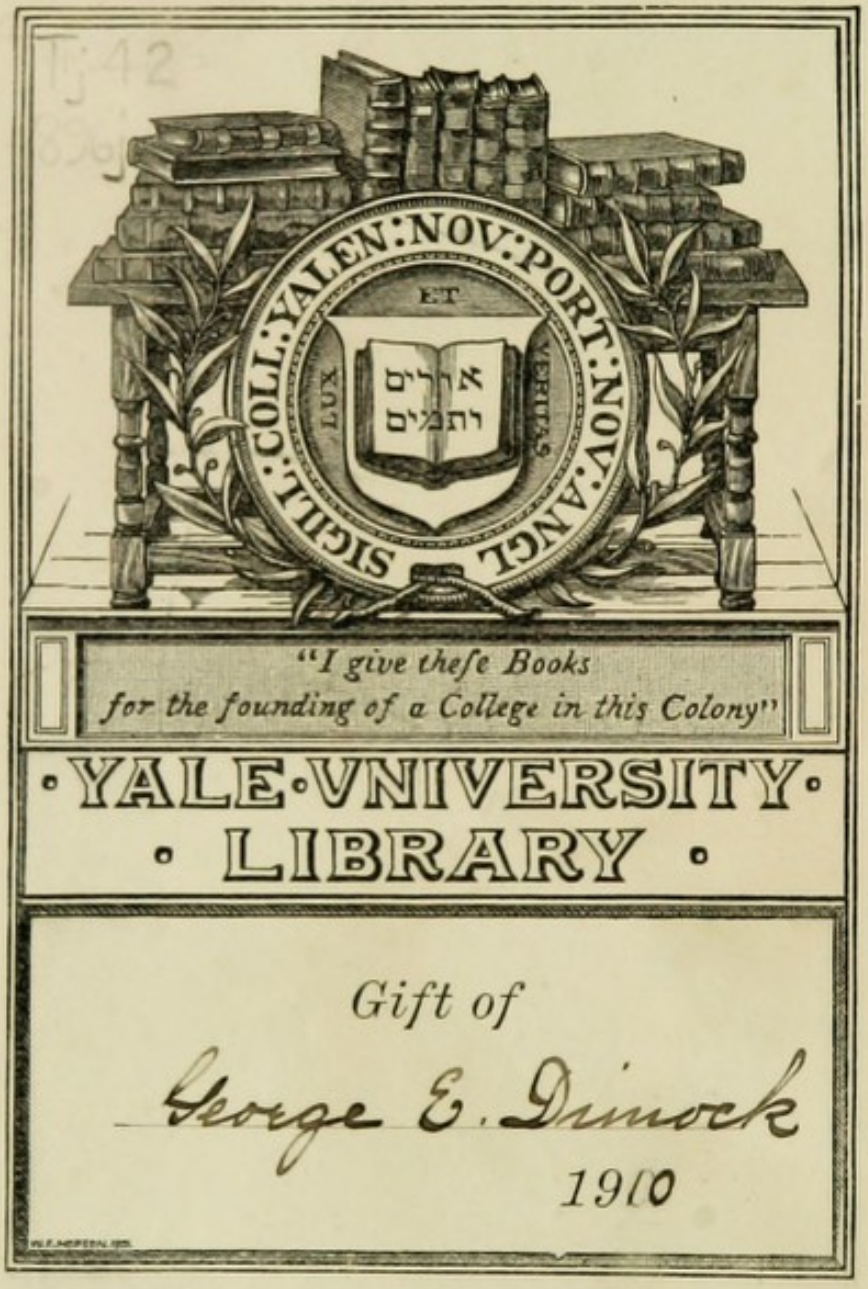
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THERAPEUTICS

OF

INFANCY AND CHILDHOOD.

BY

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Electrotyped and Printed by J. B. Lippincott Company, Philadelphia, U.S.A.

THIS BOOK IS INSCRIBED TO THE CHIEF OF
MY CLINIC,

DR. FRANCIS HUBER,

IN DUE APPRECIATION OF THE VALUABLE AND UNREMITTING
SERVICES RENDERED BY HIM THESE FIFTEEN
YEARS, AS A

TRUSTED ASSISTANT AND FRIEND
AND
EFFICIENT CO-OPERATOR,

BOTH TO ME AND TO THE COLLEGE OF PHYSICIANS AND
SURGEONS OF NEW YORK.

"Die Frucht der Heilung wächst am Baume der Erkenntniss. Ohne Diagnostik keine vernünftige Therapie. Erst untersuchen, dann urtheilen, dann helfen."—C. GERHARDT.

PREFACE.

MUCH of what is contained in this work may be claimed as common property. Much of it I have taught before. Indeed, very few books can ever be written that will be entirely new. Pediatrics is not new to-day; nor was it so when, in 1860, I established the first systematic course, in our country, of clinical instruction in the diseases of children. Having since that time appeared before the medical public with essays and monographs only, I was repeatedly reminded by friends of my obligation to submit to the profession which has afforded me so many facilities and advantages a compact picture of the therapeutics of infancy and childhood as I have it in my mind.

A large part of this work is devoted to diet and hygiene, a good deal also to the consideration of the action of medicines. For, indeed, I believe in medicines. Advancing years and experience during a period of increasing exactness in medical methods have rather strengthened my belief than otherwise. What the knife is to the surgeon, drugs are to the physician. The knife does not make the surgeon, nor do medicines make the physician; both, however, are indispensable. To employ them with benefit takes skill and experience, both individual and collective, as also judgment and honesty.

Indications for the administration of medicines are furnished by etiology and symptomatology. Both of these occupy a prominent place in this book. Without a diagnosis of the morbid process and of its evolution, and without the appreciation of its influence on the patient, no rational therapy

can be thought of. Consequently I have taken particular pains to offer clear, though brief, statements of differential diagnoses.

I have tried to write a book for those who are sufficiently prepared by previous studies to build their therapeutical measures on the foundation of an exact recognition of the conditions they have to deal with. It is intended for those to whom neither the principles of diagnosis nor the facts of materia medica are mysteries. Therefore I have abstained from ornamenting my pages with numerous recipes. While aiming at accuracy in dosing, I have trusted, as regards the actual writing of prescriptions, to the knowledge and intelligence of the reader. On account of our present period of transition to the metric system, I beg to be pardoned for alternating the old methods with the new.

In view of what I have included within the frame of this volume, it might almost claim the name of text-book. I prefer, however, to call it therapeutics only, intending to emphasize the fundamental truth that everything in medical science, in order to be both scientific and humanitarian, should be conducive to the prevention or to the cure of disease.

The preparation of this book has extended over a long period. The first essays embodied in it were published in the *Archives of Pediatrics* of 1888. As a consequence the reader may discover occasional incongruities, which, however, he will find to be more those of style than of matter.

A. JACOBI.

110 WEST THIRTY-FOURTH STREET, NEW YORK,
October, 1895.

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THERAPEUTICS

OF

INFANCY AND CHILDHOOD.

I.

FEEDING OF SICK CHILDREN.

DIETETICS must be considered a part of therapeutics. The two must always go hand in hand. Sydenham knew the fact that many diseases are removed by a correct mode of living, and nutrition; and the men who established therapeutical schools on certain positive principles or preconceived ideas, arranged their dietetical and their medicinal and surgical rules on the same basis. Thus, Broussais, among others, while he purged and bled, crowned his work with starvation to such an extent that Graves, in 1843, had to come forward with the declaration that the systematic starvation of the disease ended in the destruction of the patient. It was Chossat, finally, who proved that inanition had many of the symptoms of fever, and that a starvation diet was liable to increase its dangers.

Still, there are no universal rules for feeding, as there are none for medication. There are, however, certain indications which can always be fulfilled in the treatment of individual cases. As intellect and knowledge are required for finding those indications, so there is need of tact and experience to apply and fulfil them. Some of them are plain enough. It

is clear that in conditions of great debility there must be no further reduction of strength; an irritated cerebrum must not be excited; hemorrhages, peritonitis, dysentery, perityphlitis require absolute rest; a hyperæsthetic stomach must not be overfed; a gastro-enteritis resulting from the presence of ferments must do without milk; convalescence and acute inflammatory fevers must be protected. Still, there are chronic fevers with fair digestion, which permit of generous feeding. All these indications and rules are equally valid for both the adult and the young. Still, the latter have some peculiarities which alter the application of general rules to a considerable extent, for several reasons. Of these I shall mention but a few in this connection. Habits, which play an all-important part in the nosology of adults, such as alcohol, narcotics, sexual abuses, are not observed—unless very exceptionally—in the child. Cardiac debility, which is the constant danger of the senile period, and a frequent one in the adult, is not so frequent in the very young, partly because the heart is larger and more powerful, compared with the rest of the body, and partly because it has not had so much time and opportunity to become diseased. On the other hand, general metamorphosis is very rapid in the young, because of both the rapidity of the vital processes, and the constant necessity of adding to the tissue of the body, besides keeping up the equilibrium. Therefore inanition is not tolerated for a long time. Thus the child cannot long remain without being fed, and, therefore, its digestive organs require permanent attention. Their physiology must be carefully studied in both the healthy and morbid conditions. What the child eats is of but little consequence compared with what it digests. Nor are its subjective sensations the proper guides for the selection of foods or the times of feeding. It is not always true that where there is no appetite there is no digestion. Nor are the pangs of hunger or the temptations of cravings safe counsellors. Nor

does the condition of the tongue, to which we are apt to turn as one of our advisers in many of the ailments of the adult, deserve of the same confidence in the young, for the frequent local processes inside the oral cavity are very apt to mislead us.

From the very first month of life a distinct diastatic effect is produced by the oral secretion; it increases with every month. Even infusions of the parotids, prepared at different times after death, produce the same effect. Infusions, however, of the pancreas taken from the bodies of infants who have lived three weeks, produce no such changes. The diastatic power of the pancreas begins with the fourth week only, and remains feeble up to the end of the first year.

Zweifel experimented with infusions of different glands. That of the submaxillary glands of an infant did not transform starch into sugar, even after the lapse of a whole hour. The effect of an infusion of the parotid of a baby seven days old was distinct after four minutes; however, that of the parotid of a baby which had died at the age of eighteen days, of gastro-enteritis, did not show itself until the lapse of three-quarters of an hour. Nor was a diastatic result obtained by a similar infusion made of the parotids of a baby prematurely born, and one who died of diarrhœa and debility.

It is a remarkable fact that different varieties of starch are not changed by saliva into grape-sugar in the same length of time. In reference to the time required, however, there is no uniformity of opinion. Solera found that the transformation of the starch of the potato was the most rapid. Next came that of Indian corn, next wheat, and the transformation of the starch of rice was the slowest. According to Malay, raw starch changes slowly, boiled starch quickly. According to him, that of the potato required from two to four hours; that of wheat from one-half to one hour; of barley from ten to fifteen minutes; of oats from five to seven minutes; of rye from three to six minutes; of potato paste five minutes.

It is important to know that the effect produced by saliva persists in the stomach for a period of from one-half to two hours. But it ceases altogether, and starch will no longer be changed into grape-sugar, inside the stomach as soon as the secretion of hydrochloric acid has begun in the digestive process. This is a very important fact, because it shows that the farinaceous food of the infant or child, though it be not masticated, and pass the mouth very rapidly, is still under the influence of the saliva in the stomach, for some time.

Hydrochloric acid is not secreted at once. The first acids in the stomach while digestion is going on are organic, mostly lactic. This is found to be contained in that organ when gastric juice is removed from it in the first period of digestion. Thus in a gastrostomized boy Uffelmann found under normal circumstances, and in the absence of fever, during the first half-hour, lactic acid only; afterwards hydrochloric acid.* The latter is not met with during fever and a considerable degree of gastric catarrh (and also in dilatation of the stomach

* This agrees with what Ewald and Boas published lately as the result of their experiments also. But they claim to have found hydrochloric acid only, when a decoction of starch alone was introduced into the stomach. Still later Th. Rosenheim (*Centralbl. f. d. Med. Wiss.*, November 12, 1887) reports as follows, after the ingestion of fifty grammes of bunn and one hundred and fifty of water: Free hydrochloric acid makes its appearance in the healthy stomach very early, 0.3 p. m. after fifteen minutes, 1.0 p. m. after thirty minutes. This quantity or more is found until the elimination of chyme has been completed. From beginning to end there is lactic acid to a uniform amount, viz., 0.3 p. m. In carcinoma there was but 0.1 p. m. of hydrochloric acid, in hyperacidity 1.0 p. m. In every case and in every period of digestion there was lactic acid. There was less hydrochloric acid (but 0.2 p. m. after an hour) and a fair amount of lactic acid when carbo-hydrates only were taken, no matter whether saliva was admitted to, or excluded from, the stomach.

These data are here added for the purpose of showing that the difficulties of arriving at absolute facts are exceedingly great. Still, the results of the three observers do not differ too much from the accepted doctrine.

resulting from constriction of the pylorus). In these conditions farinacea (amylacea) are taken to advantage, principally because the diastatic effect of saliva is not disturbed.

Some of the main points to be remembered from the foregoing are these:

There is diminution or absence of saliva from the parotid in the very young suffering from diarrhœa and debility. Thus the very young ought to have but little starchy food, or sometimes none at all in these conditions, particularly as the pancreas cannot be relied on for diastatic action in the first weeks.

Whatever saliva, however, has been secreted and is swallowed, continues its action in the stomach as long as there is no hydrochloric acid in it. This in the healthy is secreted only after half an hour or later. In the feverish and catarrhal stomach very much later or not at all. Thus what saliva is present, displays its diastatic action continually. Thus the food craved for and digested is farinaceous. Animal food which requires hydrochloric acid is not wanted, nor is it readily digested.

To discuss here all the functions of the stomach is not necessary. In anæmia, convalescence, particularly in fevers, they are impaired. Both pepsin and hydrochloric acid are wanting. To increase their secretion large quantities of WATER are required.

Infants' food ought to be mixed with large quantities of water, for reasons given on other occasions, under ordinary circumstances. In diseased conditions of the stomach the free dilution of children's nourishment with water is demanded upon the following additional facts. Only to a certain limit will pepsin be furnished for digestive purposes. Probably a portion of this is not entirely utilized, because a great quantity of water is necessary to assist in pepsin digestion. In artificial digestion albumin often remains unchanged until large quantities of acidulated water are supplied. Without

doubt many disturbances of digestion are to be explained by a deficiency of water, certainly many more than are due to an excess of it, for the latter is speedily relieved by rapid absorption.

For the reasons given, I advocate under all conditions a plentiful addition of water to children's food. In this connection I would lay stress upon the fact that, as a rule, small children receive water only as they get it in their milk or milk food. Alike in summer and in winter, it is probable that the fact seldom occurs to a mother or nurse that a child may be thirsty without being hungry at the same time. Certainly many a discomfort and even sickness in a child is conditioned upon the fact that it has been compelled to eat in order to get its thirst satisfied, and often has to suffer thirst because the over-stimulated and injured stomach will take no more nourishment at irregular and too short intervals. There are even normal products of digestion capable of disturbances in the digestive process, chief among which is peptone itself, which is not absorbed unless it be greatly diluted. I have, therefore, considered it necessary in preparing the rules for the feeding of children, which the New York Health Department has annually published and distributed since 1872, to insist upon giving infants who cannot ask in so many words for it, an occasional drink of water, at least during the hot weather. When there is the least ground for the supposition that the drinking-water is contaminated with germs of disease, or where it is unusually hard, it should be boiled before its admixture with children's food, whether the diet be milk or a mixed one. In general it will give greater satisfaction to use the boiled water systematically, even though there be no apparent urgency for it in the cases of very young infants.

There are many other indications for the administration of water in the diseases of the young. In many morbid conditions it is wanting. Perspiration, diarrhœa, general inanition,

feverish diseases, diminish its quantity in the tissues and blood-vessels. Thus an inspissation of the blood takes place, thromboses form in the small veins of distant parts or the viscera, in the brain they lead to convulsions and defective innervation (hydroencephaloid), in the limbs to œdema or gangrene. The remedy is water in sufficient quantities. Where the stomach rebels, the hungry lymph-ducts of the rectum will greedily absorb an ounce or much more, injected every hour or two. In many a case life is saved in this manner.

Where general metamorphosis is slow, water in abundance increases the elimination of urea and carbonic acid. Where the urine is scanty and of an undue specific gravity, water protects the kidneys from undue irritation. It acts on the mucous membranes as it does on the external integuments. In laryngitis and bronchitis it liquefies viscid expectoration, in many forms of constipation it acts beneficially by increasing the secretion of the muciparous glands of the intestines. Ice and ice-water, or iced carbonated water, in small quantities, but frequent doses, relieve hyperæsthesia of the stomach and stop vomiting. Warm water acts as an emetic, hot water injected into the rectum combats collapse. In this very connection, however, I may allude to what good may be done by abstinence from water. In some forms of acute gastro-enteritis, where vomiting and diarrhœa are excessive, the only salvation is in total abstinence for from four to eight or ten hours. Not infrequently the turning-point in the course of the threatened danger dates from the commencement of what appears to be cruel starvation.

A regular addition to the milk food of infants and children is that of SUGAR. Its percentage in the milk of the woman, ass, and mare is larger than that of the cow. Immediately after the milking of the cow the milk-sugar begins to be changed into lactic acid. This process, together with the gradual conversion of fat into acid, is the cause of curdling.

The large amount of sugar in woman's milk, together with its smaller percentage of casein and butter, gives it the peculiar bluish color and furnishes the colostrum, which contains plenty of salts besides, its tendency to loosen the bowels. This property becomes manifest, sometimes, under abnormal circumstances. Thus in the milk of anæmic women sugar is occasionally found to an unusual degree. In their cases the other solid matters may also be diminished, still, this is not uniformly so. The infants, however, suffer often from obstinate diarrhœa.

The conversion of milk-sugar into lactic acid takes place very rapidly. When it takes place in cow's milk this turns sour at once. Not infrequently is it sour from the first; it has been found to be so in the udder; in most cases it is "amphoteric," neutral. Thus the question arises what kind of sugar is to be used as the addition to the food of children both well and sick.

Cane-sugar is not so easily transformed. Indeed, it is utilized for the purpose of counteracting the rapid conversion of milk-sugar, and for the preservation of articles of food in general. Trade is not so slow in availing itself of the results of organic chemistry as the profession. Condensed milk remains intact a long time on account of the plentiful addition of cane-sugar, in spite of the original presence of milk-sugar in it. Therefore it is not at all an indifferent matter whether milk-sugar or cane-sugar be added to the food of infants and children. I have always insisted upon the selection of the latter for that purpose.

In the sick the absorption of sugar is slower than in the healthy. Besides, during most diseases, particularly those of the alimentary canal, there is more ferment in the mouth and stomach. Thus but little sugar ought to be given, and never in a concentrated form. Grape-sugar and dextrin are absorbed equally. Cane-sugar, according to Pavy, is partly inverted and partly absorbed. All appear to be changed,

when given in moderate quantities, into carbonic acid and water, even during moderate fevers.

In that form of constipation of small infants which depends on a relative absence of sugar and superabundance of casein in the breast-milk, the addition of sugar acts very favorably. A piece of loaf-sugar (a teaspoonful or less) dissolved in tepid water (or oatmeal water) must be given before each nursing, and will often prove the only remedy required to regulate the bowels.

The physiological effect of CHLORIDE OF SODIUM is very important, no matter whether it is directly introduced through the mother's milk, or added as a condiment to cow's milk, or vegetable diet. Both of the latter contain more potassium than sodium, and neither ought ever to be given, to the well or sick, without the addition of table-salt. A portion of that which is introduced may be absorbed in solution; another part is, however, broken up into another sodium salt, and hydrochloric acid. Thus it serves directly as an excitant to the secretion of the glands, and facilitates digestion. Therefore during diseases in which the secretion of gastric juice is interfered with, or in the beginning of convalescence, when both the secreting faculties and the muscular power of the stomach are wanting, and the necessity of resorting to nitrogenous food is apparent, an ample supply of salt ought to be furnished. The excess of acid which may get into the intestinal canal unites with the sodium of the bile in the duodenum, and assists in producing a second combination of chloride of sodium, which again is dissolved in the intestines and absorbed. Its action in the circulation is well understood: it enhances the vital processes, mainly by accelerating tissue-changes through the elimination of more urea and carbonic acid.

A very important fact is also this: that the addition of chloride of sodium prevents the solid coagulation of milk by either rennet or gastric juice. Thus cow's milk ought never

to be given without table-salt, and the latter ought to be added to woman's milk when it behaves like cow's milk in regard to solid curdling and consequent indigestibility.

Habitual constipation of children is also influenced beneficially, for two reasons: not only is the food made more digestible, but the secretions of the alimentary canal, both serous and glandular, are made more effective by its presence.

A certain amount of *fat* is digested even in fevers of moderate severity, thus also in typhoid fever. But it is a good rule to rather reduce its quantity, because when infants were fed on cow's milk during capillary bronchitis, the fat in the fæces amounted to forty per cent. of the solid constituents. A few additional remarks will render the subject clearer, and show that it is very easy to give too much fat.

There is a large amount of fæces, although the baby receives absolutely nothing but mother's milk. What has been called detritus in the fæces is not exclusively undigested casein, but principally fat and large masses of intestinal epithelium. This so-called detritus is not soluble in water, acids, or alkalies, but quite soluble in alcohol and ether.

Casein is present only when it has been taken in too large a quantity, or when there is too much free acid in the stomach. In those cases there are large quantities in the fæces.

An important practical application of this fact is the following: As it is true that fat is not completely absorbed, even under the most normal circumstances; as free fat acids are so easily formed and accumulated; as they are found in moderate quantities, even in healthy babies; as a surplus is very apt to derange digestion and assimilation, and to prevent the normal secretion of either of the digestive fluids; as there is a superabundance of fat in the normal food of the nursling, the conclusion is justified that we should be very careful in preparing foods for the healthy or sick. It is very easy to give too much fat. It is hardly probable that there is too little.

Under the head of "Fat Diarrhœa" German journals and a few text-books speak of a diarrhœa, the chief characteristic of which is the presence of a large quantity of fat in the stools.

The normal fæces of the newly-born contain ten or twelve per cent., sometimes more, of fat. In abnormal cases, even when the food does not contain it, the fæces may contain from forty to seventy per cent. of fat.

The microscope reveals in serious cases fat, almost to the exclusion of everything else, sometimes pure, and other times in more or less regular needles. The anatomical condition in fat diarrhœa may vary, but in the majority of cases we have to deal with a simple catarrh of the intestinal tract. There are changes in, and exfoliation of, the epithelium of the small intestine, swelling of the mucous membrane of the duodenum, with obstruction to the flow of the secretions of both liver and pancreas, and such hyperplasia of the mesenteric lymph bodies as to impede the absorption and circulation of chyle. Finally, in a very few instances, anatomical changes were found in the pancreas resembling those which in the adult interfere with the emulsion of fat.

No improvement is possible unless the quantity of fat contained in the food be largely diminished. The administration of cream and the routine treatment with cod-liver oil are equally injurious in these cases.

In feeding the sick no new principles must be sought for. The sick child is still the child, and the physiological laws hold their own under changed circumstances. No new articles of food can be discovered or invented, only the preparation or mixture of those in ordinary use may change temporarily, or a restriction in their number or amount take place. Thus, I cannot undertake to give in full the methods of feeding infants and children. In several previous publications have I done so, and must refer to them. I will only repeat a few

rules, leaving the reasons for them to the thoughtfulness or the recollection of the reader.

The principal SUBSTITUTES for breast-milk are those of the cow and the goat. The mixed milk of a dairy is preferable to that of one cow. Cow's milk must be boiled before being used. Condensed milk is not a uniform article, and its use precarious for that and other reasons. Goat's milk contains too much casein and fat, besides being otherwise incongruous. Skimmed milk obtained in the usual way, by allowing the cream to rise in the course of time, is objectionable, because such milk is always acidulated. The caseins of cow's and woman's milk differ both chemically and physiologically. The former is less digestible. There ought to be no more than one per cent. of casein in every infant food. Dilution with water alone may appear to be harmless in many instances, for some children thrive on it. More, however, appear only to do so; for increasing weight and obesity are not synonymous with health and strength. A better way to dilute cow's milk, and at the same time to render its casein less liable to coagulate in large lumps, is the addition of decoctions of cereals. It has been stated before, that a small amount of starch is digested at the very earliest age. But cereals containing a small percentage of it are to be preferred. Barley and oatmeal have an almost equal chemical composition; but the latter has a greater tendency to loosen the bowels. Thus, where there is a tendency to diarrhœa, barley ought to be preferred; in cases of constipation, oatmeal. The whole barley-corn, ground for the purpose, should be used for small children, because of the protein being mostly contained inside and near the very husk. The newly-born ought to have its boiled milk (sugared and salted) mixed with four or five times its quantity of barley-water, the baby of six months equal parts. Gum arabic and gelatin can also be utilized to advantage in a similar manner. They are not only diluents, but also nu-

trients under the influence of hydrochloric acid. Thus in acute and debilitating diseases which furnish no, or little, hydrochloric acid in the gastric secretion, a small quantity of the latter must be provided for.

Such practitioners and authors who convinced themselves of the ill success often attending the use of milk, or watered milk, commenced at an early period to mix it with MEAT-soups, meat-tea, or egg. Bretonneau reported, as early as 1818, that "tabes mesenterica" disappeared, in the hospital of Tours, from among the children fed on beef-soup and milk. This mixture Vauquelin declared to come nearest to mother's milk of all preparations. The administration of some beef-soup, well made, a cupful every day (mutton-broth when there is a tendency to diarrhœa), is advisable towards the end of the first year. Long before this period, indeed at any time during infancy, it is indicated in cases of early rhachitis, rhachitical constipation, undue adiposity, and retarded teething.

Beef-tea, well made, in a bottle swimming in the water-bath, is still believed by some to be the model food. That it is not so rich in soluble albuminoids as was believed, ought to be generally understood by this time. What, however, it does contain in large quantities, is salts. Thus it is a dangerous article in summer diarrhœa, and must never be administered by itself. When given at all, it ought to be in combination with farinacea, raw albumin (which in this mixture requires very little salt, if any).

Beef-broth is about as nutritious as whey, and no more. But on account of the extractive substances of beef, kreatin and kreatinin, it is more stimulating. The temperature of the body is not raised by it. In gastric irritation, gastritis, and acute dysentery it ought not to be given. Veal-broth is liable to increase diarrhœa, mutton-broth constipation, and is therefore preferable in cases of diarrhœa. A broth of beef, which contains from 1.5 to 2 per cent. of albumin, is made by

mixing one part of beef and six of water with a little chloride of sodium and allowing it to stand from ten to twelve hours. Then it is slowly boiled and the whole mass pressed out. Still better is a modification of Liebig's beef-tea, which is obtained by adding one half-pint of water, with six or seven drops of dilute muriatic acid, to a quarter- or one-half of a pound of finely-cut lean beef, stirring it occasionally during two hours, and boiling a few minutes. Beef-juice obtained by pressing out beef after slightly broiling it, contains from six to seven per cent. of albumin. It is slightly acid, and spoils quickly.

The peptonized beef preparations are available both internally and for rectal alimentation. Of the good specimens in the market I have been in the habit of using mostly Leube-Rosenthal's beef solution and Rudisch's (Parke Davis) sarkopeptone. Either may be mixed with hot water or hot broth; a few teaspoonfuls and upwards are valuable additions to the daily food. The former is taken by many undiluted in small quantities; those who object to it because of its strong aromatic taste and odor, will still relish it when quite cold. Valentine's preparation is weak, but very palatable.

Scraped beef, raw, has been highly recommended in the chronic stage of, and convalescence from, exhausting gastro-enteric catarrh these forty years. It is very digestible, and but for the danger of giving rise to tænia mediocanellata, a valuable addition to our means of restoring health. White meats contain less fat, hæmoglobin, and extractive material than beef. Sweetbread (thymus), 22 per cent. of albumin, 6 gelatin, but 0.4 fat, 1.6 salts, and 70 water.

Egg has been utilized as an admixture to milk, or as its substitute, in a great many ways. Both the yelk and the albumin have been so employed. The white of an egg, with a little salt and six ounces of water, well beaten and shaken, is a good mixture, which can take the place of infant food

only temporarily, but is an invaluable make-shift in severe intestinal catarrh, or a permanent nutriment in the same, when added to other food.

Falkland skims milk, and transforms it by means of pepsin. The process does not recommend itself to general use by its circumstantiality. Roberts heats milk to nearly a boiling-point, and treats it with liquor pancreatis and bicarbonate of sodium. Fairchild's method of peptonizing milk is generally understood all over the country and is widely appreciated. In this connection I may be permitted again to refer to Dr. J. Rudisch's method of improving cow's milk for the use of children and adults, sick and well, particularly those who suffer from gastric catarrh and do not digest milk in its usual composition. It consists in mixing twenty-five minims (half a teaspoonful) of dilute hydrochloric acid with a pint of water and a quart of milk. When this mixture is boiled but a few moments it keeps well, and is quite palatable and highly digestible.

Alcohol has conquered its place among the medicinal foods in the diseases of infancy and childhood. Very little, if any, is required in catarrhal, or the first stages of inflammatory, diseases. It is contraindicated in meningitis, acute cardiac ailments, gastro-enteritis, peritonitis, and acute dysentery. It finds its application in depressed strength and vitality; thus, in the rules for the management of infants during the hottest days of summer, which the Health Department of the city of New York has published annually these fifteen years, I recommended the administration of a teaspoonful of whiskey daily. It is also required in chronic diseases and slow convalescence.

Its action is stimulant, nutritive, antipyretic, and antiseptic. It is decomposed into carbonic acid and water, and thus saves the waste of material parts of the body. When given in sufficient quantities, it reduces the temperature; the amount required for that purpose is, according to Binz, forty grammes,

corresponding with about three ounces of brandy or whiskey. Its most beneficial action is exhibited in sepsis of all forms, mainly also in the septic variety of diphtheria. It is almost impossible to give too much. The doses must be watched so as to be sufficiently large. Whoever is not afraid of giving six ounces of whiskey daily to a child when one or two fail, or ten or twelve when six fail, will soon convince himself of its power for good. It must never be given in concentration; the gastric mucous membrane tolerates no pure brandy or whiskey for any length of time; they must be diluted with either water or milk properly prepared. Wines, brandies, and whiskeys are not equivalent. The latter is obtained pure with greater facility, and at less expense, and besides has, for many, a less disagreeable taste than either of the others, which are often adulterated. The ether contained in wines militates against any antifebrile effect which may be expected from it; the fusel oil with which brandies are too frequently adulterated, acts rather as a paralyzing than a stimulating agent.

Dyspepsia is one of the functional disorders of the stomach, and depends sometimes upon slight changes in the gastric mucous membrane. It consists in partial or complete loss of appetite, with more or less impaired digestion. In regard to this, however, in every individual case, it is good not to rely too implicitly upon the reports of mothers or nurses. Older children will complain of præcordial heaviness. They will suffer, as do infants also, from eructations, which, when they result from swallowing air, are absolutely odorless, but when they consist of actual gastric gases, have a very faint odor. A sensation of oppression and frontal pain is complained of by older children; the younger ones are apt to vomit.

The causes of dyspepsia must be sought for either in anatomical changes in the organ, which can rarely be proven; or (more frequently) in quantitative or qualitative changes in the secretion; or in a changed nervous influence, as, for instance,

in fever; or in an abnormal condition of the food, which is the most frequent cause.

The treatment of this disorder consists chiefly in abstinence or in the use of the greatest care in the preparation of meals. Milk requires boiling, peptonizing, or treating with muriatic acid according to the method I have detailed before. In every case the admixture of farinaceous decoctions and a little salt improves the digestibility of milk though prepared as described. In many the latter alone, with or without a meat soup, will be the only food which is tolerated. The gastric secretion of infants who have been fed artificially, is liable to be hyperacid. Alkalies should be given at once. The addition of a few grains of bicarbonate of sodium (baking-powder) to the food may suffice. A few grains of an alkali (magnesia, sodium, calcium, according to the indications explained elsewhere) given a few minutes before every meal, act more surely.

VOMITING has been mentioned among the symptoms which accompany dyspepsia. In the infant, however, it is almost a normal occurrence. The infantile stomach is vertical and cylindrical, and the fundus but little developed. Thus, whenever there is a tendency to empty the stomach the antiperistaltic motions do not press against the fundus, but directly upwards. There is, therefore, less genuine vomiting than a mere overflow of the contents, which takes place so easily that the babies are not disturbed by it.

The treatment of such cases, if treatment be required at all, would consist in the application of some dietetic rules. The infant should have less food, and at longer intervals; should not be carried about immediately after meals; ought not to be shaken or jolted; nor carried face downwards.

This overflow takes place, as a rule, immediately after the baby has been nursed; at that time the milk is still fluid. If vomiting occur a little later, the milk will be coagulated; if, then, the milk be not coagulated, the stomach is not in a normal

condition. In these cases, and particularly when the baby lives on artificial food, there is uneasiness and pain associated with the vomiting. An acid mucus is expelled, together with the contents of the stomach; these are the cases in which antifermentatives, such as nitrate of silver, bismuth, resorcin, are indicated. Sometimes antacids alone will suffice, as detailed before.

Gastritis. Acute Gastric Catarrh.—The feeble, the anæmic, the convalescent, and the feverish are predisposed to this affection. But it may occur in the previously healthy as well. In all such children the production of normal gastric acid is diminished, and digestion impaired thereby. Besides, in all of them, the muscular power of the stomach is reduced.

Cold or hot ingesta, too large quantities of food, acids, spices, irritant medicines, alcoholic drinks, fat meat, cake, decomposed food with its ferment, each may be the cause of acute gastric catarrh, and must be carefully avoided; dentition, as such, is not a cause. Exposure to changes of temperature is apt to produce gastritis, but the usual cause is improper food. A single small meal, consisting of, in that case, indigestible food, increases pain, vomiting, and fever. Abstinence and cold water to the head act well when there is a tendency to convulsions. Cold applications to the heart will also reduce the temperature of the whole body. A warm bath will frequently do good. *I do not, however, advise bathing or handling the child much while the convulsion is lasting.* When thirst is very great, small quantities of ice-water should be given often, or seltzer-water, or Vichy, or Apollinaris; also water to which dilute muriatic acid has been added in the proportion of one to three or ten thousand.

Solid food must not be given. When there is a great deal of mucus, milk must be given very much diluted, or prepared after Rudisch's method.

When the tendency to vomit is great, food and drink must be given in teaspoonful doses, and, where the sensitive-

ness of the stomach is very marked, mucilaginous and farinaceous foods only will answer, together with small doses of bismuth repeated every one or two hours.

Where acid is predominant, calcined magnesium will answer best, if given in small doses frequently repeated; also bicarbonate of sodium, and very small doses of opium, one-sixtieth to one hundred and fiftieth of a grain, every hour or two hours.

CHRONIC GASTRIC CATARRH is either the result of an acute catarrh, or of the continuation of injurious influences. Large and frequent meals, too cold or too hot food, and fast eating are frequent causes. The stomach may be either in a hyperæmic or in an anæmic condition; it may be hyperæsthetic or atonic. Its secretion may be faulty or deficient. All of these changes may take place in the stomach without any complication on the part of neighboring organs, or these may be the only, or partial, causes of the gastric disorder; thus pre-eminently cardiac or pulmonary ailments, which result in impaired circulation of the distant organs. Thus many a chronic catarrh of the stomach, both in the young and adult, requires among its first indications a proper attention to the original cause. At all events, the number of meals and amount of food must be adapted to the digestive powers. Medication can do good service in most cases, either such as is directed to the mucous membrane itself (alkalies, bismuth), or to its faulty secretion (pepsin with muriatic acid, resorcin), or to the debilitated condition of its muscular power (strychnia). At all events, the children must be taught to eat slowly. Their food must be tepid, and not too much diluted, inasmuch as absorption in many cases is slow. Sugar, fat, and starch must be allowed in small quantities only.

ULCERATIONS of the stomach (and duodenum) demand that the organs should be kept as alkaline as possible. Abnormal acids (acetic, butyric, caprylic, or lactic in excess) must be neutralized before food is given. An occasional antacid is

not sufficient to obtain that end; it must be given regularly, every two or three hours, also a few minutes before a meal. Sodium and magnesium salts, which contain carbonic acid, must not be given regularly. That gas produces peristalsis. Calcined magnesia answers best in doses of one or two grains, administered every hour, or every two or three hours, in water which must not be too cold. Hot water is even better. More than that quantity is seldom tolerated because of its purgative effect (which, however, is very welcome in patients with a tendency to constipation). When a larger quantity of antacids is required, carbonate or phosphate of calcium may be added to the magnesium, with or without the subnitrate or subcarbonate of bismuth.* That medicinal treatment must be continued through weeks or months. Without it I see no gastric or duodenal ulceration getting well, in spite of the most careful dietetic regulations.

The very function of the diseased organ is a great danger. Both stomach and duodenum must be kept as idle as possible, and their labors made easy. No indigestible food must be given, no solid food permitted. Most cases in older children bear boiled milk (in some mixed with a little bicarbonate of sodium), strained oatmeal or barley gruel, rice or arrow-root water, and stale wheat-bread; a few, also, raw beef, scraped. Some tolerate nothing but boiled milk, or buttermilk. There are those who prefer kumyss, matzoon, peptonized milk, or that prepared with muriatic acid. Whatever they take must be swallowed slowly. Milk, when drank hastily, is liable to coagulate in big, hard lumps, and proves indigestible and injurious. The same milk, when taken by the mouthfuls, or from a spoon, will prove beneficial. The milk must be boiled in

* The effect of lime-water is in part imaginary. If given for the purpose of neutralizing acids, in small doses, it is a failure. Its beneficial action on otherwise indigestible cow's milk cannot depend on the minute dose of the antacid contained in it. (See p. 505.)

the morning, and heated over again several times during the day. It must not be cold when taken, and may be mixed with a little table-salt. Many prefer, and tolerate best, the mixture of milk and cereal decoctions. Such must be the food for weeks and sometimes for months; the meals must be small and more numerous. Thus the patients will get well, and thus only.

ACUTE AND CHRONIC ENTERITIS, INTESTINAL CATARRH, with diarrhœa as a prominent symptom, compare with acute and chronic gastritis in their mutual relation. Acute catarrh of some duration extends mostly over the whole intestine; its worst cases are also complicated with the same condition of the stomach. The most serious forms are those of "acute gastro-enteritis." In them the diet must be a very strict one. *No raw milk, no boiled milk, no milk at all in any mixture,* in bad cases. In the very worst cases *total abstinence* for from one to six hours, or much longer; afterwards, teaspoon doses of a mucilaginous or farinaceous decoction from time to time. A good preparation is the following: Five ounces of barley-water, one or two drachms of brandy or whiskey, the white of one egg, salt, and cane-sugar; a teaspoonful every five or fifteen minutes, according to age or case. Later on, a table-spoonful of boiled milk may be added. The same may be mixed with mutton-broth, which, with the white of egg, is better than beef-soup or beef-tea in convalescence. In vomiting abstinence is mostly superior to ice; the latter may sometimes quiet the stomach, and feel pleasant momentarily, but it stimulates peristalsis. Beef-tea, in its customary preparation, ought to be avoided. In convalescence, when given at all, it ought to be mixed with barley- or rice-water. Towards the end of the disease, or when the discharges are numerous and copious, the blood becomes inspissated, the circulation slow, and thromboses (hydro-encephaloid) form in the smallest veins of distant organs. Then it becomes necessary to introduce liquid into the circulation by administering water through

mouth or rectum. Never is the common sense and tact of the intelligent practitioner more thoroughly taxed. In regard to that there can be no law. No printed rule ever supplies or substitutes brains.*

In chronic cases boiled milk must form but a small part of the food. The white of eggs in water, or barley- or rice-water, is superior. Still, there are exceptional cases in which even it is not tolerated. Then the cereal and farinaceous preparations, with or without mutton-broth, are preferable. In rare cases one of the better artificial foods is quite successful. Acorn coffee, acorn cocoa, answer well when given once or twice daily. The meals must be small, and may be more numerous, but a fair regularity must be kept up.

CONSTIPATION may have many causes. The intestinal mucus may be deficient or too viscid. Such is the case in febrile conditions, now and then in chronic intestinal catarrh, and also when there is too much perspiration and secretion of urine. Or the food may be inappropriate, as when it contains a superabundance of casein, particularly in cow's milk, or of starch, or too few salts, or of sugar.

Peristalsis may be incomplete through rhachitic debility of the muscular layer, or the muscular weakness dependent upon sedentary habits, chronic peritonitis, intestinal atrophy, and hydrocephalus.

There is, also, beside mechanical obstruction by cystic tumors, intussusceptions, volvulus, and imperforations, an apparent constipation which ought not to be mistaken for any of the above varieties. Now and then a child will appear to be constipated, have a movement every two or three days, and at the same time the amount of fæces discharged is very small. This apparent constipation is seen in very young infants rather than in those of more advanced age. Such children are ema-

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* Med. News, July 9, 1887.

ciated, sometimes atrophic. They appear to be constipated because of lack of food, and not infrequently this apparent constipation is soon relieved by a sufficient amount of nutriment. Constipation resulting from a superabundance of starch in the food is easily cured by the withdrawal of the injurious substance.

Constipation produced by too much casein in the food will be relieved by diminishing its quantity. The proportion of casein in the food of infants should never be more than one per cent. Besides, this amount of casein ought to be copiously mixed with a glutinous decoction (oatmeal).

Infants that have been fed on starchy food, or even such cereals as barley, should have oatmeal substituted for it.

Constipation depending on lack of sugar is very often speedily relieved by increasing the quantity of sugar in the food. This is the case not only in artificial feeding, but also when the children are fed normally on breast-milk. Such mother's milk as is white and dense, and contains a large amount of casein, is made more digestible, and will produce better evacuations, when a piece of loaf-sugar dissolved in tepid water, or oatmeal-water, is given previously to every nursing. Older children will take honey to advantage, as long as it does not add to the abnormal gastric acids. Regular doses of cod-liver oil, given twice or three times daily, will obviate or relieve constipation, besides fulfilling other indications. But it is self-understood that it must be pure, and not adulterated by the fashionable admixture of phosphate of calcium. Children of more advanced age, and with good gastric digestion, will be benefited by breads containing husk. Children of any age will be benefited by drinking large quantities of water.

Rhachitis is frequently the result of protracted intestinal disorders. Therefore proper feeding is an absolute necessity. Animal food must predominate, but meat ought to be lean.

The so-called erethic disposition requires less meat, but more of the better class of farinaceous foods,—viz., barley and oatmeal, with boiled milk, and salt. The same indications are valid for all the conditions subsumed under the head of scrofula. Coarse bread, acidulated food, fruit not absolutely ripe, must be avoided.* The introduction of phosphates, in whatever shape, is a mistake, for the following reasons:

In the careful experiments of Foster, who fed infants on milk, it was found that the mineral constituents were absorbed least (still less than fat). Of the ashes of milk in general, there were in the fæces 36.5 per cent.; of the calcium in particular, seventy-five per cent. In spite of that the baby throve, and increased in weight in one week one hundred and seventy grammes. Thus there appears to be but very little need of salts on the part of the growing baby. The infant of two and a half years receives in one day 1.25 grammes of calcium, of which there is an elimination of 0.92 gramme in the fæces and 0.03 in the urine. There is then a balance of 0.3 gramme in a day, of 2.1 in a week, of a kilogramme, or two pounds of calcium, in a year. This is all that is utilized.

Almost the entire quantity of calcium in the body is deposited in the bones, which contain eleven per cent. of calcium in the adult, and in the infant and child somewhat less.

There are some very important practical points connected with the results of these observations.

As long as the food contains plenty of calcium and phosphoric acid there is certainly no indication for the introduction of the same in the form of medicine, or as an addition to food, for the purpose of improving nutrition. Thus the *combination of cod-liver oil with phosphate of lime*, which has become

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* Loose bowels behave well under the influence of acorn coffee (containing gallic acid), or acorn cocoa, as introduced into practice by Michaelis, of Berlin.

so fashionable, is *based upon an illusion* concerning its alleged efficiency. Besides, the empirical observation has been made also, at a very early time, that immediately after the administration of preparations of calcium there was increased elimination through both the fæces and the urine.

Thus, as there is no actual absence of calcium phosphate in the food, the organism should be spared useless labor. In occasional cases, where the effect appears to be favorable, this very effect is different from what was intended. When rhachitical or anæmic infants are supplied with phosphate of lime, and iron, bismuth, etc., they are generally patients who are suffering from primary or secondary catarrh of the stomach, with superabundance of acid in its secretion. In these very cases the calcium phosphate acts as an antacid, inasmuch as phosphoric acid becomes free and the lime neutralizes the acids of the digestive organs.

FEVER consumes nitrogen (elimination of urea), carbon, water, and also salts. These losses must be repaired, but with great care. For fever diminishes at the same time the secretion of saliva, and of gastric, probably also that of the pancreatic juice. Besides, it renders the stomach hyperæsthetic (nausea, vomiting), and impairs the absorbing power of all the mucous membranes. In the capillary bronchitis of the nursling, cow's milk is not digested satisfactorily. Still, nurslings will digest fairly sometimes, and lose less flesh in many of their febrile ailments than older children. A fair amount of peptones is absorbed both in the stomach and rectum. In moderate fevers some sugar is absorbed, also albumin; fat in but small quantities, because of its tendency to become acid; starch finds its saliva more or less diminished; thus its amount must be carefully estimated.

Food, when given in an undue quantity, may act injuriously by acting as a mechanical irritation, and by giving rise to fermentation. Can it thus increase the fever? Undoubtedly. I

have but lately seen a child sick with pain and fever who recovered rapidly through the effect of a purgative, which brought away large masses of fæces. Another had what appeared to be a second relapse of typhoid fever, with a renewal of splenic tumefaction. All the symptoms vanished speedily when the bowels were thoroughly emptied of large offensive stools.

In ordinary fevers the food must be liquid, and rather cool, in vomiting cold, in respiratory diseases warm, in collapse hot. The best feeding-time is the remission; in intermittent fevers nothing must be given during the attack except water, or acidulated water; in septic fevers nothing during a chill. Common ephemeral catarrhal fevers may do without food (except water) for a reasonable time. Sleep must not be disturbed, except in conditions of sepsis and depressed brain action. In both there is no sound sleep, but sopor, which may be interrupted. In sepsis (diphtheria and other) this rousing from sopor is an absolute necessity. Unless they are roused frequently to be fed sufficiently, and stimulated freely, the patients will die. Besides, in most of the cases, the temperatures are not high, and there is no contraindication to feeding on that account.

Chronic inflammatory fevers bear and require feeding as generous as it must be careful. Altogether, however, it requires the good judgment of a well-informed physician to take into account the possible influences of individual habits, and energies, of ages and sexes, of constitutions, and of climate and season.

TYPHOID FEVER is of long duration, its temperature is sometimes quite high in children, as it is in adults. The small intestines are affected principally. Thus, not only is, after the first few days, a considerable amount of food required, but it must be so chosen as to be digestible in the stomach; its proper selection is the more important the more the latter organ is impaired by high temperatures. Beside plenty of water, or acid-

ulated water (hydrochloric, no organic, acid), albuminoids are indicated. Milk and cereals (in decoctions, which must be strained) are the proper foods. The administration of stimulants, both as to quantity and to time, depends on the character of the individual case, and the power of resistance on the part of the patient, beside the condition of the heart. Where the latter becomes feeble at an early period, beside heart-stimulants (digitalis, spartein, caffein, camphor), alcoholic stimulants are required. Diarrhœa demands (beside opium, naphthalin) albumin, rice-water, arrow-root, mutton-broth. Hemorrhage forbids food in any shape for a time, the duration of which depends on the general condition of the patient. At no time during the disease, and during the first ten days of fully established convalescence, the food must ever be solid. No vegetables must be allowed until three weeks have elapsed since the beginning of apyrexia. When the milk and cereal food become distasteful, a change in their preparation, as described above, will and must suffice. The large majority of relapses are due to a dereliction in the strict rules of feeding.

The diet in other chronic or acute diseases is regulated by the general rules which have been laid down before. Thus, a few words may suffice.

HEREDITARY SYPHILIS contraindicates the employment of a wet-nurse. The infant's own mother may nurse it if she can.

CEREBRAL DISEASES contraindicate alcohol, coffee, hot soups, and solid foods. Cerebro-spinal meningitis results in speedy loss of weight and strength, particularly through severe and protracted vomiting, and the greatly-impaired appetite. In these cases feeding must be insisted upon. The feeding-cup, Soltmann's biberon pompe, and feeding through the nose (no tube into the œsophagus) must be resorted to.

RESPIRATORY DISEASES require liquid food. Jurgensen's recommendation of roast, and bread with butter, is objection-

able in every acute inflammatory case. Food and drink must not be too cold. Sugar, and sweets in general, are permissible in small quantities only. Farinaceous foods are the most reliable ones. In the beginning no alcoholic stimulants. They will be required when debility and collapse set in at an early time, or in protracted cases. Capillary bronchitis is often complicated with gastro-enteritis, and then no milk can be allowed; sometimes not even breast-milk is digested.

ACUTE RENAL DISEASES contraindicate alcohol in any shape, particularly beer; also spices, coffee, and tea. CHRONIC RENAL DISEASES require generous feeding, because of the copious loss of albumin. But—contrary to Oertel and Loewenmayer—no eggs or meats ought to be given in any quantity, or at an early period. Milk and farinacea must take their places. Alcohol is permissible in urgent cases only. Salt must be avoided except when the secretion of urine is to be fostered. It ought not to be forgotten that appetite and digestion may be suffering from the fact that the tissue of the stomach is œdematous, like all the rest of the organs. This is another reason why eggs and meats ought to be avoided. If required, in the later stages, peptones may take their place.

ACUTE RHEUMATISM requires milk diet and vegetable acids (lemonade), as long and at such times as they do not interfere with the milk food.

RECTAL ALIMENTATION.

The rectum absorbs, but it does not digest. Whatever, therefore, is to enter the circulation through the lower end of the alimentary canal must be dissolved before being injected. Suspension alone does not usually suffice. Water can be introduced in quantities of from twenty-five to one hundred grammes (one to three ounces) every one, two, or three hours, and may thus save life by adding to the contents of the thirsty lymph-ducts and empty blood-vessels. Salts in a mild solution will

thus be absorbed. Food must be more or less peptonized before being injected. The peptones mentioned above are readily absorbed when fairly diluted. When too thick they are not absorbed, become putrid, and a source of irritation. Milk ought to be peptonized. The white of eggs becomes absorbable through the addition of some chloride of sodium. Kussmaul beats two or three eggs with water, keeps the mixture through twelve hours, and injects it with some starch decoction. The latter is partly changed into dextrin. Fat, when mixed with alcohol, becomes apt to be partly absorbed. Andrew H. Smith recommends the injection of blood. Its soluble albumin, salts, and water are readily absorbed; more we ought not to expect. Still, he has observed that the evacuations of the next day contained none of the injected blood. Whatever we do, however, and be the rectum ever so tolerant, not more than one-fourth part of the food required for sustaining life can be obtained by rectal injections, and inanition will follow, though it be greatly delayed. Finally, children are not so favorably situated in regard to nutritious enemata as adults. In these the lengthening of the nozzle of the syringe by means of an elastic catheter permits of the introduction of a large quantity of liquid; indeed, a pint can be injected, and will be retained. But the great normal length of the sigmoid flexure in the infant and child, which results in its being bent upon itself, prevents the introduction of an instrument to a considerable height. It will bend upon itself; besides, a large amount of contents will be expelled by the feeble or resisting young patient.* When a solid instrument is used, it is apt to be felt high up in the abdomen. This is the result of a large portion of the intestine being pushed upwards with the tube.

* The amount can be somewhat increased by raising the baby by its feet, while the chest and abdomen are supported by a soft pillow, and injecting quite slowly, or, rather, allowing the liquid to flow in from above downwards. Gentle manipulation of the abdomen, while the procedure is going on, will aid our purpose.

II.

TREATMENT OF THE NEWLY-BORN.

1. *Asphyxia.*

THE prognosis of asphyxia and of its treatment is a very doubtful one in many cases. It does not only depend on the knowledge and skill of the physician, but on the causes of the abnormal condition. A moderate or serious compression of the head, compression or prolapsus of the cord, intra-uterine respiration and aspiration of foreign bodies, apoplexy, anæmia of the fœtus, accumulation of carbonic acid in the blood, poisoning by the morphia, chloral, or excessive temperature of the mother, congenital diseases, and malformations, each of them or several combined, influence both the prognosis of the individual case and the result of therapeutical procedures.

When the long duration of labor, the prolapsus of the cord, the protracted compression of the head, the early loss of amniotic liquor, or a high temperature of the mother endangers the life of the fœtus, the best *preventive* of asphyxia is the artificial termination of parturition. The respiratory organs of the fœtus passing out of the vagina must be protected from contact with copious discharges of liquor amnii and other foreign material accumulated in the bed, the face being raised so that aspiration, mostly through the nose, cannot take place. The mouth of the newly-born, unless it cries lustily, must be cleansed immediately by a moistened piece of cloth wrapped round the finger, the tongue drawn forward, and the baby placed on its side before attention is paid to anything else. Beating the nates, tickling of the fauces by means of a feather, and the momentary inhalation of ammonia can be resorted to before the baby is separated from the placenta. Most practitioners, indeed, will prefer to prolong the connection with the

maternal organ until the pulsation of the cord begins to flag, under the usual circumstances. The separation of the baby must take place immediately when there is no pulsation in the cord, or asphyxia is well pronounced. When the baby is strong and cyanosis marked, Grenser recommended to allow the cord to bleed before the application of the ligature. When bleeding was but scanty, he invited it by placing the baby in a warm bath. This procedure I have imitated several times with advantage.

When the ligature has been applied and the baby removed, the mouth of the asphyctic infant ought to be cleansed again as above, quickly but gently. For amniotic liquor, meconium, and vaginal secretion, when aspirated, will, though the asphyctic condition may be relieved, give rise to bronchitis and pneumonia after two or four days. Many babies die in this way.

Insufflation into the lungs for the purpose of establishing respiration has been practised by Smellie as early as 1762. It is done from mouth to mouth, from mouth to nose, or by catheterization of the larynx. The first method is not reliable, if but for the tongue closing pharynx and larynx ; the second is often successful, but may inflate the stomach as well as the lungs. By inflating the former the chances for a normal action of the lungs become less. After every insufflation which fills the lungs, the chest ought to be compressed by two hands over the lower latero-anterior region of the chest-walls.

The direct insufflation of the lungs may become detrimental for several reasons. Thus, H. Reich has the case of a consumptive midwife who was reported to have infected twelve infants with acute tuberculosis in thirteen months. In the practice of another midwife, who was healthy, in the same town, no such case occurred. During nine previous years there were but two cases of tubercular meningitis, and but one in the year following the death of the consumptive woman.

Moreover, the act of insufflation may prove dangerous by the impossibility of limiting the force of the entering volume of gas. Rupture of pulmonary tissue and emphysema have been observed. The same accident may occur when a catheter is used for the same purpose. It has, however, the advantage of permitting the sucking out of the aspirated material before air is blown into the lungs. Ribemont's and others' metal catheters cannot be carried much below the vocal cords. An elastic catheter, guided by a wire which allows any degree of bending and may be withdrawn when the vocal cords have been passed, is better adapted for both aspiration and inflation.

The asphyctic baby ought to be plunged into a warm bath (100° F.) immediately, and gently rubbed. The other methods may be continued during that time,—beating, tickling, electricity. When it is thin, pale, and collapsed, a hot injection into the bowels (104°–108°) will render good service. The quick and repeated alternation between the warm bath of a minute and a cold one of one or two seconds, or the pouring of cold water on chest, or neck, while the body is in the warm bath, restore many. But great care must be taken lest the bath be too hot. It may produce convulsions, and has been known to give rise to tetanus. Before, and after the bath, indeed at any time, the vigorous swinging of the baby on the arms of the medical man is a good adjuvant.

Among all the mechanical methods of artificial respiration (Marshall Hall, Silvester, Howard, B. Schultze, Pacini, Woihler, Bani, Schüller) those of Silvester and Schultze render the best services in the asphyxia of the newly-born. Both are very simple, and either of them is effective.

Silvester places the patient on his back, a small pillow (piece of clothing, towel, sheet) between the shoulders, the tongue drawn forward. The two arms are caught above the elbow and slowly carried upwards. Thus the chest is expanded. Then they are carried downwards and pressed against the sides

of the chest, a little anterior to the axillary line. Thus the lungs are compressed. This combined action may be repeated fifteen or twenty times in a minute.

B. Schultze places his index fingers into the axillæ, the three other fingers gently against the sides of the chest, the thumbs covering the shoulder from behind. The infant is then swung forward. The lower extremities bend on the abdomen, the abdomen presses against the diaphragm, and the lungs are compressed,—expiration. The parts then return slowly downwards and swing back, thus expanding the chest, —inspiration. This action may also be repeated fifteen or twenty times in a minute. There is but one (occasional) contraindication to the employment of this method,—viz., the insufficient development of the fœtal bones. When the newly-born is too premature, and the ribs too soft and flexible, it is useless.

During all this time, whenever feasible, the surface of the infant must be kept warm artificially by hot blankets, stones, bottles, and a few drops of brandy, whiskey, camphor-water, or tincture of musk may be given in some hot water if deglutition is possible, or injected into the rectum. When the main difficulty appears to be, after a while, in the excessive debility of the heart, it is possible that a five-hundredth part of a grain of nitroglycerin, repeated after fifteen and thirty minutes, will do good and speedy service through its ready absorbability on every mucous membrane. I have no experience with it in the asphyxia of the newly-born, but its rapid action in failing heart and collapse and shock from other causes encourages me to recommend it for a fair trial of its powers.

Electricity was recommended in cases of asphyxia as early as 1793 by Hufeland. But the first case, in which the rhythmic faradization of the phrenic nerve and its associates was resorted to (Ziemssen) for the purpose of producing artificial

respiration, was that of an asphyctic girl poisoned by carbon oxydul. The phrenic nerve acts on the diaphragm. Its aids are the cervical plexus, which controls the trapezius, levator scapulæ, and middle scalenus muscles, and the brachial plexus. The ramifications of the latter are the anterior thoracic nerve for the pectoralis major and minor; the posterior thoracic for the middle scalenus, posterior superior serratus, and the rhomboid muscles; and the lateral thoracic for the serratus anticus major.

In many cases since, such as poisoning by chloroform, coal gas, opium, diphtheria, sulphide of hydrogen, and pernicious intermittent fever, also in those of apoplexy, drowning, and hanging, electricity has been employed to advantage. Its effect is often rapid and powerful.

In asphyxia of the newly-born, the systematic faradization of the phrenic nerve has been first employed by Lauth and Pernice.

The point of application selected by most authors is near the sterno-cleido-mastoid muscle, over the phrenic nerve. The other pole is applied either to the neck or to the diaphragmatic region or any other part of the surface. The localization of the effect to the phrenic nerve alone, which was insisted upon by many, is certainly an illusion. The current will surely strike the pneumogastric, phrenic, sympathetic, and many sensitive and motory nerves at the same time. As this cannot be avoided, as indeed it is better that it should be exactly so, it is best to use large sponge electrodes and moisten them thoroughly with salt water. The head, arms, and shoulders should be slightly raised, and a small pillow placed between the shoulders for the asphyctic baby to rest on. One of the electrodes must be kept stationary; the other brought into contact with the surface but a single moment. A deep inspiration will then take place, the lungs will expand, and lateral pressure on the lower part of the chest must be resorted

to for the purpose of emptying the lungs afterwards. Another application is then made with the same result, and must be followed with the same manipulation. This has to be continued for some time until the baby cries, and it appears safe to discontinue the application. Whenever a cough or a coughing movement is noticed, it must be omitted temporarily. The favorable result, however, is not always permanent. The causes of the asphyctic conditions are still active, and the infant will require resuscitation again, and perhaps many times. Thus close attention must be paid, sometimes for many hours.

Great care must be taken in regard to the duration of the application. Continued or too frequent irritation by the current causes over-irritation and paralysis. Not infrequently is the immediate effect a favorable one, inspiration becoming deep and the heart active, but after but a short time the former grows more superficial, the pulse feeble, and the cyanotic hue returns to the lips and finger-nails. Then it is time to stop for a while, and resort temporarily to other means of resuscitation. Thus the practice of Lauth's, who applied the current for from two to three minutes, is decidedly improper and dangerous.

In some cases, where the interrupted current is inefficient, the galvanic (continuous) current, with occasional interruptions, has been known to yield better results. In my own cases I have never had an opportunity or been under the necessity of employing it.

The application of large sponge electrodes may not always be convenient. In those cases no harm is done by using the metal poles instead. Though the irritability of the brain (and nerves) is but low in the newly-born, the pain produced by the interrupted current thus applied is very intense, and the effect on the contraction of the diaphragm quite marked. Thus it is not necessary to lose time for preparing, if not handy, the more complicated apparatus. Still, exhaustion is more readily obtained through resuscitating by pain and muscular

action combined than by muscular contraction alone. In most cases, however, I was satisfied with not losing even a fraction of a minute, particularly in those early times, where the most convenient apparatus was the old-fashioned rotating machine.

How long is the asphyctic baby to be watched and the attempts at resuscitation to be renewed? At all events they must not be given up as long as the heart-beats are audible, though ever so feebly. Nor is the crying sufficient to permit watchfulness to be relaxed. The deep recession, during inspiration, of the diaphragmatic region (the "peripulmonary groove" of Trousseau) must have ceased, the cry be vigorous, the eyes wide awake, and the extremities in lively motion. Before this end is attained there is danger of a relapse, partly from impaired innervation and the continuation of some of the causes of the asphyxia, and partly from obstruction through mucus, which may be coming up constantly and gathering in the pharynx and posterior nares.

2. *Post-Natal Asphyxia and Atelectasis.*

Atelectasis may be congenital or acquired. The lungs may never have expanded to their normal degree, or after expansion had taken place, they may have collapsed, or contracted again. The causes of this condition may also be either congenital or acquired. There may be malformations and intra-uterine diseases of the organs of respiration or circulation, such as defective development of the lungs, hernia of the diaphragm, hypertrophy of the thyroid gland, pleural effusions, syphiloma of the lungs, acquired bronchial catarrh, bronchitis, and pneumonia. Or anomalies of the nervous system may exist, such as hemorrhage or some other injury of the respiratory centre, and cerebral pressure from effusion, beside intra-uterine malformations. Or, finally, the baby may be premature, with feeble muscles and soft bones.

The treatment resembles much, or is identical with, that of

genuine asphyxia. Respiration must be insisted upon. Warm and cold baths, cold affusions in the warm bath, swinging, beating, and electricity come each in for their share in the treatment. The baby must be made to cry, or it will perish. This indication is particularly urgent in the acquired cases of atelectasis which result from bronchitis. There the small bronchial tubes are filled with a viscid sticky mucus, which must be removed. This is a condition not peculiar to the quite young, it is as well met with in older babies suffering from bronchitis, particularly when in a condition of ill-nutrition and general debility. In them, the closing of the nose and mouth for from four to eight seconds will so saturate the respiratory centre with carbonic acid as to elicit deep and forcible inspiration immediately. It is an effective method, and not cruel because it is successful.

The babies must be fed conscientiously. As many are suffering from inanition, this must not be neglected. They must have plenty of water, warm or hot, with from one to four drachms of brandy through the twenty-four hours, aq. camphoræ, a few drachms; perhaps, as suggested above, nitroglycerin. Hot injections into the rectum will stimulate the nerves and fill the blood-vessels. The infant must be carried about, its position in bed changed from time to time, and its skin be kept warm according to the methods detailed before.* Even the most desperate-looking cases, with shallow respiration, and cyanosis of the skin and mucous membranes, may recover when the attendants are as persistent as the morbid condition dangerous.

* It is this condition, in which Credé's and Tarnier's apparatuses (*couveuse*) have triumphed over great difficulties, and mainly in premature babies. Still, any box or bed, with hot bottles and stones, or a box with double walls filled in with hot sand, or a bed with hot flannel, or cotton, or the hot register, or anything the good will and ingenuity of the practitioner will supply, will answer the purpose. At the same time the air admitted to the lungs must be cool and pure.

D'Outrepont saved a newly-born of thirteen inches in length and one and a half pounds in weight, Kopp one of eleven inches and two pounds, Redman one of thirteen inches and a pound and three and a half ounces, Ahlfeld one that was born in the twenty-ninth week of utero-gestation, measured fifteen inches (thirty-nine and a half centimetres), and learned how to suck after a few weeks; and another one that had the same size of fifteen inches and a weight of forty-eight ounces (fourteen hundred and fifty grammes) when five weeks old. It also took the breast afterwards. Several infants of less than three pounds at birth I have saved myself, nor are similar cases quite rare in the literature of the subject.

J. H. Moore published in the Philadelphia *Reporter* of April 17, 1880, the case of a fœtus born before the end of the sixth month of utero-gestation; length nine inches, weight one and a half pounds, that cried after thirty minutes, but did not move. Fifteen months afterwards the same fœtus is said to have commenced to walk, and weighed nineteen pounds.

3. *Kephalhæmatoma.*

The hemorrhage between (mostly) the parietal bone and its pericranium is usually the result of pressure by the lower segment of the uterus. Occasionally, however, kephalhæmatoma is observed after breech presentation also. It is caused by the deficient development of the external layer of the cranial bones and the shallowness of the indentations in which the blood-vessels are running, the thinness of the vessels, and the mobility of the integument. It is circumscribed, does not spread beyond a suture, fluctuates, and begins to be surrounded, after a few days, by an osseous ring, the result of the formation of new bone from the raised periosteum. It grows in size for some days, then remains stationary, and is gradually absorbed within from six to twenty weeks. After this time the bone is thickened, but absorption of the newly-formed

bones will also take place in most cases. But rarely a permanent thickening will be noticed in later life.

In some cases there is an internal kephalhæmatoma as well. It consists in a hemorrhage between dura mater and cranium, and may lead to all the consequences of intra-cranial hemorrhage (apoplexy of the new-born),—viz., convulsions, paralysis, death, or meningitis, cystic degeneration, etc. There may be no contiguity between the external and the internal hæmatoma. Still, many cases of the external form will extend directly into the cranial cavity through a congenital fissure in the bone.

The treatment is forestalled by what has been said of the spontaneous absorption of the extravasation. No treatment is required. The swelling must be left alone. The bony thickening will also get well in the course of time. It is important to insist upon this expectative treatment, because the attendants will often not appreciate the absolutely benign nature of the large tumor.

Meddlesome practitioners have tried compression. If there be any communication with the cranial cavity, this procedure may become dangerous by blood being pressed into the interior. Ointments have been recommended "to make believe," for the purpose of quieting the anxiety of the family. Puncture has been resorted to. If made at an early period, it will facilitate new bleeding; in many a case it has been known to produce suppuration, though the operation was believed to have been made antiseptically. Incision is still more reprehensible. It is not permissible except in those cases which have terminated in suppuration through previous maltreatment. Then a large incision and thorough disinfection are indicated, and will be followed by a relief to pain, redness, and fever. Puncture, aspiration, or incision may perhaps be necessary, even without suppuration, in one of two conditions: firstly, the tumor may be so large as not to undergo absorption for many weeks, and to endanger the bone, which may become necrotic; still, I have

not seen such a case these twenty years; secondly, in a case of complication with apoplexy, aspiration may be capable of allowing some of the internal extravasation to escape.

Other indications for the treatment of this internal kephalhæmatoma are yielded by the asphyxia depending upon the disturbed innervation. The antiphlogistic treatment will be confined to cold or cool applications only. The consecutive paralysis demands an appropriate treatment, the results of which will be mostly questionable, and depend upon the amount of extravasated blood, of tissue destroyed or compressed, and consecutive changes in the nerve-centre.

4. *Hæmatoma of the Sterno-Cleido-Mastoid Muscle.*

The fragility of the fœtal blood-vessels and some injury experienced by the muscle during parturition gives rise to a hemorrhage about or above the middle of the long muscle. When observed the tumor has the size of a hazel-nut or more; it is spherical, circumscribed, and rather hard. The latter condition is due to the secondary inflammation of the torn muscular fibres. This occurrence is not at all very uncommon. Even in older children, mainly in kite-flying boys, who extend either of their sterno-cleido-mastoid muscles incautiously, the same hæmatoma and myositis are observed.

When observed at an early period the local application of ice may reduce the bleeding. For a week, after ceasing the employment of ice, small pieces of cloth moistened with cold water will check the secondary inflammation to a certain extent. During all this time the head must be kept quiet,—best perhaps by carrying the baby on a hair pillow large enough to support the whole body, head included. When the tumor has time to become hard, it may last for years; when it is large, it may give rise to a slight torticollis. Then gentle stretching and massage, the application of a mild galvanic current, and the inunction of an absorbable ointment of iodide of potas-

sium may be tried to advantage (iodid. potass., aq., āā 1 ; adip. suill., 2; lanolin, 6–8).

5. *Sclerema.*

The induration of the connective tissue of the newly-born known by that name, consists of a serous infiltration (of and) under the skin, begins generally in the lower extremities, and spreads over the whole body with the exception of the chest. The surface is apt to be slightly hyperæmic in the beginning, and then turns yellowish and quite pale. Respiration is shallow, nursing feeble, secretion of meconium and urine scanty, sensibility diminished, the pulse slow (60–75), accelerated only towards the fatal end, and temperature reduced much below the normal, even to 90° and less. Recovery takes place but very rarely. Even those who suffered from a slight attack only, are liable to perish of pneumonia after two or three weeks. Many of the infants are prematurely born, exhibit defective innervation, possibly from fœtal brain-disease, or suffer from some cardiac affection.

The patient must be fed from a spoon or through the "biberon pompe," mentioned in the first essay of this series. Alcoholic stimulants may be given in the shape of brandy or whiskey, four to six drops every half-hour; also a drop of tinct. digitalis every hour or two hours, and aq. camphoræ, ten drops every hour. Massage commencing at the periphery, gentle but persistent with the thoroughly-warmed hand, or through a warmed cloth, will improve the circulation, and probably absorption, to a certain extent. Maybe, also, that extensive (general) galvanization of the surface will serve the same purpose. The infant must be kept warm near a stove or furnace register, provided the head can be kept away from it and the air-supply for the lungs be kept up at a moderate temperature. Otherwise hot stones, hot sand, hot bottles, must be distributed, well covered, through the bed at a safe dis-

tance. Frequent bathing in salt water of at least 100°, with constant friction and massage in the bath, will prove as beneficial as the bad or very doubtful prognosis in most cases will permit.

6. *Bathing.*

The first bath of the newly-born, and bathing of infants in general, demands great caution. For the temperature of the young exhibits some peculiarities in regard to both its development and elimination. Immediately after birth it is apt to decrease by a degree (F.) or more, in consequence of defective circulation and respiration and the great difference of the baby's surroundings before and after birth. A feeble new-born requires more time for its temperature to rise again to its norm. That is so particularly in regard to the surface. Thus it is that the thermometric measurements when made in the axilla are as deceptive in the feeble young as they are apt to be in adults, with an immense fat layer underneath or with insufficient superficial circulation.

A certain degree of cooling in the air of the room takes place under all circumstances at birth. When moderate, the sudden change acts favorably by inciting reflex action, but a considerable and continued reduction of temperature must have a dangerous influence at a time when the functions of the body are not yet regulated.

In Lassar's experiments, when an animal after recovering from albuminuria got exposed to a cold temperature, the same condition returned. Rabbits thus exposed, without or after depilation, suffered from interstitial inflammations of liver, lungs, heart, and neuroglia. The blood-vessels of liver and lungs became enormously dilated, the arteries filled with thrombotic masses, and leucocyte emigration was marked round the veins. When the animal was pregnant, even the liver and other organs of the fœtus were found to be inflamed. This

is exactly what clinical experience has taught every observer of every generation, in spite of modern contradiction. Thus I have observed a sudden return of the morbid symptoms in three persistent and protracted cases of hæmoglobinuria after every exposure to cold, and particularly cold and moist air.

Therefore the newly-born babe must not remain uncovered for any length of time. The nurses who spend—with more pedantry, emphasis, and self-consciousness than intelligence—much unnecessary time in oiling and soaping and washing and bathing, turning this and that way, drying the surface, wrapping the navel, applying the bandage, and dressing the newly-born in fineries, in which it finally arrives shivering with a cold nose and blue feet, are not infrequently the causes of ill health or death. In a case recently seen, the pneumonia of the newly-born was undoubtedly due to the fact that the baby was neglected while both physician and nurse were engaged about the fainting mother. Craig must have seen many such cases, for with him "no baby is ever washed, dressed, fed, tied up, the cord is not wrapped up, but the infant is anointed with fat and wrapped in flannel the first twenty-four or thirty-six hours."

The bath of the newly-born must not be hot. A single midwife in Elbing lost ninety-nine babies out of three hundred and eighty, of trismus. Through all her life she had estimated the temperature of the bath by trying it with her uncovered arm. She lost her temperature sense after a while, as was found by a judicial investigation, and the babies their lives. Still, the bath ought not to be less than 90° F., nor ought it to be much cooler through a number of months, in spite of a French author's opinion, who says that the epidermis becomes macerated by warm baths; that babies who are getting bathed grow "pale, soft, and flabby and eczematous," and proves the correctness of his position by his zoo-

logical discovery that "no other mammalia take a warm bath regularly."*

The proportion of the surface to the cubic mass of the human body is larger in an infant than in an adult, and with it is the number of peripherous nerve-ends and capillaries relatively greater. Thus there is a greater liability to reflex symptoms depending on exposure in spite of the low degree of nervous irritability in the newly-born. Thus it is that a protracted cold bath is not well tolerated even by older infants; but, also, that tepid or cold bathing or packing exhibit a very much more rapid effect in the young than in the old. For both the reduction of temperature and the reflex effect do not depend on the weight of the body, but the extent of the conducting and radiating surface.

When the baby is six months old, particularly during the summer months, the warm bath is to be succeeded by washing and friction with tepid and, later on, cold water. When washing is substituted for bathing, water may be selected of a lower temperature, inasmuch as but a part of the surface is exposed to its influence at one time. When the bath is gradually made cooler, in the course of time, friction of the skin during bathing stimulates its action. In pathological conditions, when cool or cold bathing is resorted to for the purpose of reducing an abnormal temperature, this aim is always reached as far as the surface is concerned. But to accomplish the same end for the whole body, it is necessary that the skin should retain its vitality and lively circulation.

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* To the general rule implied in the above remarks on the necessity of bathing in warm water only, according to which the body of the newly-born infant is to be kept warm, the head forms an exception. Artificial heat and feather pillows ought to be avoided. A soft hair pillow is preferable, or a quilt lined with a layer of cotton. Whenever it is necessary to employ a soft head-rest, a feather pillow may be covered by a bed-sheet folded up to the size of the pillow and fastened to its corners by safety-pins.

Unless that be so, the internal temperature may remain unchanged, or even rise while the surface is cool. In such a case, which must be ascertained by taking the rectal temperature, the cold bath ought to be followed immediately by a hot one for the purpose of restoring the surface circulation. In this way the reduction of temperature aimed at by the administration of a cold bath is finally accomplished by the hot in a desperate case. In milder ones the warming of the extremities and the general surface by dry heat may suffice to restore the warmth of the surface. At all events, a cool or cold bath after which the feet do not become warm at once, is dangerous.

7. *Mamma. Mastitis. Perimastitis. Angioma.*

Since the time of Menard, Scanzoni, and Guillot, the secretion of the mammary gland of the newly-born has been the subject of frequent investigations by clinicians, chemists, and physiologists.* It is mostly found towards the end of the first week, and resembles very much the milk of the mature woman, in the mammæ both of the male and female infant. The superficial milk-ducts are obstructed with epithelium; the interior ones are dilated in many places and filled with a cuboid epithelium and a liquid which resembles colostrum. This secretion may be absent, but it is frequently found in premature or still-births, though the mammæ be but rudimentary. The dilatations (ectasiæ) will increase in size for weeks, and begin a retrograde development as late as the middle of the first year of life.

The tendency of epithelial elimination, which is a peculiar feature in the newly-born, and which is so commonly observed in its skin, mucous membranes, sebaceous follicles, and kidneys, appears to be very marked in the mamma of the newly-

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*Jacobi, in Gerhardt's Handb. d. Kinderkrankh., 1st vol., 2d part, p. 39, of the 2d ed. 1882.

born. This discovery of Epstein's renders the subject of our discussion very much clearer from an etiological point of view.

The swelling and secretion of the gland may last a week or two when undisturbed. After it has been squeezed out ever so gently, a new secretion will be invited and continue five or six weeks. Thus pressure of any kind must be avoided. It is barely possible that it may not be injurious, and that a gentle inunction of warm oil, which is so commonly used, may do no harm. But as a rule every sort of pressure occasions an attack of inflammation and, maybe, suppuration. Though an abscess be ever so small it is sufficient to destroy all or a part of the mamma forever,—a serious misfortune in a female. A swelled mamma must be left alone. Applications of cool or warm water, the cloth being well pressed out and covered with oil-silk and cotton, or flannel, or of a mild lead wash, will answer well. Also applications of iodide of potassium dissolved in glycerin, one part of the former in two or five of the latter, which are repeated every few hours. Extract of belladonna may be added to advantage. When suppuration could not be avoided, the incision must not be delayed. It ought to be made at the greatest possible distance from the nipple, directed towards the nipple, so as not to cut the main milk-ducts, and treated antiseptically. Indurations remaining behind require frequent and gentle inunctions of an iodoform ointment (iodoform, ℈ii; ol. bergamot, ♏iv; adip. suilli, ʒvi–x), or iodoform collodium, to be applied with a brush twice every day (iodof., 1; collod., 10–20) in such a manner that only those scales of the application which are found peeled off from the skin, have to be removed before a new layer is applied over the dried-up previous application. A very mild galvanic current of from two to six elements, conducted through the induration by means of soft sponge electrodes moistened with salt water, has rendered me good services in many cases.

Perimastitis, the inflammation of the surrounding connective

tissue, may occur primarily, but is mostly the final result of traumatic mastitis. It grows dangerous, *unless* incisions are made early and treated antiseptically, with great care. I have met with not a few cases in which the suppuration of the connective tissue was very extensive, spread over a large surface, undermined the skin of the chest, axilla, and back, resulted in gangrene, erysipelas, or sepsis, and terminated fatally. The antiseptic solutions (applications, injections, irrigations) must be used frequently, but ought to be mild. Carbolic acid ought to be avoided, for infants are easily poisoned by it.

The mamma ought to be examined for angiomata in every baby, whether there be mastitis or none. Nævi are by no means rare in this neighborhood, and ought to be destroyed at once, either by the application of concentrated nitric acid or by the actual cautery (red-hot iron, galvano-cautery, or thermo-cautery), for they are liable to grow rapidly, and prove dangerous to the female. The former mode of treatment is adapted to superficial nævi only. Deep-seated ones, and real vascular tumors, require the actual cautery.

8. *Treatment of the Cord.*

The indications for the application of the ligature, and thereby the complete interruption of fœtal circulation, appear to vary in the practice and teachings of the obstetricians. When the baby has cried a few times, the majority apply the ligature and cut the cord. Others insist upon waiting for the collapse of the cord produced by that of the vein, while the arteries are still pulsating, and some will wait for the disappearance of the arterial pulse. A few facts may be remembered for the purpose of guiding the practitioner in individual cases, for the amount of blood entering, or retained in, the body of the infant is by no means an indifferent matter.

If the ligature be applied after the cessation of the umbilical pulsation, there are still six ounces of blood (one hundred

and ninety-two grammes, according to Zweifel) in the placenta. If the latter be compressed by Crede's procedure that amount is reduced to three ounces (ninety-two grammes). Thus the difference between the two procedures means a difference of three ounces of blood in the circulation of the newly-born, which is an enormous addition to the usual quantity of blood, which in the infant but little older is but little more than five per cent. of the total weight of its body. After all, it appears that the deferred separation of the baby, when poorly developed and pale, and the admission of more blood to its system, is deserving of recommendation; while, on the other hand, there may be an occasional indication for bleeding the infant.*

The introduction of a large quantity of blood is, however, no unmitigated blessing. The blood-vessels of the newly-born are so thin and fragile that spontaneous hemorrhages on serous membranes and into the nerve-centres, etc., are by no means uncommon under normal circumstances. It is true that the destruction of superfluous blood-corpuscles is very rapid, as rapid, indeed, as it is known to be after transfusion in the adult, but some time is required to accomplish that end, and during that time hemorrhages may take place, and have been reported by Neumann and Illing. This danger is sufficiently great to counterbalance the alleged observation of Hofmeier, according to whom babies, after deferred separation from the mother, lost less weight and commenced to increase sooner than those removed more speedily. However, Violet states that the former lost twenty ounces (six hundred and nineteen grammes), the latter but nineteen (five hundred and eighty-five grammes).

Nor does Porak's observation, according to which congested babies exhibit a more intense degree of jaundice, lack confirmation.

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* Archives of Pediatrics, March, 1888, p. 130.

If the ligature be thin, it is liable to cut through the walls of the blood-vessels prematurely; if too thick, it may not suffice to compress them satisfactorily. It ought to be applied at a distance of from one and a half to two and a half inches from the abdominal wall. Not nearer, in order to avoid the effect of the immense muscular power of the umbilical arteries inside the abdominal cavity. A second ligature is placed about an inch from the first, and the cord cut between them. It is a good rule, which must surely be adhered to in every case of thick cord, to apply an additional ligature between the first and the abdominal wall, to avoid hemorrhage from the insufficiently compressed arteries, which may take place after the cord has commenced to shrink. The abdominal end of cord is then wrapped up in a dry and soft piece of linen, lint, or cotton, placed on the left side of the abdomen, and fastened, by means of a soft flannel bandage, which is wide enough to cover the larger part of the chest and all of the abdomen, so as not to slip.

In wrapping up the end of the cord no oil must be used. Warmth and dryness favor mumification; moisture and exclusion of air, gangrene. This holds good also for the cord when it is separated from the living baby by an additional ligature, and in the dead. Thus, the former forensic axiom, that a dry cord proved life, which prevailed for decades after Meckel had demonstrated its fallacy as early as 1853, is absolutely worthless. Thus, fatty substances, and moisture of any kind, must be avoided as much as possible. Powdered subnitrate of bismuth, or oxide of zinc, or iodoform, or salicylic acid, one part with ten parts of starch, may be dusted round the insertion of the cord and over the stump daily. The latter application is not necessarily useless (from the point of view of antisepsis), for the separation of the cord is a gradual one, and not uniform through the whole thickness of the amnion and the three blood-vessels.

The size of the sore stump and the rapidity or slowness of cicatrization depend upon the thickness of the cord, the intensity of the line of demarcation, and the reactive inflammation. The latter are most marked in vigorous infants. As a rule, the surface is dry a few days after the falling of the cord, and cicatrization complete within twelve or fifteen days after birth. This normal process is, however, disturbed by careless handling, local irritation, and infectious influences. In these cases there is a serous or purulent secretion, and cicatrization may be deferred for many weeks. Under these circumstances local treatment is required. Carbolic acid ought to be avoided, for the newly-born and infant are easily influenced by its poisonous properties. Solutions of lead, zinc, or alum answer quite well. As before, however, I recommend the powders of zinc oxide, bismuth subnitrate, alum with starch, salicylic acid with starch, or iodoform. Such measures will always prove helpful; to omit them in times of erysipelas or diphtheria is unpardonable. Perchloride of iron, or subsulphate of iron, must not be used. Under the hard coagulation formed by its application over the whole wound secretions will accumulate, cannot escape, are absorbed, and produce sepsis. I have seen babies die from applications of iron to the umbilical stump, as I know of women dying for the same reason when the hemorrhages from their uteri or from the lacerated vaginæ were maltreated in the same manner.

9. *Omphalitis.*

Inflammatory infiltration of the abdominal integuments which surround the stump, with swelling, pain, purplish discoloration, gangrene, or abscesses, and consecutive peritonitis, occurs within a few weeks after birth, and is the result of traumatic or septic influences. The dermatitis requires applications of lead-wash; tendency to suppuration, warm antiseptic (or aromatic) applications; the presence of pus, a large incision, with antiseptic after-treatment. Cold applications are not

tolerated. Bathing is painful. Any of the antiseptics mentioned will render good service. Carbolic acid must be avoided. Generous feeding by a wet-nurse, alcoholic stimulants (from one to two teaspoonfuls of whiskey daily), plenty of water, and evacuation of the bowels by injections, are the additional aids in treatment. The main reliance is on the local treatment,—viz., large incisions and antisepsis.

10. *Umbilical Gangrene.*

This is the result of an inflammatory process in a prematurely-born baby, or one that fell sick with diarrhœa. It may extend inwards to the intestine and terminate in perforation. The prognosis is very bad except in the few cases in which there is a well-marked line of demarcation. The treatment consists in antisepsis and stimulation.

11. *Arteritis and Phlebitis.*

The former is very much more frequent than the latter. Arteritis is often connected with general sepsis, pneumonia, pleurisy, peritonitis, arthritis, and subcutaneous abscesses. The infection reaches the arteries from outside through the lymph circulation, begins in the connective tissue surrounding the vessels, and attacks the adventitia first. Budin succeeded in forcing septic material through the cord from beyond the umbilical ligature. Pus can seldom be squeezed out of the arteries, and the diagnosis is sometimes made at the autopsy only. The disease begins often before the complete separation of the cord, absorption taking place through the cord, which dries and shrinks irregularly, and admits poison through the newly-formed cuts or fissures.

The treatment is indicated by the causes, which are self-infection from a putrefying surface, infection by soiled fingers, cloths, baths, applications of any kind, the contact with a septic mother, or the contact with anything septic,—for in-

stance, the pus of ophthalmo-blennorrhœa, or the decomposing lochial discharges of a healthy woman. Thus the treatment is mostly preventive. The scissors, cloths, and sponges used for the newly-born must be aseptic. The baby must not be in the mother's bed, and must be attended before the mother on the days following her confinement. The hands touching the baby's body must be carefully cleaned and disinfected, the cord and umbilical wound treated as detailed before. The internal treatment is identical with that advised in omphalitis and gangrene.

The symptoms of phlebitis differ sometimes from those of arteritis in this,—that there is more peritonitis of the hepatic region from the beginning, more epigastric meteorismus, more icterus. Now and then pus can be obtained by gently squeezing along the course of the vein. The infection is either direct, through the vein, in which an ulcerous process is sometimes found half an inch or an inch above the navel, or also through the lymph-current in the surrounding connective tissue and the adventitia of the vessel. The treatment cannot differ from that of arteritis. Recovery is possible when the absorption of the poison has not been very copious, or elimination progresses with absorption at an equal rate. A female baby of less than three pounds, in my experience, exhibited no other source of septic infection but a slight erosion or ulceration of the umbilical stump, with hardly any secretion. She recovered, though the process extended to the end of the second week, with temperatures reaching sometimes 103° F.

12. *Umbilical Hemorrhage.*

This may take place from the arteries, either before or after the separation of the cord. Its treatment is either mostly preventive, or the indications become so clear in every individual case that it becomes easy to fulfil them. Though the pulmonary aspiration and the great contractility of the mus-

cular layers of the arteries render a hemorrhage difficult, though no ligatures have been applied, an insufficient development of those muscular fibres, or the presence of asphyxia or atelectasis, or a pneumonia, may produce a disposition to bleed. In such cases it may become necessary to apply an additional ligature. The arterial power being greatest in the abdominal cavity and near the umbilical ring, the cord must not be cut near the body. Two ligatures, as described above, are a fair preventive. Tight bandages impede circulation, and must be avoided. When the cord is cut too short, or torn off, it may be impossible to secure the vessels; in such cases two long harelip needles must be run through the abdominal wall, crosswise, and a strong ligature tied underneath them. The same procedure may be resorted to when the hemorrhage takes place after the separation of the cord, either from the blood-vessels, or from the slowly-healing surface, in consequence mostly of inconsiderate handling. A moderate compression of the wound, which has been covered with iodoform or the salicylic acid and starch-powder, and borated cotton, by means of a bandage, will answer well.

All of such cases yield a better prognosis than those resulting from hæmophilia, congenital syphilis, general sepsis, or acute fatty degeneration. In these conditions the blood coagulates with even greater difficulty than that of the healthy new-born, and not infrequently all attempts at stopping the bleeding are liable to prove futile. The ligation of the whole mass is often unsuccessful because the stitch-channels will also bleed; chemical styptics are too often useless; plaster of Paris has sometimes proved successful, and the actual cautery has proved advantageous in a few cases. But the majority of such cases terminate fatally.

13. *Icterus.*

A certain degree of yellowish discoloration of the skin is the result of the normal changes of hæmatin deposited in the

skin during the rapid transition from fœtal to post-natal circulation. When by retarded separation of the newly-born from the mother, and compression of the placenta, the amount of blood in the circulation of the infant is unduly increased, this form of hæmatogene jaundice is rather more developed. The simplest form of hepatogene icterus is produced by the sudden diminution of the blood circulating in the vessels of the liver, which encourages the exosmotic transition of bile into the adjoining blood-vessels. All of these forms of jaundice require no treatment. Duodenal catarrh will produce icterus in the newly-born, as it does in advanced age. Thus the feeding and the digestion of the baby must be carefully watched. The routine administration of syrup of rhubarb is a mistake on the part of the female busybodies which must be discouraged. Maybe some of them can be taught that acid cow's milk and indiscriminate feeding in general, and exposure, tight bandaging, and cold feet, can do still more harm than their medicines. Icterus resulting from congenital obliteration of the large biliary ducts, or congenital cirrhosis, or acute fatty degeneration, or epidemic hæmoglobinuria is incurable. Icterus during septic infection is a bad symptom, and rarely terminates otherwise than in death. Icterus depending on congenital syphilis of the liver is grave, but I have met with several cases which recovered. A thorough and energetic antisyphilitic treatment is in such cases the only safeguard. It may prove unsuccessful, however, because the syphilitic process of the connective tissue is not confined to the liver, but extends to the rest of the organs. Mercury must be administered for a long time, a twentieth or a twelfth of a grain of calomel three times a day; careful inunction of a scruple of blue ointment daily; or one-thirtieth of a grain of corrosive sublimate in a one-fifth of a per cent. solution of distilled water for subcutaneous injection daily. In the beginning of the treatment two of these medications may be combined,

or one of these together with the internal administration of from three to five grains of iodide of potassium. The internal administration of the bichloride of mercury is also well tolerated; one-hundredth of a grain may be given in a teaspoonful of water, or food, every two or four hours, and continued many weeks.

14. *Melæna.*

The quantity of blood evacuated from the bowels is sometimes enormous, particularly in view of the fact that the weight of the blood in the body of the newly-born amounts to little more than five per cent. of the weight of the baby. The cases complicated with vomiting are the worst. These are the results of the presence of ulcerations in the stomach and duodenum. Competent respiration and an aseptic umbilical wound are the best preventives. The treatment consists in applications of ice to the epigastrium, while the limbs are kept thoroughly warm by artificial means. Tincture of chloride of iron may be given in drop doses. Food is to be given at a low temperature.

15. *Trismus and Tetanus.*

Its prognosis is not quite so bad as it was believed to be formerly. Now and then recoveries have been reported, and I have seen them myself, though the number of cases observed by me have not been very numerous. The prognosis is better when trismus appears at a later period after the separation of the cord than usual, and when its course is protracted. Cases lasting more than five or six days are rather promising. Such as set in early and exhibit a high temperature (106° and more, up to 111°), disturbances of respiration, and great inanition are bad. As a preventive, it has been proposed to remove women, for the time of their confinement and recovery, from districts where trismus is endemic. At all

events, the greatest care must be taken of the umbilical wound, through which the infection takes place. Food must be introduced through the rectum or the nose. For days after no food can be introduced into the mouth; the patients are sometimes able to swallow whatever is introduced into their pharynx. By means of a medicine-dropper or a small teaspoon fluids may be poured down. Medicines must be administered subcutaneously, atropiæ sulphas in doses of one one-thousandth or one six-hundredth of a grain a number of times daily; curare, one-fiftieth or one-thirtieth; extract of calabar, one-half of a grain. A few of my cases got well with chloral, mostly per rectum, in doses of from one to five grains from six to ten times a day. High temperatures may be influenced by antipyrin or antifebrin. Bathing is contraindicated because the baby bears no handling.

16. *Blennorrhœa.*

Blennorrhœic conjunctivitis may be prevented by repeated disinfectant injections into the vagina of the woman in labor. For that purpose a solution of three parts of carbolic acid in one hundred of water, or one of bichloride of mercury in one or two thousand of water, are sufficient. After the newly-born has been bathed, a few drops of a two-per-cent. solution of nitrate of silver, or a one-twentieth of a per-cent. solution of bichloride of mercury, are applied to the cornea. When the disease is established, both eyes are affected in most cases. When but one, the healthy eye must be covered with a disinfecting lotion and borated cotton, and its infection by sponges, towels, water, and fingers guarded against with the greatest care. The diseased eye must be kept scrupulously clean by pouring tepid water over the cornea, or (and) removing the pus by means of small pellets of borated cotton. To succeed in this the upper and lower eyelids must be turned out. This is not always easy, and is never satisfactory unless

the cornea becomes perfectly visible during the manipulation. Once a day the application of a mitigated stick of nitrate of silver (nit. arg., 1; nit. sod., 2) is useful. It may be substituted by a two-per-cent. solution of nitrate of silver in water. In both cases the surface must be washed with a mild solution of table-salt afterwards, and ice-cloths, small and as dry as possible, applied every ten minutes or oftener. When the cornea is ulcerated, a few drops of a solution of sulphate of atropia (1 to 200) may be instilled several times daily.

17. *Umbilical Fungus.*

The umbilical stump requires frequent inspection. Unless it cicatrizes speedily, granulations will spring up from its surface and form into small tumors. They are either sessile or pediculated, and are apt to grow very fast. They are not sensitive, but apt to bleed. In some cases they are discovered on very close examination only, and may remain many years, even to advanced age. Exceptionally such a fungus is not, or but partly, the result of granulation, but consists mainly of the remnants of the omphalo-mesenteric duct (with unstriped muscular fibres, tubulated glands, and cylindrical cells) or allantois. Once it was found by Virchow to be a sarcoma.

It requires no excision. When it is pedunculated a silk ligature may be applied, and, after it has come away, the stump treated. Otherwise the little tumor requires cauterization or astringent and antiseptic applications. Nitrate of silver may be used, but must be neutralized by chloride of sodium immediately. Other applications are, a drop of liquor subsulphatis ferri once or twice daily; the powdered subnitrate of bismuth; iodoform; one part of salicylic acid with five parts of starch.

18. *Hernia.*

Congenital umbilical hernia (exomphalus) is called a fissure of the median line of the abdominal wall, which is the result

of an arrest of development. When the fissure is but small and the sac contains intestine only, the condition is incurable. When the sac is large, containing at least a portion of the liver, together with intestine, the contents may be reduced and the cases cured. Twenty-four such cases have been collected by Kocher.* C. Brenz reports the case of a girl weighing two thousand seven hundred grammes at birth. When the hernial sac had been reduced, which was accomplished with difficulty, he compressed the sac by means of a pair of pincers, removed it with scissors, applied three percutaneous ligatures, removed the clamp, applied the actual cautery to the stump, and covered it with antiseptic dressings. Both these and the ligatures were removed on the eighth day. The case proved successful, though there was peritonitis as early as twenty-four hours after birth.

Acquired umbilical hernia, which contains small intestine and peritoneum, and is produced by a large size of the cord, leanness and insufficient development of the baby, and by screaming, coughing, and the straining consequent upon diarrhœa, constipation, phimosis, or anal fissure, demands reduction, which is almost always quite easy, and retention, which is by no means so easy, within the abdominal cavity. The usual shape of trusses is unavailing, or even injurious. Whatever appliance is used must be larger than the aperture, and not be too hard. Linen or lint compresses, plates of cork, covered with linen or lint, may be held in position by means of a bandage, to which they can be fastened by stitches or pins. Knitted bandages are more useful than those of linen, cotton, or flannel. Adhesive plasters are used frequently, but are generally too irritating on the sensitive surface of the infant.

Incarceration and strangulation of an umbilical hernia are very rare, but there is on record a fair number of cases in

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* A. Jacobi, Intest. Dis. of Infancy and Childhood, p. 267.

which herniotomy was performed successfully in infants of a slightly advanced age.

Inguinal hernia is a curable disease. When the short and straight inguinal canal of the newly-born becomes more oblique and the adjacent fat increases, in the course of a few years the rupture will disappear, provided a proper truss has been retained for a long time. During that period the intestines must not be allowed to protrude at all. The truss must be worn day and night, with the exception of such times when the infant is sleeping quietly. A good fit does not mean undue pressure. The testicle must be closely watched. It is found high up in the scrotum behind the hernia. Sometimes it has not descended into the scrotum, and is then mostly discovered in the inguinal canal. By gently pressing it downwards and applying the truss above, we not only protect it but facilitate a complete descensus.

19. *Congenital Constipation.*

Malformations of the intestinal tract, such as strictures or complete interruptions, will either terminate fatally or require surgical treatment. The latter class includes imperforate anus and rectum. In these cases, where the obstruction is complete, we cannot speak of constipation. This condition may, however, be found to depend on an anatomical peculiarity which is quite frequent, and may give rise to mistakes in diagnosis and treatment. The colon descendens of the newly-born is quite long. The sigmoid flexure, which I have found to measure as many as thirty centimetres (twelve inches), is bent upon itself several times in the narrow pelvis. Thus the convolutions of the intestine will press upon and compress each other* to such an extent as to result in obstinate constipation. In some extreme cases the babies died without or with colotomy,

* A. Jacobi, The Intestinal Diseases of Infancy and Childhood, Detroit, 1887, p. 184.

which was performed on the strength of a mistaken diagnosis. The treatment of that congenital form of constipation must be adapted to the anatomical condition which gives rise to it. Rectal injections alone are rational. They must be made daily, at least once a day, and continued up to the completion of the fifth or sixth or even seventh year. At that period the normal relations of the several parts of the intestine are accomplished, the pelvis becomes larger, and evacuation of the bowels easier. No purgative medicines must be resorted to, inasmuch as the obstacle is mechanical only. There is, however, a single indication for their administration,—viz., those symptoms depending upon constipation, which point to the absorption of intestinal putrid gases above the obstruction. Septic fever, high temperatures, and serious reflex symptoms —such as convulsions—may require the speedy evacuation of the bowels. Though such occurrences be rare, they are sometimes met with.

III.

GENERAL THERAPEUTICS.

THERAPEUTICS of infants and children have enjoyed, or suffered from, their fate like "books" and those of adults. They have had their stages between the era of dull and ignorant prescribing and that of impotent and conceited nihilism. But neither a deluge nor an absence of drugs make a physician, nor do they contribute, when by themselves alone, to the welfare of a single individual or the community.

Much has been said of the difficulty of a diagnosis in the diseases of infancy and childhood, and the consequent difficulty experienced in treating them. I do not believe that the diagnosis in the case of an adult is much easier. The latter will often mislead you intentionally, or because he is carried away by prejudices and preconceived notions; the former may conceal by not being able to talk, but will certainly not tell an untruth. Besides, the ailments of children are but rarely complicated, and a single diagnosis tells the whole story. If it be not made, it is perhaps best for the practitioner not to attempt much doctoring, and for the patient to be left alone. For, happily, most diseases have a tendency to get well, either completely or partially, and many will run a more favorable course when not meddled with.

This does not mean to say, however, that I discourage treatment even in such ailments as run a typical course extending over a number of days or weeks. On the contrary, I am opposed to the practice—much too common—of those who do not, for instance, wish to interfere with a whooping-cough because it finds its natural termination after several months. This is true, but many of the children find their natural termination also during these months. Every day of whooping-cough is

a positive danger. A lobular pneumonia which occurs in the second or third month of the disease, and proves fatal or terminates in phthisis, would have been prevented if the original affection had been removed or relieved by treatment. A physician advising no treatment in such cases as terminate unfavorably in this manner, ought to be made punishable in the state of the future. Nor do I approve of the practice of "meeting symptoms when they turn up." My responsibility is not lessened by my busying myself with subcutaneous injections of brandy when a collapse has set in which I ought to have foreseen and prevented, or with giving digitalis when on the fifth or sixth days of a pneumonia the pulse is flying up to 160 or 200. Anybody can perform that sort of perfunctory expectant treatment extending from the first call to the writing of a death certificate. What I expect of a physician is to know beforehand whether that individual heart will carry its owner through an inflammatory or infectious disease without requiring stimulation or not. Many a case might be saved by a few grains of digitalis, or another cardiac tonic, or a few efficient doses of camphor or musk, if administered in time.

Altogether, it has always appeared to me most satisfactory to treat infants. They are truthful, unsophisticated; they are what they appear, and they appear what they are. In their pathology and therapeutics there is no mysticism, no faith-cure, no spiritism, nor any other diabolism. Their nature and that of their ailments are simple enough, but you must know how to understand them. Fortunately, children are no mere miniature editions of adults, and their ills and whims and their peculiarities must be known.

There is one all-important principle in treating infants and children which cannot be repeated too often. They are very liable to become anæmic, to submit to general inanition, and suffer from failure of the heart in spite of its anatomical and physiological vigor. These facts render it urgent that the

physician never lose sight of the general condition of the patient while attending to a local disorder.

The best treatment is preventive. Proper feeding and nursing of the infant prevent the numerous gastric and intestinal diseases of the earliest period, which either destroy life at once, or lay the foundation of continued ill health. For that reason a rather large part of my literary labors has been dedicated to the questions of diet and hygiene. Attention to respiration and circulation and the functions of the skin are of similar moment. Bathing, cold washing, exercise, sufficient interruption of school hours, are subjects of vital importance. The best exercise of the child is play. Compulsory gymnastics in badly-ventilated localities cannot take its place successfully. The summer vacations of school-children ought to be four weeks longer than they are. The public schools ought to be closed about the middle of June and reopened in the beginning of October. Some years ago the Harlem Medical Association and the Medical Society of the County of New York requested the Board of Education of the city to open the public schools on the third, in place of the first, Monday in September. The soundness of the principle was appreciated, and the necessity for such a change was acknowledged by the authorities, and *therefore* (!) the second Monday of September was selected for the beginning of the school season, so as to afford the children an extra week's boiling in the city sun and an opportunity to lose, as they did formerly, the benefit derived from the summer vacation. The good effects of the excursions of the St. John's Guild, and the air funds, and the Sanitaria of the Guild, and the Children's Aid Society are steps in the right direction.

Milk and drinking-water are safest when boiled. It is to be hoped that the practice of sterilizing milk devised by Soxhlet, of Munich, and introduced in New York by Caillé, of New York, and Rotch, of Boston, will prove successful.

Mental and physical labor ought to be easy and pleasant. Factory work for children is an abomination, and not only a cruelty committed against the individual child who is helpless, but a danger to the future of the republic, which cannot be expected to thrive while the physical and intellectual development of the future citizen is crippled by the greed of the manufacturer and the recklessness or partiality of legislatures.

In the administration of medicines excitement on the part of the patient must be avoided; the nervous system of infants and children loses its equilibrium very easily. Fear, pain, screaming, and self-defence lead to disturbances of circulation and waste of strength. Preparations for local treatment or the administration of a drug must be made out of sight, and the latter ought not to have an unnecessarily offensive taste. The absence of proper attention to this requirement has been one of the principal commendations of "homœopathy," whatever that may have been the last twenty-five years. Still, the final termination of the case and the welfare of the patient are the main objects in view, and the choice between a badly-tasting medicine and a fine-looking funeral ought not to be difficult. In every case the digestive organs must be treated with proper respect; inanition is easily produced, and vomiting and diarrhœa must be avoided. The most correct indications and most appropriate medicines fail when they disturb digestion; it is useless to lose the patient while his disease is being cured.

The administration of a medicament is not always easily accomplished. Indeed, it is a difficult task sometimes, but one in which the tact or clumsiness of the attendants have ample opportunities to become manifest. For "when two do the same thing, it is by no means the same thing." Always teach a nurse that a child cannot swallow as long as the spoon is between the teeth; that it is advisable to depress the tongue a brief moment, and withdraw the spoon at once, and that now and then a momentary compression of the nose is a good adju-

vant. That it is necessary to improve the taste as much as possible need not be repeated. Syrup will turn sour in warm weather, glycerin and saccharin keep; the taste of quinine is corrected by coffee (infusion or syrup), chocolate, and "elixir simplex," a teaspoonful of which, when mixed each time before use, suffices to disguise one décigramme = one and a half grains of sulphate of quinia. Powders must be thoroughly moistened; unless they be so, the powder adhering to the fauces is apt to produce vomiting. Capsules and wafers are out of the question, because of their sizes; pills, when gelatin-coated or otherwise pleasant and small, are taken by many. The rectum and nose can be utilized for the purpose of administering medicines in cases of trismus, cicatricial contraction, or obstreperousness. Both of these accesses it may become necessary to resort to for weeks in succession.

The effect of a medicine depends on its dose and the readiness with which it is absorbed and eliminated. The latter differs greatly. Curare is eliminated speedily, and must be repeated quite frequently; iodide of potassium soon after its administration, but there are traces in the urine after some days; phosphate of lime appears in the urine and fæces directly; chlorate of potassium is excreted through the kidneys within a few hours, silver and mercury may take a long time, in exceptional cases. Absorption takes place the more readily the more the solution in which the medicinal substance is held is diluted; but it depends greatly on the condition of the surface or tissue which is selected for the introduction of the drug. A horny skin absorbs but little; inunctions require a clean surface, and are best made where the epidermis is thin and the net of lymph-ducts very extensive, on the inner aspect of the forearm and the thigh. A congested stomach, a catarrhal or ulcerated rectum, are more or less indolent, and disappoint our expectations quite frequently. That the doses must be adapted to the ages of the patients is self-

understood; but to establish fixed rules is more than merely difficult. To give as many twentieths of the dose of an adult as the child has years is a fair average; but this rule suffers from very numerous exceptions. Like foods which are tolerated by the adult, but are not tolerated by the young, though their amounts be diminished in proportion to their years, so there are medicines which are not borne by the infant. Nor are the doses the same for every adult. As healthy persons thrive on different quantities of food, so there is a variableness in the amount of medicines required for a full effect. Besides, there are idiosyncrasies which in some forbid the use of a medicine apparently indicated and borne with success by others. There are those who respond quickly, and sometimes too quickly, to very small doses of opium; others in whom a minute trifle of mercury produces salivation. It is this class of cases which gives rise to much disappointment, and requires all the tact and foresight of a good physician. In some the system gets used to a drug after a short time. Babies, after having taken opiates for some time, demand larger, and sometimes quite large, doses to yield a sufficient effect. Some drugs are required in proportionately large doses. Febrifuges and cardiac tonics, such as quinia, antipyrin, digitalis, strophanthus, sparteine, convallaria, are tolerated and demanded by infants and children in larger doses than the ages of the patients would appear to justify. Iodide of potassium may be given in doses of one or two drachms daily in meningeal affections, while in the same, one of the heart tonics, caffeine, must be shunned because of its—under these circumstances—exciting and irritating effects. Mercurials affect the gums very much less in the young than in advanced age. Corrosive sublimate, in solutions of one to six or ten thousand, may be given to a baby of two years with membranous croup in doses of a fiftieth of a grain every hour or two hours, for five or six days in succession, with rarely as much as the most trifling irritation of

the gums or the stomach and intestines. In urgent cases of hereditary syphilis it can be administered on a similar plan for weeks, and, somewhat modified, for months.

The dose of a medicine depends no less on the mode and locality of its administration. Modern therapeutics favor as much as possible local medication, like modern pathology, which requires local diagnoses. Subcutaneous administration dictates smaller doses, the rectum mostly a slight increase. This is a subject, however, to which we shall return. The manner of application results also in different effects. The inunction of the officinal ointment of iodide of potassium is wellnigh inert; its effect is almost exclusively that of massage, for iodine makes its appearance in the urine after days only. Iodide of potassium in glycerin, rubbed into the skin a number of times, may eliminate iodine after a day, in lanolin after a very few hours.

The rectum of the infant and child has been rising in the estimation of the practitioner since the times of thermometry; for it is certainly the safest and easiest place where to take the temperature. For therapeutical measures it is also invaluable. Its importance for the purposes of alimentation has been detailed in a former chapter.

The rectum of the young is straight, the sacrum but little concave, the sphincter ani feeble, and self-control gets developed but gradually. Thus a rectal injection is easily either allowed to flow out or vehemently expelled. Therefore one which is expected to be retained must not irritate. The blandest and mildest is a solution of six or seven parts of chloride of sodium in a thousand parts of water. This may be made to serve as a vehicle of medicine, unless incompatible with the latter, which will be but rare. An enema which is to be retained must be tepid and small in quantity, half an ounce or little more or less, and carried up well into the rectum, for the immediate contact with the sphincter may produce its expulsion.

Care must be taken to exclude air from the syringe, which, for small quantities, must be a well-fitting piston syringe, of hard rubber, with a long nozzle. This must be well oiled, and introduced, not straight, but with a gentle turn, so as to avoid folds in the anal mucous membrane (in the same way a thermometer *ought* to be introduced). The nozzle must not be too thin, as it is liable to be caught; the smallest nozzles of fountain syringes are therefore in most cases improper; the larger size is more appropriate for any age. The injection must be made while the patient is lying on his side, not on his belly over the lap of the nurse, for in this position the space inside the narrow infantile pelvis is reduced to almost nothing.

When medicines are to be injected, the rectum ought to be empty, as in infants it mostly is. When it is not, an evacuating injection ought to precede the medicinal one by half an hour. It ought to be of the mildest possible nature, for any irritation of the rectum, from the local effect of an enema to a catarrhal or dysenteric process, reduces its faculty of absorption. The medicinal solution must not be saturated; indeed, very soluble medicaments only are to be selected for medicinal enemata. Nor must they be acid, or contain anything irritating. Alcoholic tinctures require relatively large quantities of water; quinia salts must not be selected unless very soluble, such as the muriate, bromide, bisulphate. No acids must be used for the purpose of keeping them in solution. Salicylate of sodium, also antipyrin, exhibit their full power through the rectum, and permit of full doses. As a rule, however, the rectal doses are a little larger than those given by the mouth.

Larger enemata are not retained, and are therefore utilized for the purpose of emptying the bowels. This effect is easily obtained in infants and children, for their fæces are soft and movable, with the exception of those cases in which improper medicines (large and continued doses of lime and bismuth, or

astringents), or badly-selected food (casein and starch in undue quantities), or an excess of the normal great length of the colon descendens and sigmoid flexure have given rise to large accumulations of hardened fæces. Small quantities are seldom sufficient for the purpose of relieving the bowels, unless they act as irritants; in this manner glycerin, pure or with equal parts of water, may produce an evacuation readily. An evacuant injection may weigh from a fluidounce to a quart in some. It ought to be given while the child is lying down; the liquid must not enter the bowels quickly or vehemently, the fountain syringe not being more than ten or twelve inches above the anus. If that precaution be observed, occasional pain, or faintness, or vomiting can be avoided. If water, or water with two-thirds of one per cent. of salts, be insufficient, more salt or soap may be added for the purpose of enforcing the evacuation. Half a tablespoonful of oil of turpentine, with a pint of soap and water, acts often charmingly; so does the addition of a few drachms of tincture of assafœtida, in conditions of constipation, flatulency, and nervous excitability, also in convulsions, or glycerin in obstinate constipation.

Large injections will have other indications besides that of evacuation of the bowels. In many cases of intense intestinal catarrh large and hot (104° to 108° F.) enemata will relieve the irritability of the bowels and contribute to recovery. They must be repeated several times daily. When such evacuations contain a great deal of sticky viscid mucus, the addition of one per cent. of carbonate of sodium will liquefy the tough secretion. When there are many stools, and these complicated with tenesmus, an injection, tepid or hot, must or may be made after every defecation, and will speedily relieve the tenesmus. In such cases flaxseed tea or a thin mucilage may be substituted for water.

When the bowels are in a state of chronic catarrh or ulceration, the injections ought to be particularly large and contain

astringent or alterant medicines. Though they be expelled immediately, enough of the dissolved or suspended remedy will remain upon the mucous membrane. Sulphate of zinc, alum, subacetate of lead, tannic acid, nitrate of silver, salicylic acid, carbolic acid, and creasote have been used in such medicated injections. One per cent. solutions will suffice. Salicylic and carbolic acid may prove uncomfortable or dangerous, and ought to be dispensed with. Nitrate of silver requires some precaution. From a grain to five grains or more in an ounce of distilled water may be safely injected, but this enema must be preceded by an evacuant one consisting of water only, and followed by one containing some chloride of sodium for the purpose of neutralizing the nitrate and protecting the anus and external parts from local irritation. It will also be found advantageous to wash the anus and perineum with salt water before injecting the silver solution. In many cases where one of the above-mentioned agents appeared to be tolerated badly, or proved inefficient, subnitrate (or subcarbonate) of bismuth mixed with water, or gum-acacia water, in different proportions, proved very acceptable and healthful.

Suppositories are useful both for evacuating and medicinal purposes. Soap is utilized for the former purpose by the public at large, and the same material differently mixed, with or without medicinal additions, such as atropia, by the irregular trade. Local medicinal applications to the rectum are best made by means of injections, but a general effect is also obtained through a suppository. Opiates, and narcotics generally, exhibit their full power when the suppository is retained. Extract of hyoscyamus, from half a grain to a grain in a suppository, to be repeated from two to five times daily, shows its effect in vesical spasm nearly as well as when taken internally. Quinia is gradually dissolved and absorbed. Extract of nux, both in ointments and in suppositories, acts well in prolapsus of the rectum and debility of the sphincter.

Subcutaneous injections of remedial agents ought to be made more frequently than appears to be customary. The extremities ought to be avoided, for their constant motion and the relative absence of fat in their subcutaneous tissue are liable to give rise to local irritation, swelling, or suppuration. The abdominal wall is preferable. A sharp and aseptic needle and gentle friction of the injected part are all that is required. The solutions used must be clear and without any solid ingredients. When they have been preserved for some time they ought to be filtered before being used, particularly when fungous growths have begun to make their appearance in the liquid. The latter may be preserved best by adding a small quantity of alcohol, salicylic acid, or hydrocyanic acid. The doses must be small, and the medicine diluted more than in the case of adults. This is mainly required where a caustic effect is to be feared. While, for instance, Lewin advised for adults a solution of four grains of bichloride of hydrargyrum in an ounce of water, one or one and a half grains give a more appropriate solution for infants. One or two daily doses of eight or ten drops continued for weeks will prove very useful in those urgent cases of hereditary syphilis which are characterized by pemphigus on the soles of the feet and the palms of the hands in the first days after birth. Brandy and ether may be used undiluted as in adults, but the greatest care must be taken as to the locality injected. The subcutaneous tissue must be reached and the cutis penetrated. Chloral hydrate dissolves readily in two parts of water, but a solution of one in four or six is better tolerated. For the ready symptomatic treatment of convulsions it renders good service. Antipyrin is well borne in solutions of one in six or eight parts of water, camphor in from four to six parts of almond oil. Digitalin, in solution, and the fluid extracts of digitalis and ergot, are very apt to give rise to indurations and abscesses. As a rule, the most convenient medicaments for hypodermic

administration are the very soluble alkaloids. One or three drops of Magendie's solution of morphia or the corresponding solution of muriate of morphia are vastly preferable to the internal use of narcotics for bad pain in pleuritis or pleuropneumonia, or in peritonitis. It may be mixed with atropiæ sulphas for the reasons regulating its use in the adult. The latter by itself has been found quite effective in the case of an epileptic boy, who had taken the same drug internally without any success. If possible, it ought to be injected during the aura; if not, twice a day. Apomorphiæ murias is a ready emetic in doses of a thirtieth or a fifteenth of a grain. Pilocarpiæ murias can be injected in doses of one-twentieth to one-eighth of a grain. Its reckless use, both hypodermically and internally, has led to occasional mishaps, but the drug is a powerful agent for good when carefully applied, and has saved for me several cases of meningeal hyperæmia and cerebral œdema, mostly of nephritic origin. Sulphate of strychnia, while in the same affections it has mostly proved inefficient when taken internally, has rendered efficient services in enuresis depending on paralysis or weakness of the sphincter of the bladder, and in prolapsus of the rectum, and fæcal incontinence resulting from paralysis of the anus, which depended either on disease or congenital incompetency. In these cases a daily dose of a fortieth or a twenty-fifth of a grain—according to the age of the patient or the severity of the case—is sufficient. More frequent doses, however, are required in the diphtheritic paralysis of the respiratory muscles, which is dangerous and apt to become fatal unless speedily relieved. A daily dose will also yield fair results, when long continued, in spinal or cerebral paralysis. Quinia salts must be neutral when injected; I prefer the bromide, the muriate, or the carbamide. They, particularly the last, are among the most soluble. The carbamide dissolves readily in from four to six parts of warm water; the latter temperature

ought to be preferred in every case of subcutaneous injections. Quite saturated solutions ought to be avoided, because it has happened to me that the water of the solution was speedily absorbed, and the quinia remained as a foreign body in the subcutaneous tissue. Caffeine, in its combination with sodium and salicylic or benzoic acid, is an excellent heart stimulant, and has rendered splendid service in urgent cases of heart-failure or pulmonary œdema depending on cardiac disease. Both the salicylate and the benzoate of sodium and caffeine are soluble in two parts of water, and are readily absorbed. Neither has, as yet, been prepared in the convenient tablet form which has proved so acceptable in the cases of other alkaloids. Both must be avoided in those cases which are complicated with cerebral irritation. Fowler's solution, carefully filtered, may be injected into healthy or morbid tissues without often risking irritation and abscess. Still, I have seen a splenic abscess after such an injection in a case of sarcoma of the spleen. Undoubtedly, the continued use of arsenic renders very efficient services in sarcoma; but as it has to be used a very long time, it is almost useless, except in hospital practice, to rely on hypodermic medication. There is no harm in this, however; for a very gradual increase of the drug is tolerated to such an extent that, after awhile, very large doses (amounting to half a drachm or a drachm daily) of Fowler's solution may finally be administered.

Inhalation is resorted to in two different ways. Either the air of the room or a tent is impregnated with the substances to be introduced into the air-passages, or these substances are introduced through sprays or atomizers of different shapes and patterns. Some of the latter have always appeared to me very faulty, and not to the purpose at all. Tubes introduced into the mouth, through which substances are to be carried down, will land them in the mouth; it takes all the self-control and intelligence of an adult patient to allow the object

in view to be accomplished. The oral cavity is small, the tongue gets coiled up, and the faucial muscles will not relax. Nose and mouth must co-operate to allow inhalations to enter the larynx, or the former alone must be relied on. A spray calculated to reach the larynx is always best introduced into and through the nose. In this way, at all events, the posterior part of the pharynx and the respiratory tract are reached to best advantage.

Real inhalation, however, means filling the lungs with a gas or vapor. Warm steam will do good service in bronchitis and pneumonia, when the bronchial secretion is viscid and expectoration difficult, and in diphtheria, for the purpose of softening membranes and increasing the secretion of a thin and normal mucus. Cases of fibrinous bronchitis I have seen getting well in bath-rooms, the hot water being turned on for days in succession and the air thick with steam. An excellent inhalation in the inflammatory conditions of the respiratory organs is that of muriate of ammonium. Every hour, or in longer intervals, a scruple or more of the salt—the quantity depending in part on the size of the room—is burned on the stove, or over a live coal or an alcohol lamp. The heavy white cloud fills the room, is easily borne by both sick and well, and improves expectoration. Oil of turpentine can be utilized in a similar way. Its action is both expectorant and disinfectant. In the latter stages of pneumonia, when the bronchial secretion is thick, viscid, or deficient, and expectoration and cough are wanting, the room may be filled with turpentine vapor. This can be accomplished in different ways. A large soft sponge may be soaked with turpentine, with or without the addition of some oil of sassafras, and suspended at the bedside. Or a kettle may be kept boiling day and night with water, on the fireplace or over an alcohol lamp (which is preferable to a gas-stove, which consumes too much oxygen), and a tablespoonful of turpentine, more or

less, poured on the boiling water every hour or two hours. The same may be done to advantage in diphtheria, with or without a teaspoonful of carbolic acid in addition to the turpentine, and in gangrene of the lungs. The inhalation of benzin, cresolin, and similar substances, and the coal-gas of the gas-factories, have been amply recommended in whooping-cough. In its worst forms, particularly when it is complicated with convulsions, the frequent inhalation of chloroform is sometimes life-saving. A baby of six months, with hourly attacks of convulsions, I kept alive by putting him under the influence of chloroform at the beginning of every attack, and continuing that treatment for fully four days. Asthmatic attacks will do well sometimes with inhalations of chloroform, ether, and spirits of turpentine in different proportions. Nitrite of amyl also will influence them favorably; as a preventive of epileptic attacks I have experienced but little success with its administration. But in collapse, with paralysis of peripherous blood-vessels, it certainly renders good service. With the inhalation of oxygen for the purpose of bridging over the most dangerous period of a suffocating pneumonia, and of improving tissue-change in general anæmia and ill-nutrition, the profession is well acquainted. With the inhalation of ether as an antidote to poisoning with santonine I have no personal experience.

In pulmonary tuberculosis the inhalation of disinfectant vapors is employed less than the necessity of the cases appears to indicate. Carbolic acid, turpentine, eucalyptol, may be utilized for that purpose. The object is to supply the lungs with those substances in thin dilutions, but constantly. Prudden has proved that carbolic acid in twelve hundred parts of water stops the emigration of leucocytes in inflammatory disorders. Thus high dilutions, though they be hardly perceptible to the senses, and certainly not to a disagreeable extent, are amply sufficient. It is for this reason that Feld-

bausch invented small apparatuses filled with a disinfectant substance to be worn in a nostril, constantly.

The inhalation of chloroform, which is preferable to ether for the purpose of producing anæsthesia in the cases of infants and children, is rather unsatisfactory at the earliest age because of the superficial character of respiration. Its effect is very temporary, and the administration must be repeated during a convulsion or an operation. The difficulty in obtaining a complete narcosis is particularly great in the newly-born. The stage of excitement is but brief, the pulse becomes frequent, and the pupils contract. After a short time the pulse, however, becomes slow, and the pupils dilate. The after-effects are not so inconvenient as they often prove in the adult; children vomit less frequently and less profusely, and certainly with greater facility and ease, than adults. They are liable to remain under the influence of the anæsthetic a long time after an operation has been completed. After tracheotomies, which I never performed without chloroform unless the children were asphyxiated by carbonic acid poisoning, the patients are apt to sleep long and undisturbed. Thus they require a ceaseless watching until the effect has surely passed away. Through the opened trachea the children will get under the influence of chloroform very easily. Five or six drops on a sponge or some absorbent cotton, held in the mouth of the tube by means of a pair of pincers, have an almost instantaneous effect, and came near destroying a successful case of mine nearly thirty years ago, before I had the experience detailed in the previous remark, when I undertook to change the tracheal tube on the third day. Further care is also required in regard to patients in ill health. Chronic pulmonary and heart diseases do not tolerate chloroform very well, but the diagnosis of these conditions is more readily and quickly made in children than in the adult. Adipose children are liable to faint. Operations in the mouth it is best to perform

without an anæsthetic, for the amount required to overcome the resistance of the masseter and buccinator is so large, generally, as to possibly endanger the life of the patients, beside the impossibility of obviating successfully the entrance of blood into the digestive organs, where it is inconvenient, or the respiratory organs, where it is a positive danger.

Gargles of any description require a certain degree of training and self-control, and are therefore not available for children of less than seven or eight years. The liquids thus employed do not reach any farther than to the uvula, the pillars of the soft palate, and the anterior part of the tonsils. Whatever succeeds in passing them is swallowed. Thus the alleged efficacy of gargles is greatly overestimated. Astringents only have a certain influence reaching beyond the area of contact through their secondary effect on contiguous tissue. When a thorough effect is aimed at, it is better to rely on sprays, which may affect the whole pharyngeal cavity, or on insufflations of powders. As, however, in most cases where a local effect on the pharynx is desirable, the local affection spreads over the posterior nares as well, spraying, or injecting, or irrigating the nose is preferable. The liquids thus employed reach the pharynx, and are either swallowed—which is often an indifferent matter—or expelled through the mouth. When these methods are undesirable, for instance, when the liquids injected enter the Eustachian tube, they may be poured into the nasal cavities from a teaspoon or a pipette. A common medicine-dropper will often suffice. There is many a case of diphtheria in which the very gentlest method of cleansing and disinfecting the surface of the naso-pharyngeal cavity ought to be selected.

When no liquids are tolerated, fluid ointments may be introduced into the nostrils by means of a camel-hair brush, or poured in. Ointments prepared with vaseline, glycerin, or cold cream and lanolin are good vehicles. Sponges and

brushes ought to be avoided whenever the young patient objects to these strenuously. No violence must be used, for several reasons. The child's strength must not be exhausted by his attempts at self-defence, and most local affections of the throat get worse by any injury done to the epithelia. Even galvano-cauterization can and must be applied without much violence. Persuasion, patience, and cocaine will render it possible.

The *skin* in infancy and childhood participates in the anatomical structure of all the tissues at that early period, inasmuch as it contains more water than in advanced age. Besides, it is thinner. This explains many peculiarities in regard to the effects of many medicaments. Electricity in all its forms is more efficient, and a relatively mild current suffices. This fact is of particular importance, as, moreover, the bones also are thinner and more succulent. To act upon the brain, very mild currents only must be used. The spinal cord is less accessible, and appears to require rather large doses. The galvano-caustic effect resembles very much that obtained in the adult. In most cases it can be watched while being employed; thus, for instance, in the operation on angiomata, or diseases of the tonsils or nose.

Sinapisms, when not mixed with flour, must not be permitted to remain more than a few minutes. As soon as the skin begins to be discolored they must be removed. When that is done, they may be repeated every few hours, and they are active derivants in many cases of deep-seated congestive processes. The same remark is due in reference to the use of mustard-baths. A hot mustard-bath renders good services in suppressed or insufficient cutaneous eruptions of an acute character, internal hemorrhages, meningitis, and pneumonia. But it must not be continued beyond reddening the skin.

Vesicatories have lost much of the esteem in which they were held in former times. I remember the time when many

a case of pleurisy, articular inflammation, herpes zoster, was not permitted to get well without a Spanish-fly blister. Nor am I of the opinion to-day that it will do no good in some such cases, provided it be not used during the feverish stages. But their drawbacks are many. A plaster will not stick to an emaciated and uneven surface, and is even apt to give rise to gangrene when the surface circulation is very defective. In these cases the wound will heal badly. The skin of the infant being very vulnerable, eczema and impetigo will easily arise on even slight provocation. The local pain of the application produces irritation, nervousness, and sleeplessness. This is particularly so if the application be made on the extremities or the posterior surface of the body. The kidneys are frequently affected by cantharides, dysuria being the result in many cases, which then require energetic camphor treatment for the relief of the torturing symptoms.

There are some absolute contraindications to the external use of cantharides: the presence of diphtheria in any shape or manner, and such diseases as are liable, during the prevalence of an epidemic, to become complicated with diphtheria. Therefore no vesicatory must be used during nasal, pharyngeal, or laryngeal diphtheria (croup), or in the different forms of pharyngitis, or in laryngeal catarrh.

When a plaster cannot be expected to remain on the surface and to have its full effect, cantharidal collodion may take its place. The application will prove more effective when the surface is first washed with vinegar, or irritated by a sinapism, which, however, is allowed to remain a few minutes only. Then a flaxseed-poultice or warm-water applications may be applied over the vesicatory to diminish the pain and increase the effect. Very young infants ought not to carry a vesicatory more than an hour, at least not on the same spot. It is for this reason that to them the cantharidal collodion is less adapted. The plaster may be shifted from place to place.

After the epidermis has been raised, the serum must be allowed to escape through small punctures, but not so as to moisten the adjoining parts, for the cantharidin contained in the serum may exert a disagreeable local effect. The epidermis ought not to be removed, and no irritating ointment used to keep up a secretion. To cover the sore surface, vaseline or cold cream are preferable to animal fats, which may be, or become, rancid. The best final dressing is borated cotton and a bandage. Vaseline ointments with opium, lead, or zinc, and powders of zinc, subnitrate of bismuth, iodoform and amylum, in equal parts, or salicylic acid one part, with five or ten of starch, will find their occasional indications.

In many affections of the skin powders, solutions, liniments, ointments, and baths are employed. The skin is thin and irritable. Erythema will follow the contact with water quite often; thus many forms of dermatitis contraindicate its frequent use. Acute and chronic eczema get on better without than with it. Therefore astringent solutions are less advisable than astringent ointments. For superficial effect these must be prepared with vaseline or cold cream, either of which may be readily combined with lead, tannin, zinc, bismuth, salicylic acid, or iodoform. In not a few cases, with a very sore surface, denuded of its epithelium and oozing, the powders alone, or combined with starch in different proportions, will prove very effective Oleates ought to be avoided,—they irritate the skin and produce eruptions.

As the skin is thin and succulent, and the lymph-ducts quite superficial, large, and numerous in the young, substances will penetrate the skin quite readily. Ointments with that object in view must be prepared with animal fats, particularly with lanolin, to which ten per cent. of water must be added. Still, much friction may by itself irritate the surface and give rise to suffering.

In the very young, *ice* and *ice-water* applications are not

tolerated a long time. Ice to the cranium, the bones of which are but thin, is liable to produce collapse; about the neck and occiput it is better borne and often beneficial. Warm *fomentations* and hot poultices are very beneficial in many morbid conditions of the trunk and extremities, but dangerous when applied to the head and not carefully watched. General *baths* are frequently required, local baths but seldom; foot-baths may be given while the patient is lying down, but hot fomentations are more readily made, and do not require the same amount of watching, nor are they equally objectionable to the young patient.

Depletions were frequently resorted to scores of years ago. Modern practice has learned how to do without them, though we may be willing to assume that they were more frequently indicated than many of us believe at present. At all events, it ought to be taken into consideration that there is but a single pound of blood in a baby of twenty pounds, and that a patient rapidly reduced by sickness is least able to stand a loss of blood ever so small. Thus a venesection will hardly ever be thought of; at all events, I hope never to repeat the opening of a jugular vein, practised by me in a case of convulsion depending on, and increasing, cerebral congestion, a quarter of a century ago. Local depletions were once more frequent, though the liability of the skin to inflammation and furuncle was well understood, and the excitement of the little patient was such, now and then, as to lead to an increase of the symptoms, and even to convulsions. Among the occasional drawbacks was also the possible loss of blood after the leeches had fallen off. In such a case the local use of tannic acid, alum, perchloride or subsulphate of iron, digital pressure, or in bad cases the ligature underneath a harelip needle, or antipyrin in from five to twenty per cent. solutions, with or without tannin, were resorted to. The indications were bad and painful cases of pleurisy and peritonitis, and cerebral inflammatory diseases.

In the latter, the mastoid process and the septum narium are the points on which the leech or leeches ought to be applied. It is the latter spot which I prefer, when I have the choice, in such rare cases of brain-diseases of infants and children in which I still feel justified to recommend a depletion.

IV.

CONSTITUTIONAL DISORDERS.

1. *Anæmia.*

ANÆMIA is often the result of a hereditary predisposition, or congenital from some accidental cause. Mothers who suffered much during their pregnancies, or were delicate themselves, are liable to give birth to anæmic and puny infants. Premature infants, or those afflicted with congenital diseases, such as "cyanosis" or neoplasms, or smallness of heart and arteries, are anæmic, and apt to remain so. Another cause of idiopathic or primary anæmia is found in actual loss of material by copious suppuration, excessive exudations in pneumonia and pleurisy, or real hemorrhages, the results of which are sometimes not relieved through a whole lifetime. They are quite frequent in the newly-born or young, in true melæna, hæmophilia, umbilical bleeding, cephalhæmatoma; from hare-lip operations or ritual circumcision; from rectal polypi; from coryza, heart-disease, or abdominal stagnation, as epistaxis; or from ulcerations in diphtheria.

As these papers are meant to discuss therapeutics only, I cannot do more than simply allude to the direct and indirect causes of anæmia for the purpose of obtaining the indications for treatment. Among the former are prominent the administration of an insufficient amount or an improper composition of food and insufficient supply of oxygen. Among the latter I count every disease of more than a very temporary character; all those ailments which so change the alimentary digestive organs as to interfere with digestion; diseases of the organs of respiration, circulation, and elimination (kidneys); all feverish diseases, and particularly the infectious fevers (scarlatina, malaria, least of all typhoid fevers, unless they result in chronic

intestinal ulcerations); diseases of the lymph system, the larger part of which are accessible to successful treatment. It is true that pseudo-leukæmia offers the same difficulties which we meet in the adult; but the many glandular swellings—"scrofulous" or not—permit of successful treatment, both preventive and curative.

All these affections, the number and names of which I do not care to multiply, are the more dangerous, and require the more dietetic and medicinal attention, the greater their detrimental influence during infancy and childhood,—that is, during the period of growth, in which the organism has not only to sustain itself, but to increase steadily. The latter consideration is a very important one. It includes the necessity to which I have alluded in a previous chapter, not to permit a morbid condition, either acute or chronic, to exhaust itself without interference. A disease shortened a day, a sleepless night less, a dozen of diarrhœal movements prevented, a racking cough soothed, a convulsion interrupted, an excessive temperature relieved, are just as many prophylactic points gained, and as many causes of persistent anæmia mitigated in their dangerous influences.

These considerations are the more weighty the younger the patient. For in regard to anæmia the young are in a very precarious condition indeed. The infant (and child) has less blood in proportion to its entire weight than the adult; this blood has less fibrin, less salts, less hæmoglobulin (except in the newly-born), less soluble albumen, less specific gravity, and more white blood-corpuscles. It has a specific gravity of but 1045 or 1049 compared with that of 1055 in the adult. The total amount of the blood in the young is relatively small. Its weight, compared with that of the body in the newly-born, is 1 : 19.5. The relative figures in the adult are 1 : 13.

Hence it follows, from a practical point of view, that it is important not to permit the relatively small amount of blood

in an infant or child to be unduly diminished or diluted. Thus the subject of feeding and digestion is of such paramount weight in pediatrics.

While it is a good rule to be careful in regard to the amount of *food* to be allowed in the beginning of a feverish disease, a fair quantity must be allowed after a while, provided it is fluid and well selected. Unless there be a contraindication in the condition of the stomach, mostly albuminous nutriment must be administered. During protracted diseases the danger of inanition becomes imminent, still more in the young than in the adult. Convalescence requires generous feeding and stimulation also, with this restriction, that the meals must be small and frequent, and the stomach sustained all the time. In this way many a case of secondary anæmia may be avoided.

Babies become anæmic when their mothers or nurses have too little milk, or when the supply is ample but of an improper quality. Nursing during a subsequent pregnancy must be forbidden. It must not be continued too long, certainly not beyond the protrusion of the first group or groups of incisors. Nor must it be continued beyond the tenth month if at that time no tooth has made its appearance. Many a case of anæmia or rhachitis will be cured by a change of such faulty diet. It is better for the baby to develop teeth, bone, and muscle on barley or oatmeal and cow's milk than to become rotund with œdematous fat, and anæmic on his mother's powerful sympathy and powerless breast-milk. Maternal love does not improve the breast-milk of a person with a history of consumption, rickets, syphilis, nervous disorders, or intense anæmia. Sometimes even a healthy woman has a milk which is not adapted to that particular baby; then another woman or artificial food must be preferred. The addition of barley or oatmeal and beef-soup or beef-tea is always advisable when a nursling becomes anæmic without having been afflicted with a

tangible disease. A small piece of beef, half an egg daily, a crust of bread, may be added about the end of the first year. The diet ought to remain simple, and mostly fluid or semi-solid until the child is two years old. Avoid bad habits, such as fast eating, and enforce regular defecation, plenty of exercise out of doors, and undisturbed and long sleep in a cool room. Avoid crowded school-rooms and protracted lessons. "We have laws to protect children from being sent to work in factories, or to be employed on the stage, but none to protect them from the equally destructive, incessant schooling in close rooms, without air or exercise. There are too many books bought for Christmas, and too few skates."*

The subject of nursing and artificial feeding, and of digestive organs, has been treated of elsewhere ;† thus I abstain from discussing the matter here beyond the above fragmentary remarks. What, however, cannot be emphasized too much or too often is the necessity of resorting to animal food—soups, teas, peptones —in cases of infantile anæmia.

The medicinal treatment of anæmia must fulfil the causal indications first. That which depends upon chronic *gastric catarrh* requires, according to circumstances, alkalies or hydrochloric acid, pepsin, bismuth. Beside the well-known subcarbonate and subnitrate, the salicylate has made many friends of late, deservedly. Pepsin and dilute hydrochloric acid are best combined ; a baby of a year may take six or eight drops of the latter in six or eight ounces of water daily, or the acid may be mixed with milk according to the formula given in a previous essay. Disease of the kidneys has its own indications. The regulation of the heart's action—which, when abnormal, is the most frequent cause of habitual epistaxis, and of gastric catarrh

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* Archives of Medicine, vol. i. p. 1, February, 1881.

† A. Jacobi, "The Intestinal Diseases of Infancy and Childhood."—Detroit, 1887.

and hepatic congestion—is the first indication in secondary anæmia. Many a gastric catarrh will not get well without digitalis or some other *cardiac tonic*, and persistent nose-bleeding is apt to improve immediately after the administration of digitalis, with or without iron. Thus, in a great many cases, anæmia is "cured by digitalis." In a similar manner digitalis can be utilized for the purpose of more competent oxygenization of the blood. When the heart is weak, and the lungs, by virtue of old pneumonic infiltrations, offer too great a resistance to an easy circulation in the pulmonary vessels, it is again digitalis (or its equivalents) which facilitates the extensive contact of the oxygen of the atmosphere with a larger number of blood-cells.

The *insufficient innervation* of the muscular tissue of the heart, stomach, and the rest, which is one of the most serious results of anæmia, is corrected very happily by *strychnia* or other preparations of nux. An infant a year old tolerates and requires one-fortieth of a grain of strychnia, or one-fifth of a minim of the fluid extract of nux, daily, for a long time in succession. These preparations may easily be combined with any other medicinal administrations.

Iron is looked upon as the sheet-anchor in anæmia. It is mostly indicated in cases of primary uncomplicated anæmia. A catarrhal stomach does not bear it well; when the stomach, however, is abnormal in consequence of the general anæmia, iron improves both the general condition and the stomach. In many of these cases the addition of bitter tonics is advisable; strychnia is perhaps preferable. Anæmia after malaria, dropsy from anæmia, and chronic nephritis, anæmia with neuralgia, anæmia with (and from) valvular diseases which do not result in local congestion,—mainly incompetency of the aortic valve,—are greatly benefited by iron. Anæmia after chronic diarrhœa requires great care in its use; in most cases it can, or ought to be, avoided. While it is very beneficial in

the predisposition to hemorrhage, it must be avoided in hæmoptisis. It is contraindicated in inflammatory fevers, for it increases pulse, arterial pressure, and temperature. But in infectious fevers, such as erysipelas and diphtheria, it is very efficient. It requires good digestive powers, and, to combat anæmia only, no large doses. The total amount of iron introduced into the system in the daily food does not exceed much a single decigramme (one and one-half grains), and that contained in the blood of the adult has a total weight of three grammes only. Still, it is quite possible that the iron introduced into the stomach fulfils more indications than that of supplying hæmoglobulin.

Of the preparations mostly in use, either officinal or otherwise, I have mostly employed dialyzed iron, a few minims several times daily, the tincture of the malate, twelve to thirty minims daily, and the same, or somewhat larger doses, of the tinct. ferr. acet. æth. and tinct. ferr. chlor. The dry preparations are the phosphate, one to two grains three times a day, and the same doses of the carbonate (saccharated). The latter is aptly combined with proper doses of bismuth. The syrup of the iodide of iron is well tolerated by the youngest infants; as many drops as the baby has months may be given three times a day up to eight or ten drops a dose. It is well tolerated by the stomach, in which the iodine is freed from the iron and acts as an antifermentative. Besides, experience appears to confirm the theoretical inference that it proves its power as an absorbent in cases of anæmia complicated with glandular enlargements. The syrup of the hypophosphites cum ferro of the Pharmacopœia may be given in larger doses; this is the preparation which I frequently select when I mean to add the fluid extract of nux vomica. It is self-understood that I prefer the legitimate preparations of the Pharmacopœia to the wares of the agents and advertisers, "physicians' samples" or no.

For subcutaneous administration the pyrophosphate of iron with citrate of sodium and the albuminated iron have been recommended. As anæmia is a chronic condition which requires "chronic" treatment, it is not very probable that this mode of employing the remedy is very available.

The administration of iron appears to have an indirect effect also, which is apt to do much good. As a rule, the inhalation of oxygen gas, continued for five or ten minutes, in intervals of from an hour to two hours, seems to improve sanguification and metamorphosis considerably. This wholesome action, it always seemed to me, was most perceptible while iron was administered. To admit oxygen red blood-corpuscles are required; it appears that the influence of iron on their organization and numbers renders the introduction of oxygen into the blood easier and more beneficial.

Some of the worst forms of anæmia are greatly benefited by *arsenic*. They are those which result from long-continued inanition and slow convalescence, in which the stomach does not suffer; from primary catarrh; from chronic malaria; from chronic tuberculosis of the lungs; from chronic glandular swellings of a malignant type, either lymphoma or sarcoma. In all of these forms it is highly useful. The doses need not be large, but may be increased slowly. One-hundredth of a grain of arsenious acid, or one drop, or one and a half of Fowler's solution, three times a day, after meals, the latter amply diluted, are well borne for weeks, even months, without interruption, by a child of four or five years. In malaria, the remedy may be given with quinia (and iron), in other forms with strychnia (and iron); in phthisis, with digitalis.

The gradual increase of the doses of arsenic may be effected in the following manner: A drachm of Fowler's solution is diluted with sixty drachms of water; three doses of this mixture are given daily. If the initial dose be one drop, give a teaspoonful; the next dose is a teaspoonful + one drop, the

third dose a teaspoonful + two drops, and so on, until the sixty-first dose consists of a teaspoonful and sixty drops. Thus the original dose is gently and slowly doubled in twenty days.

Children bear arsenic better than adults, and very much better than senile patients. Still, even they must not take it when they are affected with gastric disorders; nor continue it when in the course of treatment conjunctivitis, œdema of the eyelids and face, or diarrhœa make their appearance.

2. *Rhachitis.*

Many cases of rhachitis which depend on hereditary influences might have been prevented or modified by attending to the parents before conception, or the mother during pregnancy. For a number of their constitutional ailments make their appearance in the offspring with the symptoms of rhachitis. If that precaution have been neglected, the injury inflicted upon the infant cannot be completely annulled; in many cases, however, it can be greatly modified. Thus there are a great many cases of early rhachitis which are due to the influence of mitigated syphilis in the parents. Indeed, some of the microscopical bone-lesions of the two diseases, as they are met with in the newly-born, are difficult to distinguish from each other. Such cases can be greatly benefited by an anti-syphilitic (mercurial) treatment, which must be continued through a period of many months.

Rhachitis due to, or connected with, *digestive disorders* demands the correction of the latter. Gastric catarrh is not frequently primary; more commonly the consequence of faulty diet; but it is in both cases the cause of anæmia, and of either insufficient or abnormal secretion of both the mucous membranes and the glands. The gastric catarrh of rhachitis is pre-eminently acid; thus neutralization of the stomach is required before every meal and between meals. Prepared chalk,

calcined magnesia, bicarbonate of sodium, the several preparations of bismuth, find their proper indications in this condition. The salicylate of bismuth, animal carbon, resorcin, find their places, beside aromatic teas, in complications with fermentative processes in the intestine and excessive flatulency. When the secretions of the stomach are merely insufficient, the addition of chloride of sodium in proper quantities will facilitate the formation of hydrochloric acid. When this does not suffice, pepsin and muriatic acid, the latter largely diluted, will take the place of the physiological gastric juice; and bitter tonics, and alcoholic stimulants, also diluted, will stimulate a normal secretion. Still, the selection of a proper food forms the main part of the indications. The principles of infant feeding, both in health and disease, I have laid down in the first of these essays; to them I refer; also to my suggestions on the same occasion, on the selection of animal foods so urgently required in rhachitis.

Malt preparations have found great favor both with the profession and the public. Unfortunately, the market has been swamped with all sorts of combinations and mixtures to such an extent that the confidence in their honest composition might easily be shaken.

Cod-liver oil, when given pure, is a powerful addition to antirhachitical diet. It is safer to avoid the compounds, emulsions, etc., and to rely on what is knowable. Diarrhœa is produced by it but rarely, in the cold or cool season,—most patients do not tolerate it quite well during the summer or on hot days,—but it has, besides being very nutritive, a favorable influence on constipation. If ever the bowels become too loose during its administration, the addition of bismuth, or a small dose of phosphate of lime, will correct the inconvenience.

Of the internal use of phosphorus I shall treat shortly.

Though rhachitis be a general disease, and not merely one

of the osseous system, the anomalies exhibited by the *bones* are apt to attract most attention. The changes exhibited in the shape of the chest, which result from the pressure of the atmosphere on the soft rhachitical ribs, are not liable to disappear entirely. The "pigeon-breast"—that is, the prominence of the sternum and (or) the costo-cartilaginous junctures—remains for life to a greater or smaller degree, according to the severity of the affection or the restoring power of the expanding lungs. The curvatures of the diaphyses of the long bones are apt to be less marked in the adult because of the extension which takes place during growth. If ever splints are to do any good they must be applied before the bones have become hard again; the eburnation following the softness of the bones after recovery resists every degree of permissible pressure. The tendency to flat-foot acquired through the flabbiness of the ligamentous apparatus during the attempts of the child at locomotion requires straightening and sustaining by a shoe made strong enough to support the ankle; scoliosis, a Sayre's plaster-of-Paris or a felt jacket; the rhachitical groove round and above the insertion of the diaphragm, well-directed gymnastics of the chest; inflexible and ugly curvatures of the long bones, either osteoclasy (fracturing of the curved bone while leaving the periosteum intact, and resetting) or osteotomy (straightening the bone after it has undergone a cutting operation). During the acute rhachitical process the bones will not only bend, but are liable to be changed in their continuity. It is true that genuine fractures are not quite frequent because of the very softness of the bones and the succulence of the periosteum. But infractions (green-stick fractures) are quite common about the extremities and clavicles. The periosteum never participates in the injury; the bone is more or less bent upon itself; the ends are not entirely separated and are easily readjusted, but require splinting until the rhachitical process has terminated in general recovery. Immobilization of the entire

body is sometimes required when the tendency to infraction is quite extensive.

Many of the serious results of softness of the bones could be avoided or mitigated by precautionary measures. Babies in general, and those with incipient rhachitis in particular, must not be made to sit up before their vertebral columns are able to support them. They must not be carried about in an erect posture, nor on the same arm always. They must be kept and carried about in a reclining posture; better on a hair pillow than on the arm until they feel strong enough to do without it. Thus scoliosis can be prevented. They must be discouraged to walk before their limbs are sufficiently strengthened; thus the curvatures of the diaphyses of the lower extremities, which in part result from the vertical weight of the body on the feeble limbs, are reduced to a minimum.

Craniotabes, the rhachitical softening of the cranial bones, is one of the earliest symptoms of the disease. The bones which commenced their post-natal ossification in a normal manner begin to soften to such an extent that the parietal and occipital bones exhibit a number of spots in which the osseous tissue has entirely disappeared. The hair falls out in that neighborhood, the scalp is perspiring copiously, the veins get dilated, the bones and meninges hyperæmic, and meningeal effusions are quite frequent. The softness of the bones results in asymmetry of the cranium, which is flattened by the very pressure of a soft pillow.

The local hyperæmia forbids the use of warm bonnets and feather pillows. A soft hair pillow must be so arranged that the head, together with the body, can be comfortably carried without any pressure. Consecutive brain symptoms require appropriate treatment. Great convulsibility demands bromides, chloral, and mild opiates, which are well tolerated in this condition. The perspiration requires cooling with water,

or water and vinegar, or powdering with one part of salicylic acid mixed with ten parts of oxide of zinc and twenty-five of starch. The general treatment of rhachitis improves this local cranial symptom, which is quite serious. In former years I was in the habit of giving a good prognosis provided the next six or eight weeks would pass without fatal symptoms (convulsions, etc.). That period was generally sufficient to so change the general nutrition and local condition as to restore a fair average of a healthy condition of the cranium and its contents. The experience of late years has shortened this period. What I suggested in a brief paper on the use of phosphorus in the treatment of chronic and subacute diseases of the bones in the "Transactions of the Medical Society of the State of New York," of 1880, and in a paper on anæmia in infancy and childhood read before the Medical Society of the County of New York in 1880 (*Arch. of Med.*, February, 1881), has proved a great success in other hands. For it is to Kassowitz that the credit of the introduction of phosphorus as the main remedy in rhachitis is mainly due. When, twenty years ago, C. Wegner fractured the bones of rabbits and fed the animals on minute doses of phosphorus, he found that these bones would heal in a much shorter time than those which were not so supplied. This observation induced me to employ the drug in all cases of subacute and chronic ostitis, Pott's disease, caries of the tarsus; and a great many cases led me to conclude that recovery was more readily accomplished under this treatment. Phosphorus is, by virtue of its irritating effect, when given in small doses, a tissue-builder, when in large doses, a tissue-destroyer. Thus it is that I am convinced of its tissue-building properties in other parts also. I may mention here, before I shall have an opportunity to return to the subject *in extenso*, that I have availed myself of this quality of phosphorus for other purposes also. It has served me well in those ominous cases, of purpura and similar processes, in which a congenital

or acquired ill nutrition of the blood-vessel walls results in habitual hemorrhages.

Kassowitz's results with the use of phosphorus in rhachitis are generally good. The cases in which it has rendered me its best services are exactly those alluded to, of craniotabes. A very few weeks suffice to change the condition of the cranial bones considerably, the softened parts become smaller and harder, and the consecutive symptoms milder. It is of equal value in acute rhachitis, with its extensive acute epiphysitis, rapid pulse, diarrhœa, general feebleness, and symptoms of scurvy.

The dose of phosphorus in these cases is from one-two-hundredth to one-one-hundred-and-fiftieth of a grain three times daily. I often prescribe the oleum phosphoratum of the Pharmacopœia, which contains one part of phosphorus in ten parts of ether and ninety of oil. Half a minim contains one-two-hundredth of a grain. The oil solutions must not be kept in a concentrated form lest they be decomposed. A mucilaginous emulsion is a fair mode of administration, for which I sometimes substituted Thompson's solution. The best preparation of all is the elixir phosphori of the U. S. Pharmacopœia, five to fifteen minims three times a day. On no account must we be tempted to try in their place the phosphates, the uselessness of which—in such cases—I have discussed extensively in a previous chapter. The hypophosphites of the Pharmacopœia, with or without iron, are a better preparation than the phosphates.

Laryngismus stridulus, the crowing inspiration of infants, is almost always connected with craniotabes, and caused by its meningeal and encephalic results. It consists of two stages, the first of which is that of paralytic apnœa, the second of a long-drawn and loud inspiration through the spastically contracted glottis. The causal treatment is that of rhachitis in general, of cranial rhachitis in particular. Before, however, it can accomplish a permanent effect the single attacks of, and the general tendency to, laryngismus require attention. For

any attack may prove fatal, though the assertion of Vogel's, who expresses the opinion that most cases of laryngismus are fatal, is grossly exaggerated in my experience, which has not changed in this respect since my utterances in 1871.* Beside the phosphorus, syrup of the iodide of iron, and other treatment, the constipation requires more than the usual attention, for the nerve-equilibrium is easily disturbed by a slight irregularity in any of the organic functions. To soothe its general vulnerability the regular administration of the bromides (twelve or fifteen grains daily of a mixture of the potassium, sodium, and ammonium salts) or a few grains daily of the valerianate of zinc are indicated. Many cases bear one-sixth of a grain of codeia in the twenty-four hours. These cases of excessive irritability are quite precarious. In them the ears require particular attention, for the slightest (external or) internal otitis is liable to produce convulsions. In them even the lancing of gums, where there is but a suspicion of local pruritus, may become pardonable. The attack can be cut short by shaking the infant, or slapping the face with a cloth dipped in water, or using the spark of a Leyden flask (for there is no time for the administration of the interrupted current). General convulsions following the attack, which are not uncommon at all, require the inhalation of chloroform or the rectal injection of from four to eight grains of chloral hydrate.

The rhachitical disorders of the *respiratory organs* owe their origin to several causes. In rhachitis the heart is of average size, but the arteries are abnormally large. Great width of arteries lowers the blood-pressure. Thus it is that the murmur of the basilar artery is heard over the fontanel of the rhachitical infant; thus also that the muscles and bones suffer from insufficient nutrition; thus, finally, that the circulation in the respiratory organs is slow and sluggish, with a tendency

* American Journal of Obstetrics, etc.

to produce congestion and catarrh. Other causes of the chronic bronchial catarrh of the rhachitical infant, which is so apt to become bronchitis and terminate in broncho-pneumonia, depend upon the smallness of the contracted chest, which compresses the lungs; and the tumefaction of tracheal, bronchial, and mediastinal *glands*, which are in close lymph communication with the bronchial mucous membranes. There are but few thoroughly developed cases of rhachitis without them. Not infrequently can some of them be felt in the supra-clavicular spaces; more commonly can they be percussed behind the manubrium sterni, the dulness of which is but partly thymic in many cases. Sometimes they can be discovered by percussion of the infra-clavicular region of the (right or more frequently the) left side. These glandular swellings, which point to and explain the frequent relations of rhachitis, scrofula, and tuberculosis with each other, are frequent appearances in the autopsies of rhachitical babies who finally died of the last developments of their chronic catarrh.

This tendency to glandular swellings requires early attendance. It is here where cod-liver oil and the syrup of the iodide of iron are mainly serviceable. In many cases the addition of half a minim of Fowler's solution, administered three times a day, acts favorably. This is the condition of things in which the use of cold sponging, salt-water bathing, salt air, are particularly beneficial. Out-door life must be insisted upon, and there are but few reasons—mostly of a local character—which forbid such babies to enjoy fresh air at all hours of the day and night.

Subacute or acute inflammations of the respiratory organs, when they have made their appearance during the chronic rhachitical catarrh, require, beside the usual rational treatment, some additional measures. More care, than in an average case of the otherwise healthy, must be taken lest the faltering strength be exhausted before the acute disease has had time to

run its course. The sluggish circulation, depending on general debility and the large size of the arteries, demands the administration of heart tonics,—digitalis, strophanthus, sparteine, caffeine, or coffee, from the very beginning, and besides small doses of alcoholic stimulants at an early stage, the use of stimulant expectorants, such as carbonate of ammonium or camphor. There is a positive contraindication to antimonials and squills; even ipecac must be avoided because of its possible depressing effect.

Rhachitical *constipation* is mostly due to the incompetency of the muscular layers of the intestine and the abdominal wall. Thus purgatives must be avoided in its treatment, with the exception of those cases in which the accumulation of fæces in the bowels happens to be attended with serious consequences. In these an occasional dose of calomel will act both as a laxative and a disinfectant. When an acid gastric catarrh accompanies the intestinal weakness, calcined magnesia in doses of a grain, given on an empty stomach, or before meals (never after), repeated several times daily, will neutralize the abnormal acidity of the stomach while opening the bowels. A daily enema of tepid water will suffice to alleviate the troublesome symptom. Cod-liver oil, while being administered on account of the general indications, has also a beneficial local effect. Pure cow's milk is more contraindicated in this condition than in almost any other. The artificial food must contain a copious addition of salt and sugar, and oatmeal rather than barley. Gentle massage of the abdomen, and strychnia, one-two-hundredths of a grain, three times a day, improves the muscular strength. The syrup of the iodide of iron, in three daily doses of a few drops, and the regular administration of beef preparations, will improve the constipation with the other symptoms; particularly when this treatment is commenced at an early period. For it is at an early period, generally in the second or third month, that this rhachitical constipation will make its first

appearance. It is one of the first symptoms of protracted rhachitis, and is diagnosticated from what I have described as congenital constipation—which depends on an abnormal length of the sigmoid flexure—by the fact that the latter begins at birth.

3. *Scrofulosis.—Scrofula.*

The discrimination between scrofula and tuberculosis is attended with no difficulty for those who claim the bacillus of Koch as the pathognomonic essence of the latter. For all the rest, and so it was before the period of the bacillus, the distinction may not be quite so easy; at all events, the boundary-lines between scrofula and tuberculosis are not always quite marked. But it is certain that the bacillus is absent in the former as long as this remains uncomplicated with an accidental invasion.

We speak of scrofula in persons who exhibit a great tendency, with no apparent, or upon the slightest, provocation, to subacute or chronic inflammation of most tissues, mainly the cutis and mucous membranes, sensory organs, glands, bones, and joints. These inflammations are persistent and liable to return; they run their course with both rapid formation and disintegration of the cells, equally in the erethic and torpid forms. Of these, the former is recognized by a frail and thin stature, delicate features, great intellect, blue sclerotic, and large pupils; the latter, by coarse and expressionless face, œdematous lips and nose, congested eyes, large abdomen, swollen glands, and frequent cutaneous eruptions.

It is no reproach to modern therapeutics to be mostly preventive. So is the treatment of scrofula. Many cases of the disorder would not appear if our modes of thinking and feeling, our habits and laws, were not the immediate results of individual egotism. As long as the welfare of the commonwealth, both present and future, does not supersede, in the

convictions of the many, the dictates of selfishness, there will be no restriction on the marriages of the scrofulous, syphilitic, and tuberculous, and the propagation and proliferation of their dangerous ailments. If the mankind of the future means to be healthy and happy, there must be found some mode of preventing hereditary influences from having full sway. We are no Spartans, who kill the unhealthy newly born, but we are to develop into men who pity those laden by their very parents with the eternal curse of illness, and citizens who feel responsible for the physical and intellectual welfare of the community. In the States, scrofula has been on the increase at a rapid pace since the immigration of the most abject parts of the most abject peoples of the Old World has been allowed to swell our numbers by the hundreds of thousands for each of the last dozen years.

An important preventive measure is the suppression of the attacks of acute diseases in children, mainly the eruptive fevers. Upon a former occasion I have emphasized the necessity of medical (hygienic and pharmaceutical) treatment of every case. It is particularly measles and scarlatina which are liable to interfere with the subsequent normal development,—the former through its influence on the respiratory, the latter through its effect on the digestive and lymphatic systems, and also on the bones. The modification of a severe form into a milder form, and the early restitution of the physical functions to a normal standard, is a gain for life.

Scrofula being frequently the direct result of digestive disorders, resulting either from improper food or nutriment improperly given, the greatest care is to be bestowed on both food and the digestive organs. This is of more than the average importance in reference to the offspring of tuberculous parents. No tuberculous mother must nurse her own infant. The selection of the wet-nurse must be the most painstaking,

and the period and mode of weaning must be supervised with the utmost care. Afterwards amylaceous food, particularly potatoes, must be avoided, or given in small quantities only. Good milk (boiled), cereals, and meat, with the addition of fruit, ought to be the principal food of children up to their tenth or twelfth year. Stimulants must not be given except on proper and exceptional indications; thus tea, coffee, alcohol, beverages of any kind, are forbidden as articles of diet. Cocoa must take the place of chocolate. The best beverage is water. It supplies every want, and when taken in sufficient quantities is the best stimulant of tissue metamorphosis. In the very rare cases in which a sensitive stomach does not bear it well, a carbonated or (and) slightly alkaline water will take its place.

Among the foods, cod-liver oil ranks high. Most children take it readily after a short time, and are anxious to have it. Thus there was no necessity of peptonizing, emulsionizing, or "hydroleinizing" from the point of view of the children, or practice. Of the reprehensibility of filling the child's digestive organs with unlimited lime I have spoken in another place. The oil can be taken in successive years. Its administration ought to be interrupted during warm days and during the summer. Still, there are those who bear it well all the time. Fat children do better without it. In disorders of the stomach, and while the appetite is bad, also during a feverish disease of any kind, also during a diarrhœa, it must not be given.

Preparations of malt may be administered to advantage in small quantities several times daily. It is self-understood that the multitude of preparations containing medicines will be left by the intelligent practitioner to the shelves of the corner pharmacy.

Tea of walnut leaves was a universal remedy in scrofulous affections when the tastes were simpler, medicines less in

number, and less ready money was invested in expensive articles. Among the poor, and in country districts, it will prove an admirable adjuvant.

Among medicinal preparations it is those of iron and iodine which have met with most praise. The indications for the administration of the former are those of anæmia. Where this is marked, iron ought to be given, and continued for a long period, according to the principles and methods laid down in a previous chapter. Iodide of potassium, of sodium, and the tincture of iodine have been used. In the erethic form of scrofula they may do harm, and ought to be avoided. The same warning holds good in reference to those children who suffer from frequent attacks of bronchitis, which may already be the precursor or accompaniment of pulmonary tuberculosis. A sensitive stomach will not bear it. It may be made more digestible by the addition of a bitter tonic, and particularly by a few drops of tincture of nux vomica, diluted, with each dose. When the iodide results in bringing on the disagreeable or dangerous symptoms of iodism, the addition of chlorate of potassium to the iodide, in doses of from fifteen to thirty grains daily, according to age, will prove beneficial. The potassium (or sodium) iodide may be taken in five- or six-grain doses, daily, by a child of two years, fifteen grains at ten years, for a long period. The sodium is better tolerated, as a rule. The tincture must not be administered in more than one-drop doses, three times a day.

The indications for the use of iodine in general are also valid for that of the mineral springs containing that element, such as St. Catherine or Kreuznach. Fat children, and those with œdematous swellings, glandular infiltrations, or the exudations resulting from scrofulous inflammations, are mostly benefited by them.

Of phosphorus, as a tissue-builder in subacute and chronic inflammations of the bones, I have spoken in another connec-

tion. Its property as a stimulant of growth in general I have often verified in many morbid conditions. Scrofulous tissues, with their rapid decay and new formation, have indeed the character of an inflammation, with the peculiar characteristic of cell proliferation, which perishes speedily because it is not sustained by a healthy connective tissue. The latter is formed by the internal administration of minute doses of phosphorus, such as I have recommended for the above indications. Thus I refer to the remarks made previously on the subject, on the doses in which the drug is to be given, the period it is to be continued, and the impossibility of substituting for it any of its salts. Those who do not pin their faith in the treatment of any disease on any single remedy, but combine remedial measures with the proper regard to hygiene, will not be mistaken in their expectations of the effects of phosphorus in the treatment of scrofulous disorder. I have used arsenic for the same purposes, and on the strength of the same indications, but it has appeared to me to offer less advantages in these conditions.

A very active treatment can and must be applied to the lymph-bodies. Their tumefaction may be prevented in most cases. They swell under the influence of an irritation in the neighborhood. An intestinal catarrh will congest the neighboring mesenteric lymph-bodies; within a few days they are enlarged and hyperæmic. When the local catarrh continues the hyperæmia will result in hyperplasia, and no long period is required to so change the tissue as to render the induration unabsorbable. If the diarrhœa "of the second summer," or of "teething," had not been permitted to go unchecked, these "scrofulous" glands would never have existed, and never interfered with lymph circulation and nutrition. Or a nasal catarrh, or a facial eczema, or one of the scalp, is allowed to continue and develop into a chronic condition, and the secondary swelling of the glands round the throat and neck is the irrepressible result. Principiis obsta. The greatest and

gravest consequences might easily be prevented by attending to their trifling causes.

When the lymph-bodies have had time to undergo induration, the attempt must be made to reduce them, though they be ever so hard or large. The frequent inunction of iodide of potassium ointment made with lanolin will often carry the point. Which preparations ought to be used, and to what extent the remedy, to what the massage of the parts is effective, have been detailed before. At the same time the syrup of the iodide of iron may be administered internally.

When these measures have proved inefficient after a reasonable time, the indurated lymph-bodies must be removed. The operation is not always easy, but recovery is almost certain, and the protection afforded by it pays more than fully for every exertion on the part of the medical man, and the temporary annoyance on that of the patient.

Diseased bones must be treated on similar principles. Unless a scrofulous ostitis be superficial and within easy reach, the diseased parts ought to be removed with the least possible delay. The number of cases recovering, though after a long time, and sometimes with shattered general health, without an operation, affords no excuse for those which have been permitted to develop into caries, or necrosis, or pyæmia, or leucocythæmia.

That the scrofulous condition requires good air and ventilation may be mentioned, though it hardly appears necessary to do so. The children ought to be kept in the open air constantly. For that purpose the winters ought to be passed, if circumstances permit, in warmer climates. From that point of view the summer sea-sanitaria of our large cities, and the similar institutions of the civilized countries of Europe, have rendered valuable services.

The skin of a scrofulous child must be kept scrupulously clean. But water must do more than merely that: the child

must get used to cold water, and thereby accustomed to changes of temperatures. The principles laid down in connection with the bathing of the very young hold good here, and I refer to my remarks on the subject. Salt water is preferable to plain water, and sea-bathing to either. Only in the cases of those who suffer greatly from eczema and other scrofulous eruptions, water must be avoided as long as the surface is not relieved. Indeed, no irritation of the surface is tolerated. Thus a scrofulous skin ought to be spared adhesive plasters or vesicatories, though the indications for their use be ever so tempting.

Incidental diseases of scrofulous children require more than the usual care. The perishable character of all their tissues renders an average febrile or inflammatory disease uncommonly dangerous. Unexpected deaths are frequently met with in such cases. In them the avoidance of strong purgatives, or depletions, is the first commandment; in them early feeding and sufficient general stimulation are among the principal indications; in them cardiac tonics, given timely and plentifully, will save many a life that would otherwise succumb.

4. *Tuberculosis.*

In the young, as in the old, the tuberculous poison is spread either by mechanical transmission through cough, deglutition, and aspiration, or in the contiguity of tissues after having been developed in a given locality, or through lymph-ducts and blood-vessels. The latter, after having absorbed from the primarily invaded part, are liable to distribute the poison in a distant part or all over the system. Most frequently the primary seats of the affection in the young are the bones, joints, and lymph-bodies. Among the latter, those of the mesentery are by no means so frequently affected as they are still reputed to be; those of the neck and mediastinum are more subject to primary infection.

The most common forms in which tuberculosis makes its appearance in the young are acute miliary tuberculosis, acute or subacute cheesy (scrofulous) pneumonia, and genuine chronic tubercular phthisis with cavities. The latter form is not very frequent, but we see it at every age. While I have met with but very few cases before the end of the first year, they are not quite rare after the sixth or eighth. It is often accompanied or preceded by pleurisy; indeed, it appears probable that this pleurisy, with its frequent relapses, is the primary seat of tuberculosis in many.

The most common form of phthisis in the young is that which is developed out of scrofulous pneumonia. It is a frequent result of the bronchitis and catarrhal pneumonia attending measles and whooping-cough, and quite generally accompanied with considerable changes in the glands. It is often seen in the lower lobes; indeed, the upper lobes are often found to be the seat of induration, resulting from interstitial inflammations, which retract the corresponding part of the chest, exhibit diminished respiratory murmur and dulness on percussion, and may last a long lifetime without endangering life or health to any considerable extent.

What I said about the mode of development of these frequent forms points at once to preventive treatment as the principal indication. If bronchitis, catarrhal pneumonia, measles, whooping-cough, and glandular diseases are frequent causes of tuberculosis, those primary affections must be effectually treated. There is no bronchitis which cannot be made milder, many a case of catarrhal pneumonia can be shortened or rendered less dangerous, and most, perhaps all, cases of whooping-cough modified and shortened. In a former paper I insisted upon the necessity of treating all the self-limited diseases. The sin of omission is as grave as that of commission. And in my remarks on scrofula, to which I here refer, I pointed out the facility of eradicating the coming evil by removing un-

absorbable lymphatic glands. Unfortunately, the success of treatment in cases of acute miliary tuberculosis is so small, and of chronic tuberculosis so unsatisfactory, that the indications for preventive treatment are the more urgent. The facts of universal tuberculosis arising from a local source cannot be denied, having been proven by thousands of experimental and clinical observations. Now and then a case is quite demonstrable. A few years ago I had a little girl in my division in Bellevue Hospital who suffered from the most exquisite and extensive tuberculosis of the skin I have ever seen. She finally died with empyema and general tuberculosis. Coming from a fairly healthy family, she developed a glandular swelling in her right axilla, which was neglected, and permitted to break spontaneously and result in fistulæ. From that place the lymphatics transported the infection, and produced extensive ulcerations over the chest; metastases took place to other parts of the body, and the child died of universal tuberculosis. It is an indifferent matter to investigate whether the original affection was tubercular already, or whether the tubercular character was developed afterwards. This much is certain, that the child need not have died if the gland which was primarily affected had been extirpated.

It is unnecessary to add that tuberculosis of the bones and joints, so frequent in infancy and childhood, require prompt attention, and in many cases operative procedures.

Among the causes of tuberculous consumption which makes its appearance in otherwise healthy persons, both young and old, the following also are given prominence by all observers of note: Insufficient supply or change of air, absence of exercise, overwork without rest or vacation, monotonous food, and persistent mental emotions. Most of these sources of disease act as well on the young as old, and may lead to infiltration, before there was any cough as yet, but anæmia, muscular debility, and loss of appetite only. Therefore tubercular infiltrations are

frequently found among the inmates of prisons, particularly those who have been isolated a long time, workmen in factories, soldiers in barracks, students in seminaries, children in orphan asylums and large boarding-schools, those attending crowded public schools and overworked with their private studies, besides being crippled by unwise discipline, which requires absolute immobility, and loss of time or opportunity for exercising. It is not very probable that the occasional promenades of the young by couples—though not handcuffed, though on a Madison Avenue sidewalk, though attended by the goodwill, moral character, and Argus eyes of two elderly ladies—are equivalents for the free and unhampered play and development of the growing organs. If it be a fact that there is so much less tubercular disease among hunters, farmers, gardeners, and sailors than among factory men and women of all trades, school-masters, tailors, it is certain that rowing, skating, gymnastics, and tennis, even the so-called calisthenics, if practised in the open air, would expand many a child's chest, aërate his blood, keep his organs vigorous, and eliminate invading poisons.

There are many other causes or influences creating or increasing the possibility of tubercular invasion. A considerable predisposition is created by the vulnerability and fragility and œdematous infiltration of scrofula; by the catarrh produced by sedentary life and foul inhalations. Koch has proved that active bacilli pass the stomach unmolested and invade the intestine, thus rendering even a primary intestinal tuberculosis possible.

Hereditary predisposition to tuberculosis is quite frequent, and is transmitted even by such parents as appear to be in fair health. Constitutional parental disorders resulting from the influence of scrofula, rhachitis, and even syphilis, may become manifest in the children in the shape of tuberculosis. In such children every catarrh must be carefully watched. The premature ossification of the costal cartilages, most frequently

found about the superior part of the chest, and the consecutive shortening of the sterno-vertebral diameter give rise to contraction of the thorax and insufficient expansibility of the (upper lobes of the) lungs. In such cases the aëration of the blood suffers at a very early date, catarrhal and inflammatory thoracic diseases are liable to become dangerous, and gymnastic exercises are required in early childhood.

Direct transmission from the parents to the children is probably not frequent, but it is possible, and therefore the child must not share the room and bed of the consumptive. Kissing must be omitted under these circumstances; it may often be the cause of contagion, though not so frequently as, for example, diphtheria is transmitted in that manner.

A consumptive mother must not nurse her infant. She is a greater danger than one afflicted with syphilis. Her milk is a positive injury, as is the milk of tubercular cows, though the udder may not be diseased. Two cows out of a hundred are tubercular. Thus the least that can be done is to boil the milk intended for the nourishment of the infant. By thus obeying the rule which I have enjoined these thirty-five or forty years, the milk can be made more innocuous than is possible for the butter or cheese obtained from such cows. These rules ought to be strictly obeyed, though there be exceptions to the universal experience. An instance of such exceptions is mentioned by Biedert, than whom there is no more reliable observer. He reports the cases of children who were fed a long time on the milk of tubercular cows without being attacked themselves.

Among the causes of consumption monotony of food has been enumerated by many. It is evident that it cannot account for much in the cases of infants or children, whose habits are plainer and digestive functions more adapted to simpler and more uniform articles of diet. Most of these, while in health, are satisfied with milk, cereals, and but little

meat. Sweet cream may be added to the milk, but more than a few ounces are not digested through the course of a day. Cod-liver oil acts mostly through its fat. During the afebrile condition and chronic emaciation, over-alimentation, introduced by Debove, may be tried to advantage, while the insufficiency of gastric digestion may be stimulated by the administration of artificial gastric juice (pepsin with muriatic acid) and mild stomachics (gentian, nux, diluted alcoholic beverages). Where exercise cannot be procured to a sufficient extent, or is contra-indicated by the necessity of enforcing temporary, but absolute, rest, massage, according to S. Weir Mitchell's plan, will take its place. During fever, over-alimentation has to be stopped; it deranges digestion and slowly increases the fever. Alcoholic stimulants will at that time often take its place to advantage. While they do not act well in the general erethistic condition of certain over-irritable natures, with over-sensitive hearts, and in hæmoptysis, they are good stimuli for the general system, diminish perspiration, and act favorably in diarrhœa.

In the treatment of tuberculosis no single factor is beneficial by itself. The quality of the air alone will not cure the sick any more than a certain mixture of salts and water in a mineral spring, or some known chemical relation of albuminoids and carbon-hydrates in an article of food. Insufficient clothing and bedding, unheated rooms, draughty halls, indigestible food, strong coffees and teas, hot cakes and cold drinks, late hours, lively hops, brass instruments and pianos disturbing midnight rest, kill as many, in proportion, in Colorado, Florida, Southern France, and Italy, as in New York. Unfortunately, we know too well that our patients believe they have done enough for their physician (or themselves?) when they have followed his advice to change climate. In this respect, too, it is true that those who speed over the sea are changing their sky, but not their spirit.* It must never be forgotten that the change of

* "Cœlum non animam mutant qui trans mare currunt."

climate is mostly a negative remedy, and cannot be expected to offer more than the possibility of favorable external circumstances.

Moist air is a better conductor of warmth than dry air. Thus loss of temperature is more rapid in moist air than in dry air. Dry air, therefore, may be very much cooler, and is still better tolerated in spite of its lower temperature, and affords more protection. Hæmoptysis appears to be a frequent occurrence at the times and seasons of increasing atmospheric moisture (spring). According to Rohden's researches a rapid increase of the percentage of water in the blood is frequently sufficient to produce a hemorrhage. Thus the drinking of large quantities of water ought to be avoided, and no residence be selected for a patient subject to hæmoptysis where the atmosphere is very moist. Dry altitudes such as those of New Mexico have given me good results in pulmonary hemorrhage. At all events, no place must be selected where the percentages of moisture in the air are liable to change rapidly. The uniformity of an insular climate, while benefiting the average case of phthisis, is, therefore, not so dangerous to those who have bled from their lungs. Still, dry air and a higher scale of the barometer are preferable.

The diversity of opinions in reference to the climato-therapeutics of phthisis resulted from the circumstance that the indications were not distinctly understood. Neither cold nor warm, neither dry nor moist, air by itself is a remedy. Warm air does not cure, but it enables the patient to remain out of doors. The temperature must be uniform, sudden currents of air avoided, and the atmosphere free of microphytes. At an altitude of sixteen hundred feet their number is greatly reduced (Miquel), there are but few at a height of two thousand six hundred feet (Freudenreich), very few at six thousand, absolutely none at twelve thousand feet, provided the parts are not, or but little, inhabited. Over-population of elevated

villages and cities diminishes or destroys their immunity. In the factories of the Jura Mountains, with a great working population, at an altitude of three thousand five hundred feet, tuberculosis is frequent.

Protection against sudden gushes of wind and rapid changes of temperature is an absolute necessity. The elevated valleys or rather recesses of mountains (Colorado) deserve their reputation in pulmonary diseases. Davos is dusty, windy, and exposed to frequent changes of temperature during the summer, and must not be advised for that season. Woods are warmer in winter, cooler in the summer; so is the ocean. Both, therefore, deserve well their reputation in the chronic ailments of the respiratory organs.

Not the thinness of the atmosphere, but its purity, is the requisite, and a high percentage of ozone. The latter is developed under the influence of intense light, the presence of luxuriant vegetable growth, particularly of evergreen trees (Terebinthinaceæ), and the evaporation of large sheets of water. Thus ozone is found on moderate or high altitudes, in needlewood forests, and near or on the ocean.

In the general hygienic treatment of tuberculosis the skin requires particular attention. Sudden changes of temperature, which strike the surface suddenly and work their effects on internal organs by reflex,—"colds,"—in spite of the modern superciliousness of some who deny any pathological change unless the exclusive work of bacteria, will always hold their places in nosology. The skin must be both protected and hardened. Wool, or wool and cotton, must be worn near the skin, the feet particularly kept warm, no wet or moist feet permitted, undergarments changed according to season and the alternating temperatures of days or weeks, and every night and morning. It is of the greatest importance to impress upon the minds of the very poorest that they must not wear during the day what they have slept in. Still, while protec-

tion is to be procured anxiously, vigor and strength is to be obtained by accustoming the surface to cold water. The daily morning wash may be warm in the beginning, and become gradually cooler; alcohol added to the water in the beginning (alcohol alone is unpleasant by its withdrawing water from the tissues), or salt always. The temperature of the water being gradually diminished, the same treatment can be continued during the winter, with a pleasant sensation of vigor. The subsequent friction with coarse bathing towels sends a glow over the surface and through the whole body; it is desirable that, as much as possible, the patient perform it himself. The easiest way to start the habit is by washing, a short sponge- or shower-bath will take its place soon, and a cold plunge will be borne even by the weak afterwards.

It has become fashionable with many to feign a contempt for internal medicines in the treatment of tuberculosis, pulmonary and otherwise. I am glad I cannot share their opinions. Thus, for instance, I look upon arsenic as a powerful remedy in phthisis. It was eulogized as early as 1867 by Isnard, in a monograph, for its effect in both malaria and consumption, in both of which he explained its usefulness through its operation upon the nervous system. He claimed that suppuration, debility, emaciation, vomiting, diarrhœa, and constipation would improve or disappear under its administration. The doses of arsenious acid used by him in the cases of adults amounted to from one to five centigrammes (one-sixth to five-sixths of a grain) daily.

Arsenic is certainly a powerful remedy. It is known to act as a poison and a strong caustic. It prevents putrefaction, though as an antiseptic it ranks even below salicylic acid. It acts favorably in malaria, chronic skin-diseases, maladies of the nervous system, and has considerable, and sometimes unexpected, effects in the treatment of lympho-sarcoma and sarcoma. It is also said to improve sexual desire and power,

and in animals physical courage. Thus there is a variety of effects the intrinsic nature of which may be found, uniformly, in the action of the drug on the function and structure of the cell, which, though varying in different organs, has the same nutritive processes. Arsenic has a stimulating effect on cell-growth. In small and frequent doses it stimulates the development of connective tissue in the stomach, in the bone and periosteum, everywhere; in large doses, by over-irritation, it leads to granular degeneration. Like phosphorus, arsenic builds in small doses, destroys in large ones. By fortifying the cellular and all tissues, both fibres and cells, it enables them to resist the attack of invasion, both chemical and parasitic, or to encyst or eliminate such enemies as have penetrated them already. Thus it finds its principal indication in the peculiar fragility of the blood-vessel walls resulting in pulmonary hemorrhage.

The doses must be small. A child a few years old may take two drops of Fowler's solution daily, or a fiftieth or fortieth of a grain of arsenious acid for weeks or months in succession. This amount may be divided in three doses, administered after meals, the solution largely diluted. There is no objection to combining it, according to necessity, with stimulants, roborants, or narcotics, and to giving it for an indefinite period, unless the well-known symptoms of an over-dose—gastric and intestinal irritation and local œdema—make their appearance. But they seldom will, particularly when small doses of opiates are judiciously added to them. In almost every case, perhaps in every one, it is desirable to administer it in conjunction with digitalis.

In the vertebrate animal, digitalis increases the energy of the heart-muscle and its contraction; thereby it increases arterial pressure and diminishes the frequency of the pulse. By increasing arterial pressure it favors the secretion of the kidneys, improves the pulmonary circulation, empties the veins,

thereby accelerates the flow of lymph and the tissue fluids, and exerts a powerful influence on the metamorphosis of organic material,—that is, general nutrition. Besides, what it does for the general circulation and nutrition it also accomplishes for the heart-muscle itself. The blood-vessels and lymph circulation of the latter are benefited equally with the rest. Thus digitalis, while being called a cardiac stimulant, contributes largely to the permanent nutrition and development of the organ. This effect is not only of vital importance for the economy of the system on general principles, but an urgent necessity in view of the fact that there appears to be a relative undersize of the heart, either congenital or acquired, in cases of phthisis; and there is certainly such a predominance of the size of the pulmonary artery in the young, particularly over the aorta, that the normal succulence of the lung becomes pathological quite readily when the insufficiency of the heart-muscle tends to increase low arterial pressure within the distributions of the pulmonary. The selection of the preparation to be administered is not always an indifferent matter. The infusion and the tincture are not always well tolerated by the stomach; digitalis, not being a soluble alkaloid but a glucoside, is not always reliable in its effects, and not of equal consistency and strength; a good fluid extract, or the extract, are borne well and may be taken a long time. A child a few years old may take about two minims of the former daily, more or less, for weeks and months, or its equivalent in the shape of the extract (two-thirds of a grain daily); the latter can easily be given in pills, to be taken in bread, or jelly, and combined with any medicines indicated for special purposes, such as narcotics, or nux, or arsenic, or iron; the latter to be excluded in all feverish cases, or in all cases as long as there is fever. As long as there is no urgent necessity for a speedy effect, digitalis will suffice by itself; as a rule, it does not operate immediately in those small doses. The addition of

strophanthus, or sparteine, or caffeine, all of which are speedily absorbed and eliminated, and exhibit their effect rapidly and without the danger or inconvenience of cumulation, will prove advantageous in many cases.

Other medicines have been used in great numbers. Specifics have been recommended, and symptomatic treatment been resorted to. The success of the latter depends on the judgment of the individual practitioner. No text-book or essay can teach more than general principles and their adaptation to the average case, and the measures to be taken in a number of exceptional occurrences. The indications for the use of narcotics, stimulants, expectorants, and febrifuges will change according to the cases and their various phases and changes. In every case the necessity may arise for antipyrin, antifebrin, phenacœtin, salicylate of sodium, or quinia. It may be necessary to decide the question whether the administration is to be made through the mouth, rectum, or subcutaneous tissue, or how their effects are to be corrected or combined. I have often found that a hectic fever would not be influenced by quinia, or by antipyrin, or salicylate of sodium. But the combination of the first with one of the latter would frequently have a happy effect.

The change in our pathological views, or rather the addition of a new factor in our etiological knowledge, has directed our attention to the antisepsis of the respiratory organs. To destroy bacteria is not necessary in order to make them relatively harmless. It is impossible to kill the bacillus without killing the normal cell, but very mild antiseptics suffice to stop the efficiency and proliferation of the parasite. Thus we can hope that the future will teach us to reach the destructive process in the lungs. It is quite possible that the inhalation of hydrofluoric acid will not prove more beneficial than the rectal injection of sulphide of hydrogen, but the internal use of creasote (one to three minims to a child daily) and terebene (two to four

minims every two or three hours) and the inhalations of turpentine, eucalyptol, menthol, and many others, appear to rouse our hopes for a future effective treatment. Much more than hopes we cannot have at this moment. But it is useless to despair, both passively and actively. For the present, however, it is a desperate activity which tempts an enterprising hero of the reckless knife to cut away a part of a lung which is the seat of a general and disseminated process.

Among the localizations of tuberculosis in children that of the larynx is not frequent, but it is met with. According to Heinze, laryngeal tuberculosis is not produced by contact, but through the medium of the blood. But the expectorated masses are undoubtedly a frequent cause of the local infection, and as a rule the larynx is invaded rather than the lungs. Beside nodulated inflammatory swellings in the mucous membrane, submucous tissue and glands, sometimes even between the muscles, there are small granulations and ulcerations on the cords, with universal catarrh, œdema, and phlegmonous destruction. The symptoms are those of catarrh and ulceration, and depend on the locality and severity of the lesion. In some cases the diagnosis of pulmonary tuberculosis could not be made in the beginning, and that of the local affection was based on the duration of the ailment, the persistence of the fever, and steady emaciation. At first the laryngoscopic examination revealed catarrh only, and but later ulceration and infiltration. The local treatment is that of the catarrh,—inhalation of warm vapors, steam, turpentine, carbolic acid, muriate of ammonia; poultices round the neck; opiates at bedtime. The spray with lactic acid and the application of iodoform have served me less well than a daily spray of a solution of one part of nitrate of silver in two or five hundred parts of distilled water. Stronger solutions are rather harmful. The pain produced by ulcerations located on the epiglottis and arythenoid cartilages is somewhat relieved by

the application (brush or spray) of bromide of potassium, morphia, or cocaine, or an appropriate mixture of two or three of them.

The air around patients suffering from laryngeal phthisis may be moist; but it is a mistake to believe that it must be warm. Cold air is warmed before it enters the larnyx and lungs, provided it enters the respiratory tract through the nares. Only when it is admitted through the mouth it remains somewhat cool when reaching the larynx. Thus the nares must be kept as normal as possible, and competent, no matter with what difficulties: nor will open windows interfere with the comfort of the patient, provided that draught is avoided. That can be easily accomplished by screens or otherwise.

Ulcerations of the tongue and pharynx are painful sometimes to such an extent as to require frequent attention. A well-directed spray, as mentioned before, of one part of nitrate of silver in two hundred of distilled water (glass to be of neutral, blue, or black color), administered once a day, will be found serviceable in average cases. Some are so bad as to interfere seriously with deglutition. I have been obliged to use a cocaine spray before every meal.

Tubercular ulcerations of the intestines may descend to the rectum; in that case the local symptoms, and mainly the tenesmus, may be alleviated by warm injections containing gum acacia or bismuth, with or without opiates. Food and drink must be warm; bismuth may be given in doses of from two to ten grains every hour or two, so as to form a protection to the sore intestine. Tannin I have not seen to do much good. Naphthalin sweeps the whole length of the tract and acts favorably as a disinfectant. I have seen almost immediate improvement after its use. From four to ten grains may be given daily. Now and then the stomach rebels against it; in that case, resorcin, in doses of from one-fourth

to one grain, in a powder or in solution, may be given for the purpose of disinfection from three to eight times. Though it be very soluble, it certainly is effective to a certain extent. All of them may be combined with bismuth, or lead, or opium. Hydrargyrum bichloride cannot be relied upon for any effect in the lowest parts of the intestinal tract because of its great solubility, the necessity of great dilution, and its ready absorbability.

Fistula in ano is a rare occurrence in children under all circumstances. I remember but two cases in tuberculous girls of about ten years. No matter whether they be accidental complications, or the tubercular poison (bacilli) be conveyed to the parts through the circulation, or the fistula be the result of the presence, in the fæces, of bacilli, and their action on defective epithelium, practice has changed entirely during the last decade. The axiom that fistula in a consumptive patient must not be interfered with has given way to a more rational theory and sounder practice. The sooner they are operated upon and treated the better.

Pulmonary hemorrhages are not of so frequent occurrence as in adults, but I have observed them in children of from three to eight years. A single instance of hæmoptysis in a girl of eleven years proved fatal by suffocation. The application of a lump of ice or an ice-bladder over the locality of the hemorrhage acts favorably, either through the direct influence of the cold temperature or the reflex contraction of the bleeding vessels. The subcutaneous injections of the fluid extract of ergot, or ergotin in glycerin and water, are very apt to give rise to induration or abscesses; thus it will be left to the practitioner to decide in an individual case whether that risk may be taken. Sclerotinic acid has been recommended for the same purpose. A syringeful has been injected hourly of a solution of one part in five of water. It is claimed that no local injury is done by it, but it is painful, and has been corrected

by the addition of morphia. The latter may be given internally also for the purpose of relieving the patient's symptoms, both objective and subjective. If it cannot be swallowed well, the proper quantity of Magendie's solution, not diluted in water, is readily absorbed through the mucous membrane of the mouth or throat. The internal administration of ergot may be supported by that of mineral acids and digitalis. Of the latter, a single dose of from two to five grains, or its equivalent, acts well. The dilute sulphuric acid is both efficient and palatable; ten or fifteen drops in a tumbler of (sweetened) water will be readily taken to advantage. Acetate of lead, in doses of one-sixth to one-half of a grain, every hour or two, according to age and the severity of the case, is preferable to tannin; it can be given with morphia or digitalis, or both. The patient requires absolute rest and encouragement, and must be induced to make long, forcible inhalations, and told to suppress the cough as much as possible. To relieve it opiates may be required. For the purpose of stopping hemorrhages the inhalation of the sesquichloride of iron (1 to 100) has been recommended. As it was not expected to enter the bronchial tubes, its effect was presumed to be by reflex action. I have tried it a number of times, like many others, but cannot sufficiently recommend it.

Night-sweats are not uncommon in the tubercular phthisis of children of from five to twelve years of age. They are favorably influenced by the same remedies which are apt to relieve the adult; such are the sponging with vinegar and water, or alum in vinegar and water. A powder of salicylic acid three parts, oxide of zinc ten, and amylum ninety, or salicylic acid three, amylum ten to twenty, and talcum eighty or ninety, dusted over the suffering surface, is quite beneficial and soothing. For internal administration the dilute sulphuric acid, ten or fifteen drops in a tumblerful of water, is found enjoyable by a great many. A single dose of atropiæ

sulphas (one-three-hundredth to one-hundredth of a grain) at bedtime, or agaric acid (one-fiftieth to one-twentieth of a grain), duboisin (one-hundredth to one-fiftieth of a grain), or camphoric acid in doses of from five to ten centigrammes will succeed in bringing relief. Where there is an indication for opium, it may be combined with any of them. When the digestion is good, a fair dose of quinine (three to six grains), with or without extr. ergot. (the same dose), or extr. ergot. fluid. (one scruple to half a drachm), deserves a trial when for some reason or other the above remedies are discarded.

5. *Syphilis.*

The nutrition of an infant suffering from hereditary syphilis is attended with great difficulties. Many of the mothers who contracted syphilis either before conception or during gestation are anæmic in addition to their constitutional ailment; thus their milk is liable to be both incompetent and dangerous. The former class, however, is not very numerous, for women syphilitic before conception are apt to miscarry and have no living children. The latter class (those who contracted syphilis during their pregnancy) is not quite frequent, fortunately; but still the question will come up now and then whether the baby of a woman who acquired syphilis in the course of her pregnancy should be nursed by her or no. The theoretical answer to this question has been this, that the baby may be permitted to nurse if it have been infected already, but must not be put to the breast if still healthy. That answer is no answer; for in most cases of such acquired syphilis, and even in most of those of hereditary syphilis (derived from a father syphilitic before conception), the first symptoms of the disease in the infant are visible after some, or many, weeks only. Thus, nobody knows whether the newly-born is infected or not. If such a baby be puny, feeble, and in poor general health, nobody would have the courage to deprive it of its

mother's milk. Artificial feeding would be a death-warrant. Thus, such a baby ought to be nursed by its mother, and, if exceptions be permissible in favor of the puny, and the puny be expected to thrive on its mother's milk, the vigorous baby's chance will be the better. Therefore I certainly advocate the baby's nursing at the breast of the mother who acquired syphilis during pregnancy, no matter whether the symptoms of the disease be visible in the baby or not. Meanwhile, both mother and baby must be subjected to a thorough and prolonged antisyphilitic treatment.

The same baby must not be put to the breast of a healthy wet-nurse, no matter whether symptoms have made their appearance in the baby or not; or whether the baby has been subjected to an antisyphilitic treatment or not. For the nurse must not be exposed under any circumstances, without at least having been made fully aware of the risk she is running.

The mother of a baby infected with hereditary syphilis is herself either syphilitic or not. If the latter, she is immune as regards her infant,—that is, she will not be infected by her nursing syphilitic infant. In both cases she must and may nurse. For if syphilitic herself, she will not render the case of her infant more serious; if not, she cannot transmit a disease she has not herself. In neither case can she be infected by the diseased infant. In either case, both mother and child must be treated.

In no case must a baby either syphilitic or suspected of syphilis be put to the breast of a healthy wet-nurse. Syphilis contracted through the infection of the nipple is liable to be as destructive as that which attacks physicians through their fingers. Such a wet-nurse must be forbidden to nurse altogether, or permitted only with a full knowledge of the circumstances, and directed, if she accept a place after all, to nurse through an artificial nipple. Meanwhile, the syphilitic or suspected baby must undergo an antisyphilitic treatment. If only suspected, but for good reasons, the treatment must not be

postponed until positive symptoms may have made their appearance. For mercurial treatment is a less grave interference in the young than in the old, and nothing can be more reprehensible than the opportunity given to constitutional syphilis to obtain full sway.

From what has been said of the many contraindications to the infant being brought up at the breast, it follows that artificial feeding must often be resorted to. This circumstance impairs the prognosis considerably, and claims the best knowledge and soundest judgment of the well-informed practitioner.

Preventive treatment is required both on the paternal and maternal side. Syphilitic endometritis leads mostly to miscarriage; when the embryo or fœtus survives, the newly-born exhibits syphilis at once. Women infected during pregnancy may, or may not, infect the offspring, according to the time of their own primary and secondary symptoms. In all of these cases a thorough and protracted antisyphilitic treatment is required. For practical reasons, for women with habitual abortion, where the diagnosis cannot be positively made, I advise and practise mercurial treatment. Most cases of hereditary syphilis, however, are derived from the father. It is he who has to undergo a strict and effective treatment for the purpose of extinguishing the calamitous disorder.

The medicinal treatment of hereditary syphilis requires the several preparations of mercury, in many cases iodides also. Their indications, modes of administration, and doses depend, to a great extent, on the locality or organ affected, whether skin, mucous membrane, subcutaneous tissue, lymphatic glands, muscles, bones, the viscera of the thoracic or abdominal cavities, the nervous system, or the sensory organs; and on the time at which the first symptoms become perceptible. In the majority of cases this takes place between the fifth and eighth weeks of life. Then the nose, lips, and anus exhibit rhagades; these fissures are apt to be quite painful; the skin is getting

covered with roseola, the palm of the hand and sole of the foot with efflorescences; the complexion becomes sallow without being uniformly so at all times, for indeed changes and a certain degree of intermission are observed. After a while maculous, squamous, and papulous eruptions make their appearance, pustules and vesicles spring up and terminate in ulcerations, gummata appear in the skin. This form permits of a fair prognosis, particularly in the cases of infants reared at the breast. The treatment can be carried out slowly and systematically.

It consists in the internal administration of calomel; doses of from one-twentieth to one-sixth of a grain can safely be given three times a day, for months in succession. If in any case diarrhœa were to set in, and no fault be found in the food administered, or the condition of the digestive organs impaired by other causes, from a twentieth to a twelfth of a grain of Dover's powder may be added to each dose.

Other mercurial preparations have been recommended, the bichloride and the cyanide in doses of from a one-thousandth to a three-hundredth of a grain several times daily. As these pages, however, are being written for practical guidance, and not for the elaboration of the history of the therapeutics of infant syphilis, I can but advise the use of calomel as effective and sufficient. The use of the blue ointment has been eulogized under the impression that the internal administration of the drug might lead to digestive disorders; as inunctions made in the usual way were found to irritate the skin (oleates are objectionable for that reason alone), it was recommended to apply it to a sheet of soft leather surrounding the knee, and secure its slow embrocation by the spontaneous movements of the baby's extremities. Thus the treatment is left to a great extent to the patient, and the actual dose cannot, to say the least, be determined upon or even estimated. When the skin is badly affected, from ten to twenty-five grains of the

bichloride of mercury may be added to the daily bath of the infant. This external treatment also can be continued for weeks.

A similar treatment is required in those cases in which an infant or child (in him in larger doses) has acquired syphilis in one of the many ways in which the disease can be contracted. The ritual sucking out of the circumcised prepuce has given rise to syphilis as it has produced tuberculosis; syphilitic nipples of a mother or nurse, vaccination, kissing, the brushing of the throat with infected instruments, in older children sexual contact, are causes of syphilis much too frequently. This acquired syphilis of infancy and childhood is apt to run a swifter and more deleterious course than the same disease in most adults. Therefore it may become necessary to add to the above treatment such methods as have proven most effective and speedy in the most urgent cases of hereditary syphilis.

These urgent cases run a different course from those briefly sketched above. In many the diagnosis of hereditary syphilis can be made immediately after birth. General pemphigus of the surface of the newly-born is not a symptom of syphilis, but localized pemphigus of the palms of the hands and the soles of the feet is. It is but seldom the only symptom, though it requires often a close observation not to overlook the affections of internal viscera and the bones. The latter are often the seat of syphilitic disintegration; in the costo-cartilaginous junctures Wegner has studied the changes worked by syphilis long ago. Liver, spleen, pancreas, and lungs exhibit two different changes, either gummata or intestinal proliferations of the connective tissue. In the liver these are mainly met with along the blood-vessels and bile-ducts, and capable of producing jaundice, and even total and permanent obstruction of the ducts in the fœtus or the newly-born. An early tumefaction of the spleen was the first prominent symptom in one of my cases. Twice I have seen both testicles the seat of syphilitic

tumors in the newly-born. The blood-vessels suffer at an early period. The syphilitic arteritis, first described by Heubner, gives rise to congestions and hemorrhages (petechiæ and purpura) on skin and serous membranes, in the intestines and kidneys, in the cranium, and in the thymus gland. And many early brain symptoms and sudden deaths of the newly-born are due to intracranial hemorrhages, œdema, and softening from the same causes. Nor have the sensory organs of the newly-born any immunity. In one, C. S. Bull has met with iritis and choroiditis.

These are the cases in which the systematic calomel treatment is insufficient. In them it is of the utmost importance to get the system immediately under the influence of mercury. With or without the internal treatment subcutaneous injections of mercury must be made at once. The subcutaneous injections of calomel, which I have tried, like many others, in the adult, have given me, contrary to many assertions of its sponsors, so much trouble in the shape of abscesses or indurations, that I cannot bring myself to recommend them in the newly-born, with its spare connective tissue. But a solution of from one to two grains of bichloride of hydrargyrum in an ounce of distilled water is quite innocuous. It can be safely injected once or twice daily, in doses of from a one-hundredth to one-fiftieth of a grain. That treatment I have followed in many an urgent case more than a dozen years, and can safely recommend it.

When the bones and glands suffer at an early period, the mercurial treatment ought to be combined with the administration of the iodides. Potassium iodide may be given to the infant in doses of from five to twenty grains daily. Under all circumstances, the treatment has to be persisted in many months after the disappearance of the very last symptoms. In spite of that the constitutional disorder may break out again, either in its original form, or as an osteitis only, leading either to caries or to sclerosis; or as a cerebral or spinal affection.

Syphilitic arteritis, meningeal exudation, or gummatous tumor may lead to ptosis, nystagmus, facial paralysis, hemiplegia, hemichorea, or idiotism; to myelosclerosis or transverse myelitis. A syphilitic inflammation of the labyrinth with Menière's symptoms has been observed in a girl of five years by Knapp, and interstitial keratitis appears to result from syphilis quite often. In all such cases the energetic treatment with mercury and iodides combined has to be resumed, and continued for an indefinite period. But it has often appeared to me that syphilis will do more than produce those unmistakable symptoms. There are many cases of "scrofula," chronic lymphadenitis, and rhachitis which—with no other causes to account for them—appear to point to previous syphilis not completely extinguished. In a number of my own cases I have personal knowledge of such a history. Such cases do not only explain the fact that many old authors recommended mercury in "scrofula" and "rhachitis," but also that there are some in which that treatment is indispensable. But lately I had to deal with chronic cervical adenitis, mainly of the left side, and pulmonary infiltration of the left upper lobe, in a baby of two years. They resisted the usual treatment for more than a year before the suspicion of its syphilitic nature was roused and the history of the disease elicited. Six weeks of a mercurial and iodide treatment have worked a miraculous change in the local and general condition.

6. *Hemorrhagic Diathesis.*

Under this head I propose to treat of purpura, the hemorrhagic disease of Werlhof, scurvy, peliosis rheumatica, and hæmophilia, because of their similarity of symptoms and their —to a certain extent—uniform anatomical cause. Among them all, the first, with its wide-spread petechiæ and subcutaneous and cutaneous hemorrhages, is most frequently mentioned. It results from all causes interfering with general nutrition,

and particularly that of the blood-vessels. Among them are poverty, uninhabitable dwellings, chronic gastro-intestinal catarrh, dysentery, typhoid fever, diabetes, miliary tuberculosis, pneumonia, diphtheria, scarlatina, and measles. The complications with hemorrhages from the nose, stomach and intestines, kidneys, into the brain and retina, are denominated Werlhof's disease. The diagnosis of "scurvy" requires bleeding from the gums, "peliosis" complications with "rheumatic" pain and swelling of the joints, and hæmophilia the hereditary tendency to bleeding of (mainly) the male transmitted through the female.

The alleged defective condition of the blood does not explain the hemorrhagic tendency. No blood, though ever so thin, penetrates a healthy blood-vessel wall. Hydræmia by itself does not produce bleeding without an impaired condition of the tissue of the blood-vessel; thus it is that the same degree of anæmia in women may result in metrorrhagia in one, in amenorrhœa in the other. Infants are peculiarly liable to bleed, because in them the blood-vessel tissue is still undeveloped; the embryonic condition extends into early infant life, and gives rise to the frequent hemorrhages into the brain, meninges, and other serous membranes. When morbid influences are added to this physiological predisposition, the result is easily comprehended.

The treatment is to a great extent preventive. The social condition of a large part of the population is a main cause and ought to be improved. Thus the successful treatment depends largely on the prosperity of all, and is another proof of what ought to be considered a fact, that medical and social questions and aims are frequently identical. Zymotic disorders and eruptive fevers must be treated with a view of sustaining the strength of the system and the vigor of circulation. The heart's action must be watched constantly, and cardiac tonics given before heart-failure sets in. The dietetic treatment of these diseases is at least as important as their medicinal man-

agement. In this way hemorrhagic diathesis is kept off, as well as exhaustion.

Medicines can accomplish a great deal, but ergot less than it is often credited with. In these conditions I have often met with its untoward influence on digestion, and but rarely with a favorable influence on the hemorrhagic deposits or processes. Iron also does not appear to yield desirable results; among its preparations the tincture of the chloride is perhaps the best; the tincture of the malate and the liquor of the albuminate are well tolerated. Digitalis has a favorable effect on the heart's action; an infant of a year may take the equivalent of from one to four grains daily for some days, two grains daily afterwards. With it may be combined strychnia; the same baby may take a fiftieth of a grain daily. As relapses are quite frequent, the invigoration of the blood-vessels is the main object in view. From one to three drops of Fowler's solution, largely diluted, may be given every day for a long time. Better still is phosphorus, the method of whose administration, and the doses of which, have been detailed in a former paper. Lead and tannin have not satisfied me at all. Local hemorrhages, when accessible, will require the application of ice, or compression of the bleeding vessel. The solution of antipyrin (5–20 per cent.), with or without tannic acid, is a good styptic. The success of the preventive treatment of hæmophilia will be rather doubtful as long as the individual is not controlled by the community in regard to the demands of public health. The daughters of hæmophilic families ought to be prevented from, and protected against, contracting marriages and having children.

7. *Diabetes.*

Diabetes mellitus is by no means a common disease among infants and children, but it is not so rare as some will have it, nor so frequent as those assert who have found sugar in the urine of infants whose food was supplied with an unusual

quantity of sugar. Indeed, traces of sugar are often met with in the urine of nurslings. But this is not "diabetes."

In the ten years before 1860 there were thirty-one deaths from actual diabetes in Great Britain, in children under fifteen years, annually. Since that time the occurrence of the disease in every period of life appears to have increased considerably. Hereditary and family influences, such as neuropathies, epilepsy, insanity, syphilis, exert a great influence. Caron reports the cases of three children of the same mother, at the ages of three and a half and one and a half years, and of three months. Hydrocephalus, injuries to the head, colds, atrophy of the pancreas, dysentery, measles, and scarlatina are referred to as causes. In the few cases which have come under my own observation I could not elicit a cause. The highest percentage of sugar I have noticed in a child (boy of four years) was six and one-half. Heubner observed eight and one-half, with a daily quantity of five thousand grammes, or three and a half quarts. The prognosis is not so good as Redon and a few others appear to believe. The disease runs a more rapid course in infants and children than in adults, and terminates more readily in coma and death. Therefore the treatment must be circumspect and energetic. Strict antidiabetic diet must be enforced. Fortunately, the young, with very rare exceptions, are apt to live on milk mostly. Thus less difficulties are encountered in them than in adults. For these also milk, skimmed or not, forms a principal and beneficial part of their nutriment. The medicinal treatment of the young requires some modifications. The facility with which cerebral symptoms ("coma") are developed, renders the persistent use of alkalies advisable (mineral waters), and forbids the use of opium. Iodoform, which I have seen to render fair service in adults, in daily doses of from ten to twenty grains internally, is seldom tolerated by the young, even in proportionately small doses. Arsenic

may be given in increasing doses a long time, the bromide as well as other preparations, one drop and more of Fowler's solution, largely diluted, after meals, three times daily, the dose to be increased gradually until doses of from two to four drops are taken. As in every disease which resists treatment to an unusual degree, a large number of other medicines have been recommended. As these remarks are not a library, but written for practical purposes only, I abstain from enumerating drugs which I believe to be useless. There is one, however, which, in connection with everything destined to improve digestion and assimilation, appears to have a very favorable influence on the diabetic process. Salicylate of sodium, with an alkaline beverage (Selters, Vichy), has a decidedly favorable effect. A child of five years may take from five to eight grains, three times a day, and continue its use for many weeks, to advantage.

Diabetes insipidus is a rare disease, but more common than diabetes mellitus. A large amount of urine of a low specific gravity (1000½ to 1005) is secreted daily. The increased micturition, great thirst, and emaciation are among the prominent symptoms. In some cases there appeared to be a hereditary influence. Syphilitic and other brain lesions, and injuries, have been found to explain its occurrence. In one case of mine it ceased after the removal of a tænia mediocanellata, together with a copious and constant salivation, in a girl of five years. Inveterate masturbation and consecutive "neurasthenia" appeared to be the cause of the excessive flow of urine in several children of from four to eight years. It ceased gradually with the restoration of correct habits and better general health. Of the remedies which have been recommended, I mention valerian, valerianate of zinc, bromides, salicylate of sodium, and galvanization of the head. All of these proved unsatisfactory in my hands. But I have seen good results, and sometimes speedy improvement, from the administration of ergot and

atropia. A child of five years may take daily, of the former half a drachm or more (extr. fluid, or the corresponding amount of extr. ergot., or ergotin), of the latter one-hundredth of a grain or less. More reliable than either has been strychnia, in three daily doses of one-hundredth of a grain each, or more.

V.

INFECTIOUS DISEASES.

1. *Intermittent Fever.*

In older children it has the same type as in adults. We have acute and chronic forms, the quotidian, tertian, and quartan types. There are the same results and anatomical lesions. There is the general anæmia, the splenic tumor, the hemorrhages, the amyloid degeneration.

It is only in infants and very young children that the diagnosis becomes difficult. In them the type is mostly quotidian. Besides, the attack may come at irregular times. Not infrequently is it seen in connection with catarrhal diseases, which appear to create a susceptibility to the poison. The chills are not easily diagnosticated. The sweating is very frequently not profuse. The tumor of the spleen can be recognized only at a late period, but the fever is apt to be very high. Sometimes the attack is not recognized because of the first symptom being a convulsion. For all these reasons the diagnosis is very often not made.

Quinine ought to be given, if the attacks come at regular intervals, in a single dose, two or three hours before the attack. If they occur at irregular periods, it is better to divide up the total amount of quinine in three or four doses, to be given through the day. In the first case a dose of five grains will suffice for a child of three years; in the second case eight or ten grains will be required.

It is not always easy to give quinine because of the taste. A solution ought not to be tried for the same reason. One part of the sulphate of quinine may be given with forty parts of elixir simplex, but in every case the dose must be mixed just before given. The neutral tannate of quinine is taste-

less, and may be given in powder, but for one part of the sulphate two and a half of the neutral tannate must be administered. The sulphate may be given mixed in chocolate—older children will greedily take it—or in coffee or syrup of coffee. When it cannot be given internally, rectal injections may take the place of the internal administration. No acid must be added to the solution; therefore very soluble preparations only must be used, for instance, the bromide, the muriate, the bisulphate, the carbamide; or suppositories can be given, but with less positive effect than that of other modes of administration. Inunction of quinine has been recommended a great many times. The ointments made as usual with animal fats have but very little effect. Where it would be impossible to use any other method, quinine might be dissolved and mixed with fat and a larger quantity of lanolin; but even in this case the dose which really penetrates the skin and enters the circulation cannot be determined. A subcutaneous administration of quinine becomes necessary when no other can be resorted to, or when an immediate effect is required. The best preparation for the purpose is the carbamide, which will dissolve in five or six parts of water, and give rise to less induration than we are liable to meet with when using the other salts.

In the chronic form arsenic is the principal remedy, as in the cases of adults. A child of three years may commence with one drop of liquor potassii arsenitis (Fowler) three times a day, to be administered as detailed in a former essay. The liquor sodii arseniatis of the Pharmacopœia may take its place in those cases in which the stomach is very irritable; also the preparation of the same name as introduced by Pearson, which is ten times milder than the officinal preparation, and must be given in proportionate doses. In a number of cases the solutions of arsenic are not well tolerated, and the arsenious acid may be given instead. It may be given in

pills to older children in doses of a one-hundred-and-fiftieth to one-hundredth of a grain, three times a day, or more, to children of three years, or it may be administered as a powder in combination with other medicines. It may be safely mixed with bismuth, for the disagreeable odor emanating from persons taking bismuth, which has been attributed to arsenic contained in the bismuth, really belongs to a minute dose of tellurium inseparable from some specimens of bismuth in the market. All these preparations of arsenic may and must be given for many weeks or months. Constitutional symptoms belonging to an overdose I have seen more frequently when using Fowler's solution than any of the other preparations.

Tincture of eucalyptus has been given in acute, and particularly in chronic, cases. It renders good service now and then in doses of from ten to twenty-five drops, three or more times a day.

As there are very obstinate cases in the adult, so there are in children. In them, too, the spleen may remain large and the attacks return indefinitely. These are the cases which try the endurance of the patient and the patience of the physician. In them I have seen excellent results from the use of ergot these thirty years. Ergot may be given as fluid extract, and then a child of three years may take from a scruple to a drachm every day for weeks in succession, or a corresponding quantity of the extract of ergot,—that is, from three to ten grains every day, either in mixtures or, for older children, in pills. I have noticed in a good many cases, in which the fluid extract was not tolerated at all, that the extract of ergot, when given in the latter shape, was easily tolerated.

2. *Typhoid Fever.*

Its danger may come from a great many sources.

First. From the feeble original condition of the patient. Dia-

betes and alcoholism are rare in infants and children, hereditary syphilis not to the same extent. But general anæmia, either congenital or the result of previous diseases, such as intestinal disorders or chronic respiratory ailments, is frequent. Chronic bronchitis, emphysema, and previously contracted diseases of the heart impair the prognosis considerably.

Second. The amount and intensity of the poison floating in the circulation and introduced into the tissues.

Third. Abnormally high temperature.

Fourth. Insufficient power or actual failure of the heart.

Fifth. Consecutive conditions, such as diarrhœa, intestinal hemorrhages, local or general peritonitis, perforations, or ulcerative endocarditis.

Sixth. Complications which, however, sometimes are to be counted among the consecutive conditions, such as meningitis and nephritis.

Preventive treatment has led to very good results. Many houses and towns which were the seats of endemic typhoid fever have been rendered immune by improving the sewerage and the condition of the neighborhood. For typhoid fever and dysentery can be traced positively to exhalations of privies, while with regard to other diseases we can only say that animal exhalations of the same character may create a predisposition by impairing the general health, but are not able to produce specific diseases independently of other influences. Where the drinking-water is suspected, it ought to be boiled. No raw milk should be given. The fæces of the patient must be disinfected, though there be no diarrhœa, by crude muriatic acid, carbolic acid, copperas, or corrosive sublimate. The sick must be isolated, and the practice still prevalent in many hospitals to locate typhoid patients in general wards must be abolished.

Can typhoid fever be *aborted?* or, in other words, can incubation be interrupted? An affirmative answer to this question has often been given, but it is difficult to prove the correctness

of the diagnosis in an alleged case of typhoid fever lasting a few days only. Still, there can be no objection to believing that the proliferation of the poison floating in the blood may be interrupted by antifermentative treatment, and it is certainly either justifiable or advisable to try the effect of otherwise not injurious antifermentatives, such, perhaps, as creolin or bichloride of mercury. As regards the early administration of a large dose of calomel, its effect is notoriously good, no matter whether it acts as a disinfectant directly on the poison, or whether it simply relieves the intestinal tract of the poison introduced and in progress of proliferation. A child of three years may take a dose of three or four grains ; a child of eight years one of seven or eight grains. While the purgative effect of the calomel can be obtained by simply introducing the powder into the mouth, there to be absorbed, it is better in this case to let it be swallowed. It can be safely given during all of the first week of the disease. When, as frequently, there is constipation during the course of the disease, calomel is no less beneficial, but then it must be given in smaller doses, which may be repeated. Small doses of a quarter of a grain to a half-grain, repeated several times a day, will even have a good effect after diarrhœa has been present and been relieved.

With regard to the *general treatment* of the typhoid fever of children, we are equally liable to injure either by overactivity or by neglect. The so-called *expectant* treatment has its great dangers in the hands of those who make it their invariable rule ; it is safe in the hands of those only who have learned to treat the sick rather than the sickness. The air in the sick-room must be cool, the windows open. Drafts, it is true, must be avoided, but screens around the bed will permit the opening of both windows and doors. The bed-sheets must be smooth ; four or eight safety-pins will fasten them to the corners and sides of the mattress. At an early period the whole surface ought to be washed with either water alone or with alco-

hol and water. The hair, when long, ought to be cut. The children must be allowed plenty of water. Those who are liable to have dry lips and tongue must be made to drink a small quantity of either water or dilute muriatic acid in water, ten minims to the tumblerful, in small quantities every ten or twenty minutes. Fissures around the lips or in the tongue ought to be washed with a saturated solution of boracic acid, or, when bleeding, should be painted once a day with a mild solution of nitrate of silver (not more than one per cent.) and afterwards painted with an ointment consisting of boracic acid and lanolin.

Very much depends on the mode of *feeding*. No solid food must be given. Boiled milk, broths, farinaceous decoctions, strained. For older children, one or two soft-boiled eggs, either the whole of them or the white only; meat-juice. As a general thing, more albuminoids than carbohydrates ought to be given. The food must be so arranged as to be digested in the stomach, and not encumber the intestines. If necessary, a small quantity of pepsin and muriatic acid may be given with it. Peptones may be given, but they must not form anything like the exclusive diet. At a later period very small quantities of toasted bread may be added to the milk.

The tendency to complications with *bronchitis* requires frequent changes in the position of the patients. They ought to be turned from their backs to their sides every few hours, and back after a while; otherwise they ought not to be moved too much. Particular care ought to be taken not to raise them too often. Physical and mental rest is an absolute necessity. Defecation must take place in the recumbent posture. They must not be permitted to strain.

The danger arising from *high temperatures* varies in different patients. Their injurious influences depend, from a clinical point of view, on many causes, foremost among which

are both individual susceptibility and the length of time during which the child is exposed to its internal heat. A high temperature lasting but a certain time, and alternating with either an intermission or a remission (as, for instance, in intermittent or relapsing fevers), may not prove dangerous at all, and not require any treatment. But the frequent repetition of elevated temperatures, or their long duration, demand interference. Therefore they ought to be taken at least four times a day, particularly as typhoid fever is apt to yield two daily exacerbations and remissions.

Continued high temperatures in the course of typhoid fever, or intense fever at the very beginning of the disease, require treatment. In them the frequency and quality of the pulse, and the functions of the nervous system, are seriously disturbed at an early time. Under the influence of a cold bath both temperature and heart-beats diminish, arterial pressure increases, and the intellect becomes clear. But it has a peculiarly great influence on the infant and child. In them the surface is relatively larger than in adults, and the cooling more rapid and intense. The circulation is easily disturbed, the surface temperature not readily restored afterwards. It may happen that the internal temperature rises while the external blood-vessels are contracted by cold, and the internal organs become engorged. In those cases a hot bath is more liable to restore radiation from the skin and reduce internal heat. In every case, where no immediate reaction takes place,—mainly about the extremities,—after the child has been taken from the bath, this must not be repeated, and the feet kept thoroughly warm. In such cases a warm bath is infinitely milder and more useful; or where the temperature is high and threatening, a cold pack—as detailed in a former essay—around the trunk is preferable. At the same time the feet must be kept warm and a stimulant given. Cold applications to the heart are frequently sufficient to reduce temperature. In such cases as

develop sopor at an early period, together with high temperatures, the pouring of tepid or cool water over the head, or head and shoulders, is very beneficial. The contraindications to the use of the bath are general debility, weakness of the heart, cold extremities, a cold surface, complicated with high internal temperature, and intestinal hemorrhage.

The medicinal agents used to reduce temperatures in typhoid fever are salicylate of sodium, antipyrin, antifebrin, phenacetin, and quinia. Kairin and thallin deserve no recommendation, for the reason that, while their effect is no better, their efficacy is soon exhausted, and the drug has to be repeated after very short intervals. All of the medicines mentioned above must be given carefully. To avoid a possible debilitating effect on the heart, a general or cardiac stimulant must be given at the same time. All of them may be given in small doses, frequently repeated, when the remission is not marked; but as a rule an occasional larger dose is preferable. Antipyrin can be administered internally, through the rectum or subcutaneously. A child of three years may take from ten to twenty-five grains a day, in from two to four doses, two of which have often to be given in close proximity (the second after an hour or two hours). The dose of antifebrin is but one-third or one-quarter of that of the former. It is, because of its more difficult solubility, not available subcutaneously, and less so than antipyrin, in the rectum. Phenacetin may be given in doses of from two to five grains, twice or three times a day, to a child of the same age. The administration of quinia follows, as a rule, the method detailed above, but in typhoid fever it is liable to disorder the stomach and intestine and produce diarrhœa or tenesmus. Its time is the remission, its single dose from five to seven grains, once a day or every other day, and its best indication the persistence of the splenic enlargement in the course of the third week of the disease. The combination of quinia with one of the other

antifebriles yields good results quite often when one of them does not appear to be sufficient, in the same way that the effect of a tepid bath combined with an antifebrile is, now and then, quite astonishing.

The intestinal tract is the seat of many dangers. *Tympanites* and *meteorismus* depend on the paralytic condition resulting from enteritis only, or enteritis and peritonitis. The latter is either local, and corresponds with the local ulcerations, or general. Cold applications are serviceable. Enemata of ice-water will sometimes do good; or of an aromatic infusion (chamomile, anise, fennel, catnip); sometimes of turpentine half a tablespoonful or a tablespoonful mixed with the fluid (water, or soap and water). The introduction of a large catheter, with one or more additional eyes, may relieve the lowest part of the intestine. Puncture of the inflated intestine by means of a small syringe ("hypodermic") is not dangerous in such cases where it is not required. Where it would be of service, however,—that is, in the very worst forms of intestinal paralysis, with intense and dangerous inflation,—it is injurious. For in these cases the elasticity of the intestinal wall is gone, and the small punctures in the intestinal wall remain open. I have seen fæces entering the abdominal cavity through them, and fatal peritonitis, of my own making.

Diarrhœa, when moderate, need not be interfered with in any period of the disease. It is probable that the initial dose of calomel prevents it in a great many cases. When it is copious, such remedies as pass through the whole length of the intestine will render good service either by their soothing or disinfectant effect. Subnitrate or subcarbonate of bismuth, from a scruple to a drachm daily, are valuable. Salicylate of bismuth does not always act kindly on the stomach. Naphthalin, half a grain to a grain every two hours, when tolerated by the stomach,—in most cases it is,—improves the odor of the evacuations and diminishes their number. In many cases I

have given it, for its disinfectant action, from the very beginning of the fever. Salol, in doses of from one to three grains every two hours, has a similar effect. Mild doses of opium may be added, from half a minim to a minim of the tincture, every two or four hours. Resorcin is better tolerated than either, but it does not pass the whole tract. Cold applications, covered with rubber cloth and (or) flannel; they must be changed every twenty or thirty minutes. Or warm applications may take their places when the little patients are quite feeble and anæmic. Among the astringents, when required, I prefer acetate of lead. Both tannin (gallic acid is milder) and alum are liable to annoy the stomach.

Constipation is much more frequent in our cases of typhoid fever in both the young and old than in the descriptions of the books, both European and copied. When not too persistent it is not objectionable; for most children have not suffered from constipation before the disease began, and accumulation of fæces is not a very prominent feature in them. When there is peritonitis it must not be disturbed, at any rate. In no case must strong purgatives be given. Castor oil in small doses may become necessary; half a teaspoonful or a teaspoonful, every few hours, may then be given, or small and repeated doses of calomel, from a quarter to one-half of a grain. Rectal injections, tepid, of water with, or mostly without, turpentine, will be all that is required in most cases.

Perforations require the treatment best adapted to euthanasia, opium and stimulants; (mostly) cool applications to the abdomen, and hot ones to the feet.

Hemorrhages are not so frequent, as in the typhoid fevers of adults, in those of the very young, because of the superficial character of the ulcerations. But in older children the intestinal lesions are apt to be as grave as in more advanced periods of life. No food must be given for some time, drink in small quantities only, but repeatedly. Applications of iced

cloths, ice-bladder, or a lump of ice—to lose no time—to the right hypochondrium. They may be moderately heavy, for some pressure may have a local influence. Hot injections into the rectum have no styptic effect, iced ones may act through reflex. Internally, alum or lead, one-quarter or one-half grain or more, every hour or two hours, with opium and digitalis. Ergotin, or fluid extract of ergot, and other preparations of the drug which were claimed to be innocuous, I have seen to give rise, frequently, to indurations or abscesses after their subcutaneous administration. Their effect is mostly questionable, for typhoid hemorrhages are liable to cease soon, after a single attack. I have seen gangrene over a large surface after their use, and pyæmia several times. In the case of a little girl, I had to incise about sixty metastases in the course of two months before she was saved from a pyæmia which resulted from a single hypodermic injection. The internal administration of ergot may be tried when the condition of the stomach permits it. Subcutaneous injections of sclerotinic acid (one to five) have been recommended. To counteract the imminent fatal termination I have been compelled to perform transmission of blood in the case of an adult; she recovered, but died on the fiftieth day of a relapse. Injections into the subcutaneous tissue, of blood or salt water, have been advised. They prove what a sick human being may, or has to, submit to and perhaps overcome. *Quidquid delirant medici plectuntur ægroti.*

The condition of the *heart* cannot but influence the course of the disease, its complications and consecutive disorders. It cannot but be enfeebled by a serious and protracted disease such as typhoid fever; still, to what extent this feebleness will be exhibited cannot be predicted. Besides, it depends to a great extent on causes not exactly connected with the infection itself. Among these accessory causes are original—congenital—debility and chronic heart-diseases previously contracted.

Besides, the infection itself with its accompanying fever is apt to give rise to an acute myocarditis, or to granular degeneration of the heart-muscle. Among the symptoms of debility of the heart, which may easily lead to complete *heart-failure*, are pallor of the skin and mucous membranes, purplish and cyanotic hue, particularly of the lips, ears, and finger-ends, mottled appearance of the surface depending on venous stagnation in the small blood-vessels, cold extremities and nose, slow or, more commonly, frequent pulse, which, moreover, is arhythmic, and a heart-beat the sounds of which are either split or embryocardiac,—that is, exhibiting equal intervals between the first and second sounds.

The *brain symptoms* belonging to heart-failure are those of anæmia. When beginning to treat them, we must not forget the possibility of an error in the diagnosis of the condition, which may be quite serious, because the signs of anæmia and hyperæmia are the same in many respects. However, the general indications for the treatment of heart-failure may be laid down in a few rules, the first of which refers to prevention. As heart feebleness must be expected in every protracted disease, and failure feared in many, we ought to act, as a matter of prevention, exactly as the surgeon does in his operations. Before the times of antisepsis there were a great many operations which would not lead to sepsis or erysipelas. Indeed, these cases were the minority, perhaps a small one at that. But no surgeon would at present perform any operation, either serious or trifling, without antiseptic measures. If he neglected them, he would justly be held responsible for any mishap in the shape of erysipelas or pyæmia. Now, the certainty of cardiac debility and the danger of heart-failure are much more threatening in an infectious fever than those complications of convalescence after an operation. Therefore in no case of typhoid fever ought the heart to be left alone to fight its own battle unaided, with the chances of being overexerted (with

possible hypertrophy from that cause), fatigued, or exhausted. The doses of the cardiac stimulants cannot be stated categorically, but the principle must be established that it is a good rule to give moderate amounts of digitalis, strophanthus, convallaria, sparteine, caffeine, etc. The particulars have either been stated in former essays or must be left to the judgment of the practitioner. Digitalis and strophanthus may derange the stomach after a while; digitalis may not act quickly enough under certain circumstances; in such a case sulphate of sparteine, which is readily dissolved, absorbed, and eliminated, in doses of one-tenth to one-quarter of a grain every two or four hours will render good services. Caffeine must not be given when there is hyperæmia of the brain. The sodio-benzoate and sodio-salicylate of caffeine dissolve readily in two parts of water, and are reliable aids in sudden attacks of heart-failure, in hypodermic administration. Camphor internally, in doses and according to methods described before, will answer well in either the presence or absence of pulmonary complications. In cases of emergency its subcutaneous administration works admirably in either ether or almond oil, the former in ten- the latter in twenty-per-cent. solutions. The latter is less painful, and obstructs the instrument less readily.

Carbonate of ammonium disorders the stomach more frequently than camphor is apt to do. Muriate of ammonium has no stimulant effect at all. Brandy and whiskey, when of good quality and well diluted (at least one in four or five parts of water or milk), hold the first rank. That they should, while sufficient doses must be insisted upon, not be given at all unless indicated, and omitted as soon as no longer wanted, is self-understood. Still, I know that they are often continued too long, and the occurrence of cirrhosis of the liver in children who exhibited no other cause of the disease except the protracted use of alcohol for alleged medical reasons, are by no means unheard of. Champagne will often take the place of

brandy and whiskey when speedy stimulation is required, or Tokay, Madeira, Sherry, or a California wine, when the former are objected to because of their taste. When there is diarrhœa, opium given in small doses, perhaps half a minim of the tincture every hour or every two hours, to a child of three years, will act both as a cardiac stimulant and astringent. Of Siberian musk as a powerful stimulant I have spoken in a previous chapter. Nitro-glycerin in doses of a two-hundredth or one-hundredth of a grain, repeated frequently until four or six doses have been taken, will be found a vigorous remedy when, while the heart is still found acting, the arterial pulse is flagging.

Whatever medicines may be found desirable, the child must be kept absolutely quiet. In a recumbent posture it has to remain, as a rule; thus the food has to be given, thus it has to be carried to the window, or into the open air, if circumstances permit. Many a case will exhibit a wonderful improvement on the lawn, or under shade-trees, that looked like being near extinction within the four walls.

Besides, the surface has to be kept warm. It is principally the extremities which require external heat. A hot bath, without or with an aromatic addition, and hot injections into the bowels will do a world of good in many a desperate case, always provided that the manipulations required are absolutely gentle and not exhausting.

To relieve complications of the *brain* in typhoid fever the hair ought to be cut very short, the head kept cool, feather pillows not tolerated; the head of small children may be washed frequently, or water poured over it while the body and throat are protected by an india-rubber cloth. The application of ice-water directly to the head in small children is not tolerated for a long time. It may give rise to collapse, and must be carefully watched. While the head is to be kept cool, the feet must be kept warm. Mustard foot-baths and hot applications to the feet, cold water or an ice-

bladder to the heart, an ice-bladder around the neck, will be found very comfortable. When there is the slightest brain complication not depending on the infection itself or anæmia, no alcohol must be given, no opium, and no caffeine, though it may appear indicated by the condition of the heart. The head ought to be kept high, and it is sometimes necessary where the meningitic symptoms are quite clear to resort to local depletion. In these cases the leeches may be applied to the mastoid process or, better still, to the septum narium. Where the brain symptoms belong to the infection alone, or to anæmia, opium is well tolerated, and relieves sleeplessness and the general irritability. Now and then codeine may take its place, or the hydrate of amylen or chloral hydrate. Sometimes the subcutaneous injection of morphine, one or two minims of Magendie's solution, will give instantaneous relief. Warm bathing will prove beneficial in such conditions of general excitability. In these cases the use of cold must be carefully avoided.

During *convalescence* sudden changes in feeding must be avoided. It is dangerous to give other than fluid diet before the tenth day after the fever has disappeared. After that time white meats, plain puddings, and jellies may be added. Raw fruit must not be given under any circumstances. Patients must not be taken out of bed sooner that a fortnight after their fever has disappeared. Older children must not be allowed to read. No visitors ought to be admitted during that time any more than during the duration of the disease, for during that very time weakness of the cerebral functions makes its appearance or, when met with afterwards, is traceable to it. During that time the temperature and the movements must still be watched very carefully, for relapses may set in at any time. Such relapses are very frequently the result of improper food, which will irritate the intestinal ulcerations, the process of whose healing is thereby interrupted. The greatest care must be taken in those cases in which the spleen, when tumefied

during the progress of the disease, will not nearly assume its normal size about the end of the third week. When it remains large, a relapse may be looked for.

The large number of *consecutive diseases* which may result from typhoid fever are ample proofs that all such measures are by no means superfluous; multiple abscesses of the muscles, ostitis, epiphysitis, and arthritis are not very uncommon after typhoid fever. Noma is now and then seen, but it is only just to state that epiphysitis and arthritis are not so frequent after typhoid fever as, for instance, after scarlet fever, and noma not so frequent as after measles. But purpura may remain behind. Parotitis is not very uncommon. Thrombi in the extremities are sometimes met with. Erysipelas, laryngeal perichondritis, and cutaneous gangrene are by no means rare. But it is certain that many of these occurrences can be avoided if greater care be taken during the progress of the disease.

3. *Cholera.*

The form of acute gastro-enteritis which has been described under the head of "cholera morbus" when met with in the adult, and attracted intense attention a few years ago when Finkler and Prior discovered their comma-bacillus, resembling in most points that of Asiatic cholera as found by Koch, is a frequent occurrence among infants and young children. They are attacked during the summer months or in hot rooms, where milk will be readily decomposed, and when artificial food of doubtful quality and improper composition is administered. Many of these cases must not be claimed as infectious, for their alleged epidemic character need not be anything but the occurrence of the same affection in the many who are exposed to the same unwholesome influences.

Among the many microbes met with in the intestines of infants thus affected, no specific bacillus has been discovered. It is true that we meet, occasionally, with reports of cases

of intestinal mycosis exhibiting bacilli, resembling those of anthrax, in the contents, epithelia, and submucous tissue of the intestinal tract, and also in the chyle-ducts and the lymph-bodies, but both the symptomatology and the pathological anatomy of the cases are exactly like those of the acute dyspepsia, or uncomplicated acute gastro-intestinal catarrh of infancy and childhood. The treatment of all these different forms will, therefore, be discussed at a later occasion.

The management of Asiatic cholera, when occurring at an early age, differs in no way from that required in the adult.

4. *Dysentery.*

The sufferings from dysentery are so intense, and the dangers from its acute or chronic state so threatening, that active measures must be taken at once. A brisk purgative ought to precede every other treatment. Castor oil in sufficient quantities, or calomel—according to age—in doses of from one to eight grains, will have a favorable effect, the latter acting both as a laxative and a disinfectant. The general rules of medicinal and hygienic treatment are those I laid down in my book on "The Intestinal Diseases of Infancy and Childhood" (G. S. Davis, Detroit, Michigan, 1887). It is these by which I shall be guided in most of the following remarks.

The food must be liquid. Milk and strained farinaceous decoctions must be the exclusive diet for the first acute stage. It is on the general condition of the patient that the administration of other articles of food, such as jellies, beef- or mutton-broth, egg, or alcoholic and medicinal stimulants (either general or cardiac), will depend in the course of the disease.

Great sensitiveness of the left hypogastric region and local heat will be alleviated by the application of ice. Very young infants, however, bear ice but a short time, whether applied to head or abdomen. I advise to watch the effect of the application either of the ice-bladder or the ice-cold cloth. Now

and then, even in adults, we meet with an idiosyncratic incompatibility with cold. That has to be taken into account. Indeed, quite often warm applications of either water or poultices prove more efficient in regard to the two indications, which consist in alleviating irritation and reducing temperature.

The subnitrate and the subcarbonate of bismuth do not only cover and protect the mucous membrane, but have also a decided antifermentative effect. Thus bismuth is surely indicated in irritated conditions of the mucous membrane; it seldom fails when given in sufficient doses. There is no harm in sometimes giving it in such doses that part of the introduced material will pass through the entire length of the intestinal tract without undergoing decomposition. As its taste is not disagreeable, it may be given together with tannin and opium; the daily dose ought not to be less than one drachm or a drachm and a half (4.0 to 6.0). At the same time the passages ought to be examined as to their reaction. Abundant acid, so frequently found in the slightest intestinal anomalies, requires the additional administration of alkalies. In most cases carbonate of lime is preferable to either magnesium or the carbonate or bicarbonate of sodium, the salts of both of which are apt to increase diarrhœa. Sometimes, particularly when the stomach can be relied upon, the salicylate of sodium may be added to the internal treatment. Beside the favorable effect of the sodium in the intestinal tract, the salicylic acid may prove beneficial both by its antifebrile and disinfectant action. Salol, one or two grains, or resorcin, one-quarter or one-half of a grain, may take its place. The latter is better tolerated than the former, but salol has a better chance to reach the lower part of the intestine.

Opium and its alkaloids are invaluable in the treatment of intestinal ulcerations. The objections to their use are decidedly exaggerated. Such accidents as have been reported in the

journals as resulting from the administration of opium must be attributed to the fact that the dose was either absolutely or relatively too large, compared with the idiosyncrasy of the patient. Dysentery both requires and tolerates larger doses of opium than an average diarrhœa, no matter whether the latter be the result of catarrh or ulceration of the small intestine or the cæcum, or the upper part of the colon. In this respect dysentery stands abreast almost with peritonitis. The main indications are to relieve pain, reduce peristalsis, and diminish the copious serous secretion; no other remedy fulfils all of them so well. For this purpose it ought to be given internally; for enemata containing opium may act favorably, but the more intense the tenesmus and the greater the hyperæmia or the more extensive the ulceration, the less reliance can be placed on its effect, and the amount of the opiate thus brought into real action cannot be estimated. Among all the opiates I prefer a tincture, or the wine, or opium in substance, or Dover's powder; but rarely have I injected morphia under the skin. The effect of the drug is easily watched and controlled, by commencing with moderate doses, not repeating them too often, and being guided by the effect obtained. If opium is to be discarded, opium with hyoscyamus, or with belladonna, or hyoscyamus or belladonna alone, may take its place temporarily. Severe tenesmus may require the painting of the protruding part with Magendie's solution.

Astringents may either be given in combination with opium or separately. They are expected to pass wholly or partly through the entire length of the intestinal canal, thus coming into contact with the inflamed and ulcerous mucous membrane. Among those eligible are tannin, gallic acid, and vegetables containing the same (ratanhia, catechu), besides subacetate of lead, nitrate of silver, and pernitrate of iron.

The daily dose of tannin, when it is to be taken for a long time in succession, is from ten to fifteen grains, subacetate of

lead five to ten grains, nitrate of silver one-fourth to one-half grain. The latter ought not to be given more than a week, or two, in succession, for fear of argyria, two cases of which occurred in my own practice, and of my own making, many years ago. All of these medicines are best taken, if possible, in the form of pills. They appear to be better tolerated, and are certainly more effective.

The use of keratin, when it becomes handier and cheaper, will facilitate their efficiency to a considerable extent.

Another antiseptic which I have frequently administered internally in every description of intestinal ulcerations, in both acute and chronic form, is naphthalin. For its doses, and the methods of its administration, and some account of its effect on intestinal ulceration in general, I refer to the chapter on typhoid fever. We have to expect a great deal from such topical medication, and it appears that it will be one of the great refuges in all infectious diseases whose principal localization is in the intestine, as, for instance, Asiatic cholera. With creolin I have no personal experience as yet.

Adults will take from fifteen to seventy-five grains daily, in powders, capsules, or mucilage. Children bear, as a rule, according to their ages, from one-half of a grain to two or three grains, every two or three hours, in some mucilaginous substance Some do not bear it well, but when such is the case, the stomach will give warning at once.

The temperature will but rarely be so high as to require antipyretic medication. Frequent enemata will often reduce it effectively. Very young infants may demand an occasional dose of antipyrin or acetanilid (antifebrin) when the heat threatens either the nervous system or the normal structure of the tissues of the body.

Consecutive paralysis requires a mild galvanic current in the beginning. The daily application both to the spinal cord and the extremities need not exceed ten minutes ; the electrodes

must be large, and the current reversed after five minutes. After a few weeks the interrupted current may be added the same length of time, but it must be applied to the paralyzed muscles only. Together with the latter, strychnia or (and) phosphorus may be used, in daily doses of one-thirtieth of a grain in the case of a child of four or five years.

The local treatment of chronic dysenteric ulcerations requires the use of enemata. Their indications vary. They are to evacuate the bowels, or to reduce the irritability of the diseased intestine, or to accomplish an actual cure. These indications cannot be fulfilled separately; sometimes two, sometimes all three, can be at the same time. The nature and quantity and the temperature of the liquid to be injected depend in part on the end aimed at, in part on the irritability of the individual intestine. Sometimes the bowel objects to the introduction of small amounts; sometimes, however, large quantities are tolerated very easily indeed. To introduce small amounts, the selection of the syringe is a matter of indifference, provided the liquid enters the bowel gently and without pain. To inject large quantities, undue pressure and local irritation must be avoided. Thus the fountain syringe alone will answer; it ought to hang but a trifle above the level of the anus, say from six to twenty inches. The temperature of the liquid is not always a matter of great importance. Some recommend the injections to be ice-cold, some, however, tepid; both are frequently recommended as panaceas. But the practitioner will soon ascertain that some bear and require the one, some the other, some, indeed, very hot ones.

In my experience, for the large majority of patients tepid injections answer best. Not rarely is the intestine in such a condition of irritation that even small quantities of a very cold fluid are expelled at once. And again, there are cases in which enormous amounts of either cold or warm water are readily received. To accomplish the purpose of evacuating

the bowel, plain water will often suffice, but three-fourths of one-per-cent. solutions of salt in water will usually prove more acceptable. Additions of bitartrate of potassa, or castor oil, have proved so uncomfortable in my cases that I have discarded them long ago. However, when the secretion of mucus on the rectal and intestinal mucous membranes was very large, one- or two-per-cent. solutions of bicarbonate of sodium answered very well indeed. For the purpose of clearing the intestines, either of fæces or the morbid products, a single enema is insufficient. It ought to be repeated several times daily. When much mucus is secreted and tenesmus intense, it may be applied after every evacuation. In many cases the substitution of flaxseed tea or mucilage of gum acacia will prove advantageous. I have had to continue them for weeks for both their evacuating and alleviating effect. When, however, the latter alone is aimed at,—that is, when tenesmus is to be relieved,—small quantities will usually suffice. An ounce or two of thin mucilage, or starch-water, or flaxseed tea, with tincture of opium, or better, extract of opium, prove very comforting. Glycerin in water has been recommended for the same purpose. The former alone, or but slightly diluted, irritates, nay, cauterizes. It will require close judgment and individual experience to ascertain the degree of dilution, if it be used at all.

When a local curative effect is aimed at, injections of small quantities are sometimes insufficient. As the local lesions are often extensive, the amount to be injected must be pretty large. Almost always astringents are required. Sulphate of zinc, or alumina, subacetate of lead, nitrate of silver, tannin, chlorate of potassium, ergotin, salicylic and carbolic acids, and creasote have been recommended. Of the more common astringents I prefer alumina or tannin in one-per-cent. solutions. Creasote answered well in solutions of one-half of one per cent. Salicylic acid resulted more frequently in pain than in benefit. Carbolic acid, in solutions of one-half of one per cent., has proved

very beneficial, but I have learned long ago to be very careful in regard to its administration because of its poisonous effects, particularly in very young patients.

Injections of nitrate of silver may prove very useful in cases not quite acute. Before the solutions of a quarter of one per cent., or of one or two per cent. are injected, the intestine ought to be washed out with warm water without salt. After the injection has been made it ought to be neutralized with a solution of chloride of sodium; it is still better to wash the anus and the portion of the rectum within easy reach with that solution before the medicinal injection be made. For even the mildest solutions, when acting on the sore sphincters, are liable to give rise to intense tenesmus when no such care has been taken.

When the ulcerations are but few, or in the lower portion of the bowels only, small quantities suffice. But extensive lesions require large injections, the patient being on his side, or in the knee-elbow position. In these cases the nozzle of the fountain syringe must be lengthened by attaching to it an elastic catheter, which is introduced as high up as possible, after the same plan that nutrient enemata are to be given. In a number of cases, both mild and severe, where neither the usual astringents nor nitrate of silver appeared to answer, I have been very successful these twenty years, when resorting to injections of subnitrate of bismuth. The drug is mixed with six or ten times its amount of water; of this mixture from one to three ounces (30.0 to 100.0) are injected into the bowel, which has been washed out previously, twice or three times daily. The success was satisfactory, though a large portion of the injected mixture was soon expelled.

Suppositories containing the above substances may prove beneficial. But in order not to irritate they must be so soft as to melt readily. They may always contain some opium. But its admixture is not always sufficient to relieve the irritability

of the rectum. Indeed, to accomplish this end opium must at least begin to liquefy and to be absorbed, and absorption cannot be relied upon except where a part, at least, of the mucous surface is in a fair state of integrity. When no suppository can be tolerated, and the administration of an opiate to the intestine is indicated, the painting with Magendie's solution, or the injection of a small quantity of olive oil with tincture of opium, may still be tried. The local application of cocaine relieves pain, but the drug is readily absorbed, and great caution must be used in its administration because of its poisonous effects.

5. *Scarlatina.*

Preventive measures of the strictest nature are indicated in regard to no disease more than in the case of scarlatina. Its mortality is very great, in some epidemics even excessive; and when the child survives, there may be a large number of sequelæ which either terminate fatally, or in persistent injury to health, and in the curtailing of the enjoyment or usefulness of life. Among these are cardiac diseases, glandular affections, suppurative otitis, and nephritis. The first attack of the latter is not limited to the second or third week, when, it is true, it is mostly met with; for I have seen it to appear on the thirty-seventh day of the disease, and Bäumler reports the case of a child with hemorrhagic nephritis which started as late as the forty-fourth day.

There is another momentous indication for strict prevention. The facility of being attacked is by no means so great as, for instance, in measles. It is but rarely that any of the young inmates of a house escapes contagion when measles has attacked one of them. The virus of scarlatina, however, is less catching. Infants of less than a year suffer but rarely, though very severely when taken. The vast majority of those affected are less than five years old. After that period susceptibility

becomes less from year to year, so that, indeed, a child who has been protected against scarlatina during its first half-dozen year attains a certain degree of immunity for the future.

There is no reason to believe in a primary origin of scarlatina. The efficacy of the virus is so persistent, and it clings so long to clothing, bedding, and furniture, that it can be carried and transmitted to long distances by persons, towels, toys, letters, and even domestic animals and articles of food. It is transferable through the whole duration of the disease, from the incubation to the disappearance of the very last symptoms. The incubation of scarlatina may last but a few hours, like that of diphtheria and erysipelas, or as long as nine days; in this it differs greatly from measles, variola, and varicella. The last symptoms may not disappear until long after the fortieth day, which, it is true, is the average termination. The fine desquamation of the second week may have terminated entirely, but the gross peeling, particularly of the hands and feet, extends frequently to the end of the seventh or eighth week. It carries contagion as well as the desquamation of the former weeks, or as the breath of the patient, or his expectoration in the earlier periods. So slow is sometimes the process of elimination that Spottiswood Cameron claims that the end of the disease is seldom reached before the eighth week, and not always in the thirteenth. Whether the urine or the alvine dejections of the patient can spread the disease is not quite certain; but as long as there is an uncertainty they ought to be treated as dangerous elements, and disinfected and removed.

Sore surfaces appear to admit the poison. Scarlatina will enter through the integuments denuded by eczema. I believe I have lost two patients because I operated upon them during the prevalence of an epidemic of scarlatina. A child of four years, on whom I resected the head of a femur, was taken with the eruption on the fourth day and died. Another one was stricken down thirty-six hours after the resection of a tonsil.

In both cases I had reason to believe that I opened an inroad to the invading poison. Indeed, catarrhal or otherwise sore tonsils are very likely to furnish a means of invasion.

Dispensaries and schools are the hot-beds of scarlatina. A single case waiting in the anteroom of a public charity until it be seen and diagnosticated may destroy a dozen innocents while craving the blessings of public beneficence. Schools ought to be closed during an epidemic. No child coming from a house with scarlatina must be admitted. Such as have been removed from the dangerous neighborhood and not exposed since may, after thorough disinfection of the clothing worn during the time of exposure, be allowed to return after an interval of ten days.

The inunction of the patient with pork, vaseline, and similar substances adds to the safety of the attendants by preventing the carrying into the air of the eliminated particles of epidermis. The soaping and bathing contributes to the same end, but is no reliable safeguard because the virus penetrates the whole skin down to the rete Malpighii.

The sick and their attendants must be strictly isolated; during the winter, when the warm air rises and carries contagion with it to the upper part of the house, in the highest story. Whoever enters the sick-room—friend, nurse, or physician—ought to wear special clothing while inside, or at least a linen or india-rubber cover. The physician must disinfect his hands after leaving his patient. In the room the air ought to be changed often. Draught can be avoided by means of screens. No dry linen or clothing must leave the room. It must be soaked in water, or better still, in a disinfectant fluid, before it is carried off, and boiled in soap and water immediately after arriving in the laundry. The same rules which hold good in the cases of infectious and contagious diseases in general, those which refer to the disinfection of the room and furniture, and public vehicles which may have been used, must be obeyed to the letter. No room, in fair weather, will

afford the same safety as a tent would, and in no disease, with the exception of variola and diphtheria, is the erection of special hospitals more needed than in scarlatina.

The medicinal treatment of mild cases may be expectant. Cooling drinks—ten or twelve drops of dilute muriatic acid in a goblet of water—will often suffice. The food must be liquid, or at most semi-solid; in the first week milk and farinacea. Constipation in the first period is aptly relieved by a dose of calomel or a vegetable aperient. Diarrhœa, particularly in the later stages, requires bismuth, opium, perhaps astringents, such as lead, and at all events antifermentatives, such as resorcin, salol, or naphthalin; the mild form of stomatitis and pharyngitis, half a grain or a grain of chlorate of potassium in a teaspoonful of water every hour or two hours. The frequent complication with diphtheria must be met by the appropriate treatment of the latter; it will be the subject of special remarks at a future time. Diphtheria setting in on the fourth or fifth day is but seldom alarming; when on the first day, or previous to the scarlatinous eruption, it is quite ominous. In this case it is often accompanied with rapid glandular swelling and serious symptoms of sepsis. Applications of ice to the swollen neck will often keep the tumefaction within certain limits. When gangrenous degeneration of the glands cannot be prevented, and local suppuration occurs in the centre, deep incisions and the local use of carbolic acid are required in the same manner in which the same affection is dealt with in diphtheria. In milder cases, two applications daily of one part of iodoform in eight or twelve of collodion have a good effect.

High temperatures do not require very active treatment unless they result in functional or organic changes of the heart or brain. As long as these two organs perform their duties normally the temperatures may be left alone. A very frequent and feeble pulse with a high temperature requires, beside a

cardiac tonic, quinia (with the restrictions mentioned in No. 2), washing with cool water, or water and alcohol, cold applications to the heart, or a warm bath. Antifebrin and antipyrin are not to be recommended in these conditions. Delirium and somnolence, also convulsions, may be the result of high temperatures, and, particularly when the whole body, feet included, is hot, require the same treatment. Antipyrin, however, I have never seen to reduce the temperature in congestive or inflammatory conditions of the brain. The latter may be the direct result of the infection, but also at a somewhat later period of rheumatism. In either case the treatment does not materially differ from what it would be under ordinary circumstances. The latter form requires salicylates, both the application of ice to the head, counter-irritants to the feet (sinapisms) and intestines (calomel), and in most cases leeches to the septum narium or mastoid processes. The vital indication proceeding from the condition of the brain is here of the greatest importance.

When the same symptoms set in with or without a high rectal temperature and cold extremities, a mottled skin, and a cyanotic hue, the large amount of the virus which has invaded the system demands strong stimulants,—ammonia, musk, and camphor. They act better than alcohol. To their internal administration may be added camphor dissolved in almond oil, sulphate of spartein in water, subcutaneously, in free and frequent doses. These symptoms of poisoning while the temperature is but low bear opiates (morphia, one-fiftieth or one-twentieth of a grain, in repeated doses) quite well. Universal heat requires tepid bathing, with cold affusions over, or applications to, the head; a cool surface, with cold extremities and frequent and filiform pulse, hot bathing and powerful friction, and hot enemata, with stimulants.

Vomiting before and with the eruption is a frequent symptom. When moderate, it may be left alone; no food must be

given for a number of hours, ice-water in teaspoon doses, or an ice pill, every five or fifteen minutes. When quite severe and exhausting, small doses of an opiate, once every hour or two, will be found useful. In a few obstinate cases the muriate of cocaine in doses of one-twentieth or one-fifteenth of a grain answered well; in others, arsenious acid, every two hours, a two- or three-hundredth part of a grain.

One of the early complications is rheumatism. It makes its appearance often on the third or fifth day. In some cases it is muscular, and then mostly confined to the lower extremities. In others articular, but with less swelling than we are inclined to expect. Indeed, articular rheumatism in general exhibits the usual symptoms to a less characteristic degree than in adults, but they are so pronounced as not to be mistaken. This rheumatism ought to be treated at once, for endocarditis complicates it in infancy and childhood very much more readily than in advanced age. Most of the cases of scarlatinal endocarditis carried into later life are due to rheumatism. The joints ought to be well covered with soft cotton, and salicylate of sodium given every two or three hours in doses of from four to ten grains.

Endocarditis and pericarditis, without rheumatism, are but rare occurrences. Ulcerous endocarditis I have not seen except with serious general sepsis, caries of bones, thrombosis of a sinus, and other symptoms of general pyæmia.

Suppurative inflammations of joints are very rare. They form part of generalized pyæmia. There is an affection of the epiphyses, however, which is very common and differs from the above. It consists in extensive hyperæmia, and possibly inflammation. Clinical observation yields quite a number of cases of infectious diseases, but mainly scarlatina, in which during convalescence, and long afterwards, the regions of the joints are swollen and painful. This epiphysitis is the cause of the rapid increase in the growth of children who have passed

through scarlatina, but may also be the cause of serious changes, from simple "growing pains" to suppurative separations of the epiphysis from the diaphysis. In every such case, during convalescence and afterwards, the joint ought to be well supported by soft splints, emplastr. hydrarg., iodoform collodion, absolute rest enjoined, and phosphorus given in three daily doses of a two-hundredth of a grain, or more.

The complications with pneumonia and pleuritis are quite frequent; the latter is apt to be purulent; if so, its existence explains in many cases the continuance of the high temperature. In every case, purulent or not, the indications are opposed to an expectant plan of treatment. Both general and cardiac stimulants and tonics are required.

Hemorrhages are not frequent, but ominous when they occur. As a rule, they are the result of embolic processes, and complicated with local gangrene. Spontaneous thromboses, however, of the extremities, or the cheeks ("noma"), are not so frequent in scarlatina as they are in measles.

The presence of pemphigus during the eruption appears to indicate a high degree of vaso-motor paralysis. It is an ominous complication and requires stimulants as above. Urticaria is more troublesome than dangerous. The inunction with pork, vaseline, or glycerin—soothing and pleasing in most cases of scarlatina—may suffice to relieve it. Now and then mild alkaline lotions (bicarbonate of sodium in water, 1 to 100), or the washing with carbonated alkaline waters (from the siphon), or with a proper dilution of carbolic acid (1 to 200), will prove beneficent. When the burning and itching is quite annoying, naphthol five parts, and vaseline one hundred or one hundred and fifty, may be tried to advantage.

The rules for the general treatment of scarlatina must necessarily be very much like those applicable to all infectious diseases. Thus in regard to them, and particularly to the debility and failure of the heart, I refer to my remarks on the

treatment of patients suffering from typhoid fever. In scarlatina, and eruptive fevers generally, there is, however, an additional indication resulting from the participation of the skin in the process. Indeed, more than in other diseases, the hygiene of the surface has to be attended to. During the course of the disease, particularly during desquamation, a tepid bath, with soap, ought to be given from time to time, and the temperature of the room and bed kept at equal heights. While the former is to be cool, the body must be well covered and kept warm. This is the more necessary, as nephritis may set in at any time during many weeks. This serious complication, it is true, may occur though the patient be kept in bed, in consequence of voluminous elimination of epithelia, and also perhaps of bacteric invasion, but exposure and sudden changes of temperature will always hold their place in etiology, in the minds of those who do not forget to notice the living clinical case beside the dead microscopical excrement.

In this connection, while I reserve the subject of nephritis for some future occasion, I will only urge the advisability of beginning the treatment of scarlatinal nephritis with a moderate dose (one-half to one grain) of calomel, repeated from time to time, through the first two or three days. Its purgative effect, if too great, may be stopped by a small dose of opium given after every loose movement.

6. *Measles.*

The virus of measles appears to be more volatile than that of any of the other contagious diseases. The communicability appears to be greatest during the prodromal stage, and the invasion takes place, in all probability, through the bronchial mucous membrane. The incubation may last thirteen days, the first four or five of which may be attended with some fever. During all this time, and during its whole course, the disease is contagious.

Very few cases are seen during the first six months of life. After that it is common, and repeated invasions are frequent. In many seasons the mortality is very trifling; in some epidemics it has reached thirty-three per cent. of all the cases. The first epidemic occurring in regions where measles had not been known previously was found to be very dangerous, and those which occur after long interruptions are likely to prove very severe. Thus the question whether the well should be separated from the sick will depend a great deal on the severity of the epidemic.

The temperature of the room should be comfortable, a little warmer than in scarlatina, and the air moist. The light ought to be excluded to a certain extent, but not to absolute darkness. For a number of days the child should be kept in bed, unless very restless, in which case it may be taken out well covered. It is a good rule to keep the patient in bed a week after the disappearance of the fever, and in the house ten days or a fortnight longer. Relapses are not uncommon, and those particularly who have hereditary tendency to tuberculosis ought to be protected from exposure. Especial care must be taken during the cool or rainy season.

Mild cases require mostly a hygienic treatment only; still, every case has its own indications. Where there is otitis, bronchitis, pneumonia, or dysentery, it is self-understood that the patient must be kept in bed during the continuance of the complication. Warm and dry weather and a sandy soil will permit a patient to leave the house sooner than under other circumstances.

Constipation may demand gentle treatment in the beginning. As a rule, an enema will suffice. Castor oil or the elixir of rhamnus purshiana may sometimes be required. No drastic should be used because of the tendency to diarrhœa or dysentery prevailing in many instances. For the same reason no glycerin should be injected into the rectum.

A convulsion in the beginning of the disease does not always mean great harm. It takes the place of the chill in the adult, but is more dangerous because of the possibility of hemorrhages occurring while it lasts. Thus it ought to be cut short as soon as possible. Chloroform inhalations will relieve the spasm, chloral hydrate internally, or in an enema, the persistent irritability. Warm bathing may be resorted to when under these circumstances the eruption is slow in showing itself. The head has to be kept cool, the feet warm.

Epistaxis may be left alone while mild. It is sometimes a relief to the congested mucous membrane of the nares. When severe it has to be stopped.

The organs of circulation do not suffer often in measles. Endocarditis is met with but very rarely, but in epidemics of unusual severity heart-failure is of frequent occurrence. It is to be treated according to the principles laid down in the articles on scarlatina and typhoid fever. A peculiar feature in very severe measles is the frequency of thromboses. Indeed, in no other infectious disease are they met with as often as in measles. The thrombi occur in the vulva, in the skin and subcutaneous tissue, about the face as cancrum oris (noma), on the distal parts of the extremities, particularly the legs. Purpura is not frequent, but gangrene of the skin is not at all uncommon in such cases. The odor in them, and in cancrum oris, is very offensive indeed, and requires strong disinfectants and deodorizers. Thymol in solution of one to one thousand, iodoform in powder or in vaseline ointment, will be found serviceable.

What has been called hemorrhagic measles is not always very malignant. In a great many cases it means nothing but the effusion of some hæmatin into the eruption.

As is well known, the respiratory organs suffer mostly in measles. There is always catarrh of the nose, which may lead at an early period to tumefaction of the lymph bodies

around the neck. If such be the case the catarrh must not be left alone, but treated with gentle injections of a solution of salt water or boracic acid. The conjunctivitis connected with it requires tepid or cool application, or instillation several times a day of a few drops of a two-per-cent. cocaine solution. A moderate amount of bronchial catarrh may be left alone provided the cough is not very severe, for severe attacks of coughing, even without much congestion or inflammation, may produce bronchiectasis or emphysema. Particularly is such the case when there is complication with pertussis. Here morphine may be given in sufficient doses. Bronchitis is rarely dangerous unless it be capillary. Broncho-pneumonia is always a serious complication and a very frequent one. In a number of cases its course is very rapid, accompanied with cyanosis and a very small pulse. Active treatment is required in these cases. The inhalation of oxygen will now and then bridge over urgent conditions. Warm bathing and cold affusion in a warm bath will be of good service, for it is necessary that the patients, particularly small children, should cry. Unless they cry they will suffocate. Stimulant expectorants are in order, such as camphor, benzoic acid, or carbonate of ammonia. The muriate of ammonia is not sufficient. Cardiac stimulants are required at the same time, such as digitalis, spartein, musk. No depressant expectorants should be given. Antimonials should be avoided at any rate.

There is always some catarrh of the larynx. When the croupous symptoms are very urgent the air of the room ought to be filled with steam, and the patient encouraged to drink as much as possible, particularly of alkaline waters. The internal administration of the iodide of potassium in moderate doses will do good service. So will an opiate, particularly at bedtime. In connection with the catarrhal affection of the nose, otitis is now and then seen. According to Schwartze, three per cent. of all the cases of otitis can be traced back to measles.

During all this time the kidneys ought to be watched. It is true that nephritis is by no means a frequent occurrence in measles, but it has been found often enough to justify the greatest attention.

Cerebral complications have no special indications. Rules for their treatment will form the subject of a future chapter.

7. *Rötheln* (*Rubella*).

It has not yet conquered an indisputable place in pathology. There are still many who do not take it to be a separate disease. The eruption looks mostly like measles, sometimes like erythema, or urticaria, or scarlatina. Many cases have been described which were connected with catarrh of the respiratory organs and of the throat, with glandular swellings and fever. These are the cases which have been described under the name of rubella morbillosa, and would be diagnosticated by many, myself included, not as rötheln, or rubella, but as a mild form of measles. If there be any such special disease, no special treatment is required.

8. *Mumps.*

The incubation lasts a fortnight, and sometimes three weeks. Thus prevention by isolation can seldom be accomplished. The infection must be presumed to take place through the Stenonian duct. Thus a careful hygiene of the mouth must be considered the best preventive. Often the patients do not feel very sick. Many do not take to their beds. In many cases covering the swelling with cotton is sufficient to protect it. Where there is a great deal of pain narcotic applications may be made, or ice applied. The latter certainly reduces the amount of swelling, although it may not shorten the course of the disease. I have often found the application of iodoform collodion (one to eight or ten), made twice a day over the whole

surface, quite successful. When there is a tendency to suppuration, warm applications will favor it. Then incisions must be made in time, be large, and treated antiseptically. The diet must be that of all fevers,—fluid. A consecutive anæmia which is more frequent than the apparent mildness of the affection would seem to explain, requires generous feeding, iron, nux, and a change of climate.

9. *Variola.*

Vaccination ought to take place early, for variola in the first year is quite frequent among those not vaccinated. There are also many cases of variola among those not vaccinated between the eleventh and twelfth years. The smallpox reports of the German empire emphasize the fact that no case of variola occurring in vaccinated children who had more than two cicatrices, terminated fatally; nor was there a fatal case among those who were revaccinated. There was no fatal case where the vaccination marks were very distinct, between the thirteenth and forty-fourth years. The fact that none died that exhibited more than two marks appears to prove that the single mark customary among us may not be sufficient. At all events, many of our children vaccinated in the first year of life will undergo a successful revaccination when they are only from four to six years old. At that time revaccination ought to be tried.

Isolation is now recognized as an absolute necessity in the case of variola more than in any other disease. Thus little difficulty is encountered by ill will or ignorance. Patients with variola ought to be kept cool, washed frequently with cold or tepid water; now and then an ether spray over sore parts will be found quite agreeable. Fever is sometimes very high, and ought then to be modified by antipyretics. The delirium is sometimes so violent, and bordering on mania, that the inhalation of chloroform or the administration of chloral

hydrate is required. The eyes ought to be covered with cold compresses, sore places covered with vaseline or lead ointment. Superficial sores particularly, and those which yield an offensive odor, should be treated with thymol, salicylic acid, or iodoform. Scabs must be removed from the nostrils so as to facilitate respiration; abscesses should be opened in time and disinfected, and complications treated. One of the most severe complications is œdema of the larynx, or laryngitis, which may require, on short notice, tracheotomy or intubation.

After the disappearance of the fever stage the patient ought to be bathed once every day or every other day, and inunctions of fat made all over the surface until desquamation is complete.

10. *Varicella* (*Chicken-pox*).

Bad cases must be kept in bed. Very few require medicinal treatment, except when there is local gangrene. A small number of instances of consecutive nephritis are now on record, as also in vaccinia; thus the urine ought to be examined in every case.

11. *Erysipelas.*

It is so communicable that even a physician may carry it. Still, it is not probable that the healthy surface can be attacked by it. As in most cases of diphtheria, so in all cases of erysipelas, a sore surface forms the resting-place of the disease. Erysipelas may make its appearance on an eczematous skin. On the head it sometimes escapes notice for some days. Excoriations of the anus and sexual organs, or slight injuries done by a pin or by the finger-nail, are sufficient to give rise to it. It often originates in the intertrigo of the infant, or in the neighborhood of a vaccination mark. In the latter case it seldom appears immediately after vaccination, very often not before the second week or later. Chronic nasal catarrh is a

frequent cause. Some children will have erysipelas extending over both cheeks once or more every year. Slight or large operation wounds are a frequent cause; so is diphtheria, and many cases are seen to take their start from a tracheotomy wound. In the newly-born it appears, as a rule, on or near the navel, and is generally connected with universal sepsis. Prevention of the disease will mainly depend on the removal, or relief, of the several causes which have been enumerated.

Every case of erysipelas must be isolated; the diet and general treatment be regulated on general principles. The local treatment may be quite simple in some cases. The erysipelatous surface may simply be covered with soft cotton, or a powder of talcum, or of amylum, or one part of salicylic acid with perhaps ten parts of oxide of zinc and twenty-five of amylum. Applications of lead wash and opium, or of sulphate of zinc, have been in general use for a long time; also of solutions of sulphate of iron; now and then the application or inunction of blue ointment. The latter I cannot advise because of the pain and irritation resulting. The inflamed surface has been covered with collodion. Infants and children will not bear it. Ferreire has used, in a case of erysipelas on the leg of a child of two years and a half, a mixture of one part of resorcin in seven thousand five hundred of traumaticin (0.008 : 60.0). Cold applications have been made, ice has been applied, and where the extent of the erysipelas is but limited, to great advantage. Incisions outside the inflamed portion have been advised. They are useless and brutal, because the lymphatics are, as a rule, infected a good while before the inflammation shows on the surface. That is the reason why neither saturated solution of nitrate of silver nor the solid caustic have been of advantage.

Hueter recommended many years ago the subcutaneous injection of a two-per-cent. solution of carbolic acid round the

inflamed surface, and claimed to have confined every case within its original limits. In place of that, I advised many years ago the application, not on, but around, the erysipelatous area, of a mixture of one part of carbolic acid in eight, ten, or fifteen parts of oleic acid. I have treated many cases in that way, and most of them quite successfully. The application was to be rubbed into the surface around the diseased part at frequent intervals, or, when the erysipelas was confined to the extremity, a band or compress soaked in the mixture was applied above or below the diseased part, not infrequently with the result of stopping the process. Instead of the carbolic acid as administered by Hueter, Ducrey uses a solution of one part of corrosive sublimate in one thousand of water, and repeats the injections, which are to be made three centimetres apart, after twelve hours. A better plan, however, is, after all, to apply carbolic acid, one part dissolved in ten or fifteen of alcohol, directly to and beyond the surface, every hour or every few hours. It is readily absorbed, and may do good. It will do good in most cases, but may do harm by affecting the kidneys. Thus in every case where it is to be applied the kidneys must be watched carefully, and particularly in young children. Carbolic acid being rapidly absorbed, will affect infants very severely.

The internal administration of the tincture of chloride of iron has been considered a specific by many. That opinion is certainly based on an exaggeration of its merits. The preparation is, however, an antifermentative, and while being a vascular stimulant, does not give rise to fever in infectious diseases as it would do in simple inflammatory fevers.

Abscesses complicating erysipelas require large incisions and antiseptic treatment. Erysipelas of the neck is very often complicated with œdema of the larynx, and may require scarification, tracheotomy, or intubation.

12. *Diphtheria.**

The treatment must be mainly preventive. Every case of diphtheria must be isolated, during the winter on the upper floor of the house, windows open as much as possible, furniture of any kind reduced to the least possible quantity, the room changed every few days, the bedding frequently.

To what extent the infecting substance may cling to surroundings is best shown by the cases of diphtheria springing up in premises which had not seen diphtheria for a long time, but had not been interfered with ; and best, perhaps, by a series of observations of autoinfection. When a diphtheritic case has been in a room for some time, the room, bedding, curtains, and carpets are infected. The child is getting better, has a new attack, may again improve, and is again stricken down. Thus I have seen them die ; but also improve immediately after being removed from that room or house. If possible, a child with diphtheria ought to change its room and bed every few days.

The sick in crowded houses and quarters ought to be transferred to a special hospital, which ought not to be too large. The Willard Parker Hospital, foot of East Sixteenth Street, New York, with its sixty beds for scarlatina and diphtheria, is in that respect a praiseworthy example. The large amount of good it is doing would grow in geometrical progression if there were, as there ought to be in a large and ambitious metropolis, half a dozen institutions of the same class. When diphtheria breaks out in a house, either private or tenement, the well must be removed to a healthy place; in large cities, temporary homes ought to be provided for that purpose, to benefit the children of the poor. If the rich would but remember that their children will be affected through the many

* The therapeutics of diphtheria has been the subject of a paper read by the author, by invitation, before the Philadelphia County Medical Society, on May 23, 1888, and part of the discussion in the Children's Section of the British Medical Association, August, 1888.

links between them and the poor (servants, messengers, schools, dresses brought home from the tailor or seamstress, or purchased in the stylish and expensive establishments which give out the work to tenement working-people), their very egotism would compel them to do in the public interest what humanity does not urge them to perform. The sick must be reported to the health boards. The well children of a family with diphtheria must not go to school or church before a fortnight—the possible period of incubation—has elapsed since their last contact with the sick. Schools must even be closed now and then, when an epidemic makes its appearance; teachers instructed in the examination of throats. The condition of the house is to be examined into and improved; attendants, servants, nurses and cooks, seamstresses and laundresses, teachers, shopkeepers, restaurateurs, barbers, hair-dressers, with their mild diphtheritic attacks and strong pecuniary interests, are frequent sources of infection. In times of common danger, public places, theatres, ball-rooms, dining-halls, public vehicles, hackney-coaches, and railroad-cars must be superintended by the authorities. There must be no clashing permitted between the public good and the individual money-bag. Clothing, bedding, room, and house must be thoroughly disinfected; articles used in the sick-room burned or soaked in a disinfecting fluid in the room, not carried over the house in a dry state; the rooms thoroughly disinfected after a case terminated favorably or unfavorably; the corpse disinfected, the funeral private, nothing removed from the house unless disinfected, no pieces of carpet thrown away to be picked up by beggars, no mattresses benevolently donated to the unsuspecting poor.*

* To what extent contagion will prove dangerous, a case which was reported to me lately shows as well as anything I ever experienced. Unfortunately, I have not yet received the permission of my correspondent to mention names, but the facts speak loud enough. The communication I refer to came from ——, Kansas, a few months ago, and is as follows: . . . "The water used by the family is of the best quality, the drainage

The rules for disinfection, published by the National Board of Health in its Bulletin No. 10, of September 6, 1879, are still classical, very much more so than the suppression of that beneficent board—which might have proved a lasting blessing to the whole commonwealth—in this our surplus-ridden country, from motives of ill-advised parsimony. I have copied them in my "Treatise on Diphtheria," Wm. Wood & Co., New York, 1880, and in the first volume, p. 698, of the "American

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perfect, and the hygienic surroundings perfect, as far as I can make out. There has never been an undoubted case of diphtheria in the town, nor are there cases near here. The little fellow has not been away from home, nor have outsiders been at his home.

"The case was at first tonsillitis, the result of exposure to cold. An abscess formed in one tonsil, and, after its rupture and discharge, the child had temporary relief. Up to this time there had been no particular systemic disturbance other than the tonsillar trouble would account for, nor were the voice and breathing affected any different from what would be expected in this disease. A day or so before the abscess broke, his mother thought swabbing the throat with alum-water might give him relief, and she proceeded to do this, using a sponge-swab that she had used in swabbing the throat in a case of diphtheria in her family in Chicago *two* years ago. Two days after using this swab laryngeal stenosis began to show itself, together with a profound systemic disturbance characteristic of diphtheria, and death resulted in three or four days from septic absorption and obstruction to breathing. Before I saw him his mother had applied some liniment over the angle of jaw, which produced a blister. No change was observed on this blistered surface until about the time the laryngeal stenosis began to show itself, when a tough grayish membrane, closely adherent to the underlying surface and bleeding when detached,—which was done with difficulty,—showed itself. The urine showed by ordinary test about one-fourth albumin. I cannot account for the trouble in any other way than through the swab used.

"The family moved from Chicago to Detroit, where they lived six months before coming here last February, carrying the swab with them on their travels. There can be no doubt but that the case in Chicago on which the swab was used was one of diphtheria. Diphtheria was epidemic in the part of the city in which they lived, and the diagnosis was made by an able physician. About one-third of those attacked in this epidemic died." . . .

System of Medicine." They may not be accessible to some of my readers, and will be welcome to all.

"*Instructions for Disinfection.*

"Disinfection is the destruction of the poisons of infectious and contagious diseases.

"Deodorizers, or substances which destroy smells, are not necessarily disinfectants, and disinfectants do not necessarily have an odor.

"Disinfection cannot compensate for want of cleanliness nor of ventilation.

"I. Disinfectants to be employed.

"1. Roll-sulphur (brimstone) for fumigation.

"2. Sulphate of iron (copperas) dissolved in water in the proportion of one and a half pounds to the gallon; for soil, sewers, etc.

"3. Sulphate of zinc and common salt, dissolved together in water in the proportion of four ounces sulphate and two ounces salt to the gallon; for clothing, bed-linen, etc.*

"II. How to use disinfectants.

"1. *In the sick-room.*—The most available agents are fresh air and cleanliness. The clothing, towels, bed-linen, etc., should, on removal from the patient, and before they are taken from the room, be placed in a pail or tub of the zinc solution, boiling hot, if possible.

"All discharges should either be received in vessels containing copperas solution, or, when this is impracticable, should

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* Carbolic acid is not included in the above list for the following reasons: It is very difficult to determine the quality of the commercial article, and the purchaser can never be certain of securing it of proper strength; it is expensive when of good quality, and experience has shown that it must be employed in comparatively large quantities to be of any use; it is liable by its strong odor to give a false sense of security.

be immediately covered with copperas solution. All vessels used about the patient should be cleansed with the same solution.

"Unnecessary furniture,—especially that which is stuffed,—carpets, and hangings should, when possible, be removed from the room at the outset, otherwise they should remain for subsequent fumigation and treatment.

"2. Fumigation with sulphur is the only practical method for disinfecting the house. For this purpose the rooms to be disinfected must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with zinc solution, should be opened and exposed during fumigation, as directed below. Close the rooms as tightly as possible, place the sulphur in iron pans, supported upon bricks placed in wash-tubs containing a little water, set it on fire by hot coals or with the aid of a spoonful of alcohol, and allow the room to remain closed for twenty-four hours. For a room about ten feet square, at least two pounds of sulphur should be used; for larger rooms, proportionately increased quantities.

"3. *Premises.*—Cellars, yards, stables, gutters, privies, cesspools, water-closets, drains, sewers, etc., should be frequently and liberally treated with copperas solution. The copperas solution is easily prepared by hanging a basket containing about sixty pounds of copperas in a barrel of water.

"4. *Body- and bed-clothing, etc.*—It is best to burn all articles which have been in contact with persons sick with contagious or infectious diseases. Articles too valuable to be destroyed should be treated as follows:

"*a.* Cotton, linen, flannel, blankets, etc., should be treated with the boiling-hot zinc solution; introduce piece by piece, secure thorough wetting, and boil for at least half an hour.

"*b.* Heavy woollen clothing, silks, furs, stuffed bed-covers, beds, and other articles which cannot be treated with the zinc solution, should be hung in the room during fumigation, their

surfaces thoroughly exposed, and pockets turned inside out. Afterwards they should be hung in the open air, beaten and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, etc., should be cut open, the contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but should afterwards be removed to the open air and thoroughly beaten.

"5. Corpses should be thoroughly washed with a zinc solution of double strength; should then be wrapped in a sheet wet with the zinc solution, and buried at once. Metallic, metal-lined, or air-tight coffins should be used when possible, certainly when the body is to be transported for any considerable distance."

Prevention can accomplish a great deal for the individual. Diphtheria will, as a rule, not attack a healthy integument, be this cutis or mucous membrane. The best preventive is, therefore, to keep the mucous membrane in a healthy condition. Catarrh of the mouth, pharynx, and nose must be treated in time. Many a chronic nasal catarrh, with big glands round the neck, requires sometimes but two or three regular salt-water injections (1 to 130) into the nose, and gargling, if the children be large enough to do so. The addition of one per cent. of alum will often be found useful. This treatment, however, must be continued for many months, and may require years. Still, there is no hardship in it, and no excuse for its omission. The nasal spray of a solution of nitrate of silver, 1 to 500 or 1000, will accelerate the cure. Its application must be repeated every other day. Not infrequently has a treatment which was considered obsolete when I was young been of great service to me. It consists in the internal administration of the tincture of pimpinella saxifraga. It is certainly an efficient remedy in subacute and chronic pharyngitis and laryngitis. I generally give it to adults, diluted with equal parts of glycerin and water, a teaspoonful of the mixture

every two or three hours, with the proviso that no water must be taken soon after; children in proportion.

Large tonsils must be resected in times when there is no diphtheria. For during an epidemic every wound in the mouth is liable to become diphtheritic within a day, and such operations ought to be postponed, if feasible. The scooping of the tonsils, for whatever cause, I have given up since I became better acquainted with the use, under cocaine, of the galvano-cautery. From one to four applications to each side, or to the post-nasal space, are usually sufficient for every case of enlarged tonsils or lacunar amygdalitis ("tonsillitis"). It is advisable to cauterize but one side at a time, to avoid inconvenience in swallowing afterwards, and to burn from the surface inward. Cauterization of the centre of the tonsils may result in swelling, pain, and suppuration, unless the cautery is carried entirely to the surface; that means to say, the scurf must be on, or extend to, the surface. Another precaution is to apply the burner cold, press it on, and then heat.

Nasal catarrh and proliferation of the mucous and submucous tissue may require the same treatment, but in my experience the cases which demand it are less frequent than those in which the tonsils need correction.

The presence of glandular swellings round the neck must not be tolerated. They, and the oral and mucous membranes, affect each other mutually. Most of them could be avoided, if every eczema of the head and face, every stomatitis and rhinitis resulting from uncleanliness, combustion, injury, or whatever cause, were relieved at once. A careful supervision of that kind would prevent many a case of diphtheria, glandular suppuration, deformity, or phthisis.

For its salutary effect on the mucous membrane of the mouth, chlorate of potassium, or sodium, which is still claimed by some to be a specific in diphtheria, or almost so, is counted by me

among the preventive remedies. If it be anything more, it is in a case of diphtheria an adjuvant. It exhibits its best effects in the catarrhal and ulcerous condition of the oral cavity. In diphtheria it keeps the mucous membrane in a healthy condition, or restores it to health. Thus it prevents the diphtheritic process from spreading.

Diphtheria is seldom observed on healthy, or apparently healthy, tissue. The pseudo-membrane is mostly surrounded by a sore, hyperæmic, œdematous mucous membrane, to which it will then extend. Indeed, this hyperæmia precedes the appearance of the diphtheritic exudation in almost every case. The exceptions to this rule consist of those cases in which the virus may take root in the interstices between the normal tonsillar epithelia, pointed out by Stoehr but a few years ago. Indeed, many cases of throat disease occurring during the prevalence of an epidemic of diphtheria are but those of pharyngitis, which, under favorable circumstances, may develop into diphtheria. These throat diseases are so very frequent during the reign of an epidemic, that in my first paper on diphtheria (*Amer. Med. Times*, August 11 and 18, 1860) I based my reasoning on two hundred cases of genuine diphtheria, and one hundred and eighty-five of pharyngitis without a visible membrane.

These cases of pharyngitis, and such of stomatitis and pharyngitis accompanying the presence of membranes, are benefited by the local and general effect of chlorate of potassium. The surrounding parts being healthy or returning to health, the membrane remains circumscribed. The generally benign character of purely tonsillar diphtheria, which is apt to run its full course in from four to six days, has in this manner contributed to secure to chlorate of potassium the undeserved reputation of being a remedy, *the* remedy, in diphtheria. The dose of the salt must not be larger than fifteen grains (one gramme) for an infant a year old, not over twenty or thirty (1.5 to 2) for a

child from three to five years, in the twenty-four hours. An adult must not take more than one and a half drachms (six grammes) daily. These amounts must not be given in a few large doses, but in repeated doses and at short intervals. A solution of one part in sixty will allow a teaspoonful every hour, or half a teaspoonful every half hour in the case of a baby one or two years old.

It is not too late yet to raise a warning voice against the use of larger doses. Simple truths in practical medicine do more than simply bear repetition: they require it. For though the cases of actual chlorate of potassium poisoning are no longer isolated, and ought to be generally known, fatal accidents will still occur even in the practice of physicians. When I experimented on myself, with half-ounce doses, thirty years ago, the results were some gastric and intense renal irritation. The same were experienced by Fountain, of Davenport, Iowa, whose death from an ounce of the salt has been impressively described in Alfred Stillé's "Materia Medica," from which I have quoted it in my treatise on diphtheria. His death from chlorate of potassium induced me to prohibit large doses as early as 1860. In my contribution to Gerhardt's *Handbuch der Kinderkrankheiten*, vol. ii., 1877, I spoke of a series of cases known to me personally. In a paper read before the Medical Society of the State of New York in 1879 (*Med. Record*, March 15), I treated of the subject monographically, and alluded to the dangers attending the promiscuous use of the drug, which has descended into the ranks of domestic remedies; and finally, in my treatise (New York, 1880), I collected all my cases and the few then recorded by others. Since that time the recorded cases have become quite numerous, and less than a year ago a few new ones were related before the Practitioners' Society of New York. The facts are undoubted, though the explanations may differ. The probability is that death occurs from methæmo-

globinuria produced by the presence of the poison in the blood, though Stockvis, of Amsterdam, has tried, by a long series of experiments, to fortify my original assumption that the fatal issue was due to acute nephritis.

There is, in every individual case, a certain danger, which, though it be common enough in other exhausting diseases, is of particular moment in diphtheria, where it is most frequent. It can be averted by meeting it early. It is heart-failure. Where it has occurred, the indications for treatment become as clear as they are urgent and often futile. When it is simply feared, a preventive treatment will save many a case.

Heart-failure is usually developed gradually. It is foreshadowed by an increasing frequency and weakness of both heart-beats and pulse, by an occasional intermission, by unequal frequency of the beats in a given period (say of ten seconds), or by the equalization of the interval between systole and diastole, and diastole and systole. This latter condition, which is normal in the embryo and fœtus, is always an ominous symptom.

Heart-failure is due, besides the influences common to every disease and every fever, to tissue changes in the myocardium, in the nerves, or both. These changes may be due to the ill-nutrition of the tissues resulting from every septic condition of the blood, or specific alterations due to the diphtheritic process. Failure may either come on after having given warning, or it may be on you without any. Thus, there is no case of diphtheria—beyond, perhaps, those of the mild tonsillar form—but ought to make us anxious and afraid. Indeed, there is no safety and no positive prognosis until the patient is quite recovered, and even advanced beyond the period in which paralysis may develop.

Whatever enfeebles must be avoided; absolute rest must be enjoined. The patients must be in bed, without excitement of

any kind; take their medicines—which ought to be as palatable as possible—and their liquid food, and evacuate their bowels, in a recumbent or semi-recumbent position; crying and worrying must be prevented; the room kept airy and rather dark, so as to encourage sleep if the patient be restless; and restless they are, unless they be under the influence of sepsis, and thereby subject to fatal drowsiness and sopor. In no disease, except, perhaps, in pneumonia, have I seen more fatal results from exertion on the part of the sick, or from anything more than a sudden change of posture. Unless absolute rest be enforced, neither physician nor nurse have done their duty. The latter must avoid all the dangers attending the administration of medicines, injections, sprays, and washes. Preparations for the same must be made out of sight, every application made quickly and gently. On no account must a patient be taken out of bed for that purpose. I know of children dying between the knees of nurses who called themselves trained and had a diploma.

Pharmaceutical preparations, such as digitalis, strophanthus, sparteine, caffeine, besides camphor, alcohol, and musk, must not be postponed until feebleness and collapse have set in. These are at least possible, even probable; and this is certain, that a cardiac stimulant will do no harm. It is advisable to use it at an early date, particularly in those cases in which antipyrin or antifebrin are given. Besides, it is not enough that the patients should merely escape death; they ought to get up, *cito, tuto, et jucunde*, with little loss and speedy recuperation; a few grains of digitalis or their equivalent—preferably a good fluid extract—may or must be given in a pleasant and digestible form daily. When a speedy effect is required, one or two doses of two or four minims each are not too large, and must be followed up by smaller ones. When it is justly feared lest the effect of digitalis be too slow, I give, with or without it, sulphate of sparteine. An infant a year old will take one-

tenth of a grain four times a day as a matter of precaution, and every hour or two hours in an emergency.

Of the same importance are alcoholic stimulants. The advice to wait for positive symptoms of heart-failure and collapse before employing the life-saving apparatus is bad. There are cases which get well without treatment, but we do not know beforehand which they will be. No alleged mild case is safe until it has recovered. When heart-failure has once set in—and often will it occur in apparently mild cases—our efforts are too often in vain. Thus alcoholic stimulants ought to be given early and often, and in large quantities, thoroughly diluted. There is no such thing as danger from them or intoxication in septic diseases. A few ounces daily may suffice; but I have often seen ten ounces daily of brandy or whiskey save children who had been doing badly with three or four.

Caffeine, or, in its stead, coffee, is an excellent cardiac tonic, except in those cases in which the brain is suffering from an active congestion. For subcutaneous injections the salicylate (or benzoate) of caffeine and sodium, which readily dissolves in two parts of water, is invaluable for emergencies, in occasional doses of from one to five grains in from two to ten minims of water. From five to twenty grains of camphor may be given daily, as camphor-water, or in a mucilaginous emulsion, which is easily taken. It does not so disturb the stomach as carbonate of ammonium is apt to do. For rapid effect it may be administered hypodermically, in five parts of almond oil, which is milder and more convenient than ether. Strychnine may be added regularly from the beginning of failure, but mainly in cases with little increase of temperature. Its effect is more than momentarily stimulating. A child of three years will take a one-hundredth of a grain three times a day, and more in an urgent case. But the very best internal stimulant in very urgent

cases is Siberian musk. I prefer to give it from a bottle, in which it is simply shaken up with a thin mucilage. In urgent cases it ought to be given in sufficient doses and at short intervals. When ten or fifteen grains administered to a child one or two years old within three or four hours will not restore the heart's action to a more satisfactory standard, the prognosis is very bad.

The *local treatment* of the pseudo-membranes of the fauces is a subject of great importance. To look upon them as an excretion which needs no interference, is incorrect. If it were possible to remove or destroy them, it would be a great comfort; but they can be reached only in certain places, and just in those in which they do least harm. Pseudo-membranes on the tonsils are the least dangerous, for their lymph communication with the rest of the body is very scanty. Thus almost all forms of tonsillar diphtheria are among the most benign, at least as long as the process does not extend. Most cases of the kind run their mild course in from five to seven days, and it is just these which have given rise to the many proposals of tearing, scratching, cauterizing, swabbing, brushing, and burning. There are cases which do not show the harm done. The fact is, that neither the galvano-cautery nor carbolic acid, nor tannin and glycerin, nor perchloride or subsulphate of iron can be applied with leisure and accuracy to the very membrane alone, except in the cases of very docile and very patient children. In almost every case the surrounding epithelium is getting scratched off or injured, and thus the diphtheritic deposit will spread. Besides, the membrane of the tonsil is altered surface tissue (as it always is wherever the epithelium is pavement), and not deposited upon the mucous membranes, from which it might be easily detached. Whatever is done must be accomplished without violence of any kind. If nasal injections be found advisable, they can be made so as to wash the posterior pharynx and the tonsils sufficiently, and thus render

the special treatment directed to the throat exclusively, useless. Besides, it is easier, meets with less objection, and gives rise to less exhaustion than the forcible opening of the mouth. This fact is of great importance, as I shall show in connection with the local treatment of the nasal cavity. Where it is possible to make local applications without difficulty, the membrane may be brushed with tincture of iodine several times daily, or a drop of rather concentrated carbolic acid. Of powders I know only one, the application of which is not contraindicated, —viz., calomel. Even this may irritate by its very form. Everything dry irritates and gives rise to cough or discomfort. Whatever has, besides, a bad taste or odor, such as sulphur, iodoform, or quinia, must be abhorred. But lately sugar has been recommended as a panacea, also table salt. Iodol will do better than either.

For the purpose of dissolving membranes papayotin, or papaïn, has been employed. It is soluble in twenty parts of water, and may be injected, sprayed, or brushed on. I have used it in greater concentration, in two or four parts of water and glycerin, in the nose, throat, and through the tracheotomy tube, in the trachea. One of the irrepressible drug manufacturers and advertisers pushes the claims of some modification of the drug, which he calls papoid. For the same purpose trypsin is preferred by others. The mode of its application appears to be the reverse of indifferent. But lately I have seen, in the practice of one of our best-known practitioners, papayotin applied in powder, which resulted in constant irritation of the throat, while the patient otherwise was convalescent. The pharyngeal hyperæmia and slight exudation disappeared when mild alum washes were substituted.

Diphtheria of the *nose* is apt to terminate fatally unless energetic local treatment is commenced at once. This consists in persevering disinfection and cleansing of the mucous surface. The disinfecting procedure must not be omitted long, be-

cause general sepsis results from rapid absorption through the surface, which is supplied with lymph-ducts and small superficial blood-vessels to an unusual extent. Disinfectant injections must be continued every hour, for one or more days. If they be well made, the consecutive adenitis, particularly that about the angles of the lower jaw, is soon relieved, and the general condition improved. But there are cases in which it is not the lymph bodies that are the main gates through which constitutional poisoning takes place, but the blood-vessels only. In the incipient stage of such cases the discharge from the nostrils is more or less sanguineous; in them the blood-vessels, thin and fragile, carry the poison inward with great rapidity.

In a few cases injections are unsuccessful. They are those in which the whole nasal cavity is filled with membranous deposits to such an extent as to require forcible removal. Sometimes it is difficult to push a silver probe through them. That procedure may be repeated, the probe dipped in carbolic acid, or wrapped in absorbent cotton moistened with carbolic acid of fifty or ninety per cent. After a while injections alone will suffice. But now and then the development of pseudo-membranes is very rapid, a few hours suffice to block the nostrils again, and the difficulty is the same.

The liquids which are to be injected must be warm and fairly mild. Solutions of chloride of sodium, two-thirds of one per cent., saturated solutions of boric acid, one part of bichloride of mercury, thirty-five of chloride of sodium, and five thousand of water, more or less, or lime-water, or solutions of papayotin, or a five-per-cent. solution of hyperoxide of hydrogen, or a solution of hyposulphite of sodium, will be found satisfactory. From the selection of these remedies it is at once apparent that the object in view is partly that of washing out and dissolving, and partly of disinfecting. I have not mentioned carbolic acid, which may be used in solutions of

one per cent. or less. Its employment requires care, for much of the injected fluid is swallowed, and proves a danger to children of any age, but mostly to the young. In a number of cases the brushing of the whole surface with oil of turpentine has been found to answer.

Most of the syringes I find in my rounds are abominations. The nozzle must be large, blunt, and soft. After having recommended for many years the common hard-rubber ear-syringe, the sharp end of which was cut off, I now use always a short stout glass syringe with soft-rubber mounting in front.

When the children cannot, or must not, be raised, I employ the same solutions from a spoon, or a plain Davidson atomizer. These applications can thus be made while the children are lying down, every hour or very much oftener, without any or much annoyance. The nozzle must be large, so as to fit the nostril. A single spray on each side will generally suffice. I am in the habit of covering the common nozzle with a short piece of india-rubber tubing.

For a day or two these injections of fluids or spray must be made hourly. It is not cruel to wake the children out of their septic drowsiness; for it is certain death not to do so.

Injections of the nose are oftener ordered than judiciously made. Hundreds of times have I been assured that they had been made regularly, hourly, for days in succession. Still there was a steady increase of glandular swelling and sepsis. I never believe a nurse to have made them regularly unless I have seen her doing it. They *will* run up their syringe vertically and not horizontally; the fluid *will* return through the same nostril. On the successful injecting or spraying of the nares hangs every life in a case of nasal diphtheria. I have long learned to look upon a neglect to tell at every visit how to make an injection, as a dereliction of duty. This may appear a trifling way, but it is a safe one. The nurse must

be made to tell you that at every injection the fluid returns through the other nostril, or through the mouth, or is swallowed.

The procedure is simple enough, and need not take more than half a minute for both nostrils. A towel is thrown over the child's chest up to the chin, and the child gently raised in bed by the person who is to make the injection. This person, sitting on the bed, steadies the patient's head against her chest, while somebody else holds the patient's hands. The syringe is introduced horizontally by the person sitting behind the patient, and gently emptied. No time must be lost in refilling and attending to the other side. When pain is complained of in the ears, more gentleness is required, or the spray, or pouring in from a spoon, or minim-dropper even, has to take the place of the injection.

Many sins are committed in doing this very simple thing. The unfortunate little one is made to see all the preparations, and is worried and excited, and the necessary gentleness in the proceedings is neglected in too many cases.

For the purpose of softening and macerating pseudo-membranes steam has been utilized extensively. Its inhalation is useful in catarrh of the mucous membranes, and in many inflammatory and diphtheritic affections. On mucous membranes it will increase the secretion and liquefy it, and thus aid in the throwing off of the pseudo-membranes. Its action is the more pronounced the greater the amount of muciparous follicles under or alongside a cylindrical or fimbriated epithelium. Thus it is that tracheo-bronchial diphtheria, so-called fibrinous bronchitis, is greatly benefited by it. Children affected with it I have kept in small bath-rooms for days, turning on the hot water, and obliging the patient constantly to breathe the hot clouds. Several such cases I have seen recover with that treatment. Atomized *cold* water will never yield the same result. Nor have I seen the patent inhalers do much good.

Still, where the surface epithelium is pavement rather than cylindrical, and but few muciparous follicles are present, and the pseudo-membrane is rather immerged in, and firmly coherent with, the surface,—for instance, on the tonsils and the vocal cords,—the steam treatment is less appropriate. On the contrary, moist heat is liable in such cases to favor the extension of the process by softening the hitherto healthy mucous membrane. Thus it takes all the tact of the practitioner to select the proper cases for the administration of steam, not to speak of the judgment which is required to determine to what extent the expulsion of air from the steam-moistened room or tent is permissible.

Steam can be properly mixed with medicinal vapors. In the room of the patient water is kept boiling constantly over the fireplace, provided the steam is prevented from escaping directly into the chimney, on a stove (the modern self-feeders are insufficient for that purpose and abominations for every reason); over an alcohol-lamp, if we cannot do better; not on gas, if possible, because of the large amount of oxygen which it consumes. Every hour a tablespoonful of oil of turpentine, and perhaps also a teaspoonful of carbolic acid, is poured on the water and evaporated. The air of the room is filled with steam and vapors, and thus the contact with the sore surfaces and the respiratory tract is obtained with absolute certainty.

The secretion of the mucous membranes is sometimes quite abundant under the influence of steam, but still more, like that of the external integuments, increased by the introduction of water into the circulation. Therefore, drinking of large quantities of water, or water mixed with an alcoholic stimulant, must be encouraged. Over a thoroughly moistened mucous membrane the pseudo-membrane is more easily made to float and macerate.

To evolve large volumes of steam the slaking of lime has been resorted to. It is both an old and effective procedure.

Not only is the object in view accomplished by it, but it is the best means of bringing lime into contact with the morbid surface. In a room in which lime has been slaked, everything is getting covered with it. Thus this method of profiting by the local effect of lime is decidedly preferable to the almost nugatory effect of lime-water.

It was to fulfil the same indication of softening the pseudo-membrane, by increasing the secretion of the mucous membranes, that pilocarpine or jaborandi was highly recommended. Guttmann recommended it as a panacea in all forms of diphtheria. There is no doubt that the secretion of the mucous membranes is vastly increased by its internal application, and by repeated subcutaneous injections of the muriate or nitrate of the alkaloid, but the heart is enfeebled by its use. I have seen but few cases in which I could continue the treatment for a sufficient time. In many I had to stop it because after some days of persistent administration I feared for the safety of the patients. Therefore, as early as the meeting of the American Medical Association at Richmond, eight years ago, I felt obliged to warn against its indiscriminate use in diphtheria. Thus it has shared the fate of all the hundreds of remedies and methods which have been declared to be infallible, and found wanting.

Diphtheritic *adenitis*, the swelling of the cervical glands near the angles of the lower jaw, to which I have alluded as an ominous symptom, points to nasal and naso-pharyngeal infection. The treatment consists in disinfection of the absorbing surfaces.

Direct local treatment of the glands, if not entirely useless, is, at all events, of minor importance and efficiency. The application of an ice-bag of moderate size will render the best service. The use of one part of carbolic acid to ten of alcohol irritates both surface and patient more than they can do good. Inunctions may do some good by friction (massage); inunctions with some absorbable material in them may do a little better.

The common iodide of potassium ointment is useless; iodide of potassium in three or five parts of glycerin is more readily absorbed; the same in equal parts of water, with a little animal fat, and six or eight times its quantity of lanolin, gives an ointment which is so readily absorbed that iodine is found in the urine within a few hours. Iodoform may be utilized in the same way. Injections of iodoform in ether, which I suggested some time ago, are too painful. Mercurial inunctions, those of blue ointment, require too much time for any effect to take place. Oleates are too irritating locally; a lanolin ointment would prove more satisfactory. After all, however, the readiest method of reducing the swelling of the glands, and improving the prognosis accordingly, is that of cleansing and disinfecting the field of absorption. The rare cases of suppuration in these glands require incision and disinfection. They are as ominous as they are rare, however. There is but little pus, as a rule, but one or many local deposits of disintegrated gland-cells and gangrenous connective tissue. The incisions must be extensive, the scoop and concentrated carbolic acid must be freely used. In these cases hemorrhages may occur, some of them very difficult to manage. I have seen some of them terminate fatally. In these carbolic acid must be avoided. Compression, actual cautery, and acupressure have rendered good service. Solutions of iron must be avoided, for the scurf formed is a shield, behind which deleterious absorption is going on constantly in such wounds, as it does in the uterus.

The *internal treatment* of an average case of pharyngeal diphtheria can be made to combine the indications of both internal and local administration. Of a two-per-cent. solution of the hyperoxide of hydrogen, or a five-per-cent. solution of the hyposulphite of sodium, a teaspoonful may be given every two hours. Both of these remedies have been extolled. It is their misfortune that they have been praised as panaceas. For thirty years I have preferred the use of the tincture of the chloride of iron.

It is an astringent and antiseptic. Its contact with the diseased surface is as important as is its general effect; therefore it must be given frequently, in hourly or half-hourly doses, even every twenty or fifteen minutes. An infant of a year may take three or four grammes (one drachm) a day, a child of three or five years eight or twelve grammes (two or three drachms). It must be mixed with water to such an extent that the dose is half a teaspoonful or a teaspoonful; a drachm, or two drachms, with a small quantity of chlorate of potassium, in four ounces, allows half a teaspoonful every twenty minutes. No water must be drunk after the medicine. As a rule, it is well tolerated. There are some, however, who will not bear it well. Vomiting or diarrhœa is a contraindication to persevering in its use, for nothing must be allowed to occur which reduces strength and vigor. A good adjuvant is glycerin, a better one than syrups. From ten to fifteen per cent. of the mixture may consist of it. Now and then, but rarely, it is not well tolerated neither. When diarrhœa sets in glycerin must be discontinued. Still, these cases are rare; indeed, the stomach bears glycerin very much better than the rectum.

In connection with this remedy, I wish to make a remark of decidedly practical importance. I know quite well that recovery does not always prove the efficacy of the remedy or remedies administered. But I have seen so many bad cases recover with chloride of iron, when treated after the method detailed above, that I cannot rescind former expressions of my belief in its value. Still, I have often been so situated that I had to give it up in peculiar cases. These are such in which the main symptoms are those of intense sepsis, I should say such in which the iron and other rational treatment was not powerful enough to prevent the rapid progress of the disease. Children with naso-pharyngeal diphtheria, large glandular swelling, feeble heart, and frequent pulse, thorough sepsis, and irritable stomach besides, those in which large doses only of stimulants,

general and cardiac, can possibly promise any relief, are better off without the iron. When the circumstances are such as to leave the choice between iron and alcohol, it is best to omit the iron and rely on stimulants mostly. The quantities required are so great that the absorbent powers of the stomach are no longer sufficient for both.

Nor is iron sufficient or safe in those cases which are pre-eminently laryngeal. To rely on iron in membranous croup means waste and danger.

In this latter form of membranous croup, diphtheritic laryngitis, or laryngeal diphtheria, the most useful internal remedy is mercury. Empiricism has often praised calomel in small and large doses. My acquaintance with mercury in this connection is not at all new. Five years ago I published (*Med. Record*, May 24, 1884) a number of cases which got well under its use; at the same time that Dr. Thallon, of Brooklyn, published an article on the same subject. Since I have employed it (I prefer the bichloride), my conviction of the utter uselessness of internal medication in laryngeal diphtheria, so-called pseudo-membranous croup, is thoroughly shaken. Until about six years ago I felt certain of a mortality of ninety or ninety-five per cent. of all the cases not operated upon. These figures were not taken from small numbers, for I compared those of others with my own. The latter are not a few neither; for within the last thirty years I have tracheotomized nearly six hundred times, have assisted at as many more operations, and have seen at least one thousand cases of laryngeal diphtheria which were not operated upon at all. During the last six years I have seen no less than two hundred cases, perhaps many more. Among them recoveries have not been rare at all, at all ages, from four months upward. The uniform internal medication consisted in the administration of a dose of the bichloride every hour. The smallest daily dose ever given by me in the beginning was fifteen milligrammes, one-fourth of a grain, to a baby

of four months; this was continued a few days, and the dose then somewhat diminished. Half a grain daily may be given to children of from three to five years, for four or eight days or longer. The doses vary from one-sixtieth to one-thirtieth. They require a dilution of one in six thousand or ten thousand of water or milk. There is no stomatitis, gastric or intestinal irritation is very rare. It occurred in a few cases, but then it was found that the dilution had not been sufficient, one in two thousand or three thousand only. If ever it exist, small doses of opium will remedy it.

The benefit to be derived from the remedy depends greatly upon the time of its administration. Tracheotomy or intubation is required, as a rule, after days only, and can often be avoided if mercury be given in time. If the operation becomes necessary after all, the treatment must be continued diligently. Never have I seen so many cases of tracheotomy getting well, since 1863, as when the bichloride was being used constantly in 1882 and the seven subsequent years. Nor am I alone with these favorable results. There are dozens of practitioners in New York City with whose methods and results I am well acquainted, some of whom are connected with me, in some capacity or other, who confirm the above statements.

My experience with the bichloride is mainly gathered in cases of laryngeal and bronchial diphtheria, so-called pseudo-membranous croup and fibrinous bronchitis; it is there where it has been particularly effective. Still, but few of these were quite localized affections. Our cases of diphtheritic laryngitis are mostly descending, and complicated with either diphtheritic pharyngitis, rhinitis, or both. Not a few, mainly of the latter kind, exhibit constitutional symptoms of sepsis. Many such have also recovered.

In any case of diphtheria there may occur conditions and complications which yield their own indications, and require the closest attention on the part of the practitioner. I need

not here refer again to the frequent attacks of exhaustion and heart-failure, which carry off a multitude of patients, unless they be met in time. What I said in previous papers on heart-failure and its prevention (or treatment) holds good in diphtheria, if anywhere. Therapeutical nihilism destroys as many lives as any number of direct mistakes in dosing.

Nephritis and pneumonia are frequent complications or consequences of diphtheria. The treatment of either of them requires no particular recognition in this place. Nor does œdema of the glottis yield indications differing from that occurring from other causes. Diphtheria of the skin and sexual organs requires disinfectant ointments. I have mostly relied on iodoform one part, in from eight to twelve of fat.

Diphtheritic paralysis, though of various anatomical and histological origin, yields in all cases a certain number of identical therapeutical indications. These are: the sustaining of the strength of the heart by digitalis and other cardiac tonics. A child of three years may take daily, for a month, three grains or its equivalent; for instance, one grain of the extract. This is an indication on which I cannot dwell too much. Many of the acute, and most of the chronic, diseases of all ages do very much better by adding to other medications a regular dose of a cardiac tonic. It is true that it is a good practice to follow the golden rule to prescribe simply, and, if possible, a single remedy only, but a better one to prescribe efficiently.

Besides, there are some more indications: mild preparations of iron, provided the digestive organs are not interfered with. Strychnia, or other preparations of nux, at all events. In ordinary cases a child of three years will take an eightieth of a grain three or four times a day. Local friction, massage of the throat, of the extremities, and trunk, dry or with hot water or oil, or water and alcohol; and the use of both the interrupted and continuous currents, according to the known rules and the locality of the suffering parts, find their ready indica-

tions. The paralysis of the respiratory muscles is quite dangerous; the apnœa resulting from it may prove fatal in a short time. In such cases the electrical current used for very short periods, but very frequently, and hypodermic injections of sulphate of strychnia in more than text-book doses, and frequently repeated, will render good service. I remember a case in which these, and the occasional use of an interrupted current, and occasional artificial respiration by Silvester's method, persevered in for the better part of three days, proved effective.

13. *Rheumatism.*

Acute articular rheumatism is a frequent disease both in infancy and childhood.

Since I made this statement fourteen years ago,* after observations extending over more than twenty years, a few authors have accepted and verified it. But the majority are still of the opinion, inherited from their predecessors, that infancy and childhood are immune or almost so. Thus it is only four years ago that Edlefsen reported to the German Congress for Internal Medicine (*Transactions*, 1885, p. 323) but eleven cases of acute rheumatism under five years, none of which was younger than two. The assertion that the disease is rare under four or under two years is frequently met with.

Nothing can be more erroneous. The frequency of valvular diseases, mainly of the left side of the heart, in children of from four or five years to adolescence ought to suggest the frequency of rheumatism; for but few of them are due to scarlatina, almost all are secondary to rheumatism, than which there is no more frequent cause of cardiac disorder. They cannot be claimed as congenital, for the fact that but few of

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* A. Jacobi, "Acute Rheumatism in Infancy and Childhood," 1875, in a series of American clinical lectures, edited by E. C. Seguin, M.D., vol. i. No. 2.

the fœtal diseases of the heart are found on the left side, and but a small number survive the first (or perhaps second) year, remains undisputed. Nor is the number of rheumatic cases limited to those exhibiting cardiac symptoms; for though endocarditis is of more frequent occurrence—compared with the number of cases—in children than the same sequela is observed in the adult (in whom from ten to twenty per cent. contract a permanent organic lesion of the heart), still there must be, and are, many cases of acute rheumatism which run their full course without terminating in heart-disease. In order to ascertain this, the heart must be watched in every doubtful case. Endocarditis is sometimes the first symptom of acute rheumatism in children, and precedes every other even in apparently mild cases, and pericarditis and myocardial changes are not rare. When the slightest symptom of chorea minor shows itself, the heart must also be examined together with the joints, for there are those cases in which chorea is not the final development of rheumatism and rheumatic endocarditis, but the very beginning of the disease, and then referable to a rheumatic affection of the spinal membranes.

All of these remarks I believe to be opportune, because of the frequency of cases in which the persistent notion that rheumatism is a rare disease gives rise to an erroneous diagnosis—the ubiquitous "dentition," "worms," "malaria," and "colds"—and false treatment. After all, a correct diagnosis is the foundation and *sine quâ non* of sound therapeutics; thus I shall, in this neglected instance, add a few words on the subject of diagnosis, which is sometimes quite difficult.

Fever is a common symptom in small children; every physical disturbance raises their temperature. In acute rheumatism it is often but slightly elevated; it sometimes rises at irregular times, being now and then highest about noon. The swelling of the joints is apt to be very trifling and is often overlooked, the pain (either spontaneous or on pressure) may be very much

less than that resulting from fatigue, rhachitis, syphilitic bone-disease, colic, or otitis. Thus in every doubtful case of discomfort or pain the joints and heart must be examined for rheumatism. The diagnosis of acute articular rheumatism becomes quite difficult when but a single joint is affected, either temporarily or through the whole course of the attack. Such a monarthritis is principally observed in the hip- or knee-joint, both of which are also the occasional seats of traumatic injuries or tubercular degeneration. Sometimes, after a week only or still later, the additional inflammation of other joints facilitates the recognition of the exact condition. The isolated inflammatory rheumatism fails also often to be recognized because of its being denominated "growing pain." The latter term dates from the medical nomenclature of past centuries, and ought to have been dropped long ago. What has been called by that name is of various origin and nature. It may be a neurosis of a joint with or without an œdematous swelling. I have seen a number of such instances in children of both sexes, about the shoulder-, hip-, and knee-joint mostly. Another affection which has been classed under the head of "growing pain" is epiphysitis and the congestive swelling of the intermediate cartilage of the long bones. It is a frequent occurrence, without a perceptible cause beside the physiological hyperæmia required for normal growth, and liable to become pathological; it is often noticed in the convalescence, or recovery, from infectious diseases, particularly scarlatina. Still, the large majority of attacks of "growing pain" mean rheumatism; it is the failure to appreciate this fact that gives rise constantly to mistakes in diagnosis, and the neglect in the administration of both preventive and curative measures.

The treatment of *acute articular rheumatism* has been quite unsatisfactory down to a modern time. A few of the indications are furnished by the actual or alleged causes of the disease. By some it has been believed to be endemic, like

cerebro-spinal meningitis; it is sure that certain localities have been known to harbor a great many cases at the same time. Thus, a change of residence, if practicable, ought to be resorted to, provided the individual case is but one of a great many in the same neighborhood. Contagion has now and then been presumed to cause the spreading of the malady; but the number of observations of the kind is but very limited indeed. Rheumatism is very apt to make its appearance during and after some of the most prevalent infectious diseases, such as diphtheria, scarlatina, typhoid fever, dysentery, and erysipelas. Therefore the greatest possible care bestowed on those sick with them will prove a powerful preventive of rheumatic fever. The blood has been found to be changed during the latter affection. According to many writers, both chemists and physicians, the alkaline condition of the blood is less pronounced. This change, or the actual prevalence of acid in the blood, has also been either proved, or assumed to exist, in cachectic conditions of many kinds, in fevers, uræmia, leucocythæmia, diseases of the liver, in poisoning with acids, lead and mercury, in pyæmia, typhoid fever, gout, and diabetes. In them, as in acute rheumatism also, lactic acid has been found in an undue proportion. It is the same acid which has been found in over-exerted muscles; still, when introduced into the circulation, it never produced articular rheumatism. The diminution of the alkali of the blood would justify at once the administration, through the whole course of an acute rheumatism, of alkaline salts, and particularly potassium; the latter is greatly diminished according to Beneke, who, besides its relative absence, looks upon the impairment of nerve-power and the accumulation of organic acids as the main factors in the pathogenesis of rheumatism.

Sudden changes of temperature are certainly among the causes of acute rheumatism. Cold and moist weather, moist houses, exposure to wind and rain will bring it on. This effect

may be immediate, and consists in the sudden suppression of the cutaneous circulation, or gives rise, by reflex action, to vaso-motor or trophic disturbances in the joints. Particularly is that so in those who have inherited a disposition. Such an inheritance is not at all infrequent. I have seen acute rheumatism in several children of a rheumatic father or mother. The treatment of such cases must be mainly preventive. The tendency to be influenced by sudden changes of the surrounding temperature can be modified or removed by the systematic use of cold water. Children with disposition to rheumatism must have a daily cold wash, sponge, or bath. The former is the mildest mode of application. They may be rubbed down with a wet sheet, and afterwards with a warmed dry and coarse bathing towel. Those who have been strengthened by this procedure, or such as are stronger, may be sponged, or use a shower-bath for a few seconds, or a cold bath. These will be well tolerated and prove useful, when the surface, mainly of the extremities, becomes warm after a moderate dry friction. Such children as feel chilly after these applications, may begin their treatment with tepid water and alcohol (4–6 : 1). I ought to add here, that this treatment will accomplish its end best when throughout the rest of the day great care is used to protect the surface. A cold wash or bath, given to harden and strengthen, must be combined with warm clothing and bedding to protect. Nothing could be more injurious than the exposure of the surface to wind and rain. The bare knees and calves of the children of vain mothers are foolhardy provocations of the invasion of many of the serious diseases.

The swollen and painful joints must be protected against the pressure of blankets or painful handling by raising the bedclothes, keeping the limbs in a basket of proper size (waste-paper basket), and covering them thickly with cotton. Well-covered splints add greatly to the comfort of the patient.

When pain and swelling are unusually severe, the application of an ice-bladder or ice-cloth is advisable. Very young or anæmic children do not bear them long. Cold water will then take the place of ice-water or ice. A wet bandage, or pack, round the afflicted joint is often borne well and relished. It ought to be changed every hour or half hour. Very anæmic and neurotic patients prefer hot and dry applications, mainly in those cases in which the pain is the principal symptom complained of. To relieve the latter I cannot advise the subcutaneous injections of carbolic acid which have been recommended; in very severe cases I have been compelled to administer a few drops of a solution of morphia hypodermically. As a rule, however, oleate of morphia or a mild solution (from two to four per cent.) of muriate of cocaine on the skin, a chloroform liniment brushed on, chloroform poured into the cotton surrounding the joint and retained by oil silk, or a very mild galvanic current will give some relief.

The swelling of the synovial membranes and ligaments in retarded convalescence or chronic cases taxes the patience of both the sick and the physician. Vesicatories kept on for half an hour, and frequently repeated; the wet bandage or pack snugly applied so as to compress gently; compression by bandages, or collodion, gentle massage; the galvanic current daily applied, find their indications in many and various cases. Iodine will come in for its share of usefulness. Beside the internal administration of the iodides (potassium or sodium, or both combined, in doses of grs. v to xx daily), the external applications will be found beneficial. The officinal ointment will act through the gentle handling and kneading necessitated by its use. Solutions of the iodide of potassium in glycerin will act better, but are inferior to the lanolin ointment referred to in a former article. Superior to all, however, is the application, twice daily, of one part of iodoform in from eight to fifteen of collodion or flexible collodion. It is brushed over

the swollen part copiously, and allowed to dry while the limb is kept absolutely at rest for ten minutes. Only such scales as get detached spontaneously may be removed; otherwise the next application is made on top of the preceding ones. Very old cases, with chronic effusion into the joint, require aspiration and washing out. These manipulations have become safe in the hands of every physician who knows the use of soap and disinfectants on himself and his instruments since operative surgery has availed itself of the immense progress made in pharmacological laboratories.

Endocarditis demands absolute rest, both of the organ and the body. Every exertion will prove injurious. Thus an occasional dose of opium or bromide, or both combined, has a good effect. The application of an ice-bag to the cardiac region, or, when that proves too heavy, an iced cloth, acts very favorably indeed. But not every murmur means endocarditis; it may be the result of muscular incompetency or irregular contraction only, and quite temporary; it is sometimes observed in cases of but moderate severity, and mainly combined, or alternating with, or preceding chorea minor, which now and then makes its appearance in the very earliest period of acute rheumatism. Both chorea and endocarditis can be mitigated or prevented by early attention. If every case of incipient rheumatism were sent to bed, if no "growing pain" were allowed to be on the play-ground, or at school, many a life-long ailment and early death would be avoided.

The temperature is but rarely high, or rather there are a great many cases of articular rheumatism in infants and children in which the temperature is as little elevated as the rest of the symptoms urgent. But there are such as yield temperatures of from 104° to 107° and more. It is in these that delirium and other cerebral symptoms, paralytic respiration and collapse, may make their appearance, and that the most efficient antipyretics must be employed. Among them the cold

pack, as described in former papers, and applied to the trunk and lower extremities as far down as the knees, is the readiest and most effective. It is particularly indicated in the cases complicated with endocarditis; it is in these that antipyrin, acetanilid ("antifebrin"), and phenacetin will not always have a pleasant effect. All of them are inferior to the salicylate of sodium in regard to antirheumatic and antipyretic action. A child of three years may take from six to ten grains every two or three hours, for one or more days. This is the less dangerous the more the symptoms of overdoses are understood. When they appear (mainly the brain symptoms, tinnitus, stupor, paralytic or interrupted, sighing, respiration) ample time is given for the discontinuation of the drug; a single large dose for the night, of from ten to twenty-five grains, succeeds better, sometimes, than the many smaller ones. As a rule, salicylate of sodium mitigates the symptoms of pain, swelling, and fever very soon. Many of the patients feel very much better after the lapse of a day; then the doses may be diminished or administered at longer intervals. Longer than from three to five days it ought not to be given; if no effect, or an insufficient one only, be obtained after that time, no further reliance need be bestowed on it. Then antipyrin, antifebrin, or phenacetin may accomplish what the salicylate failed in. In the same way salol, salicin, and cresotic and benzoic acids have been recommended.

At the same time, particularly when there is a constant tendency on the part of the temperature to rise either permanently or periodically, sulphate (or another preparation) of quinia may be administered in one or two doses of from five to eight grains each. The most opportune time is the period of remission which mostly takes place in the morning. Alkaline salts may be given alongside the other medication, alkaline mineral waters, such as Seltzer or Vichy or bicarbonate of sodium, from a scruple to a drachm daily, or citrate of potas-

sium, or the bitartrate; or one of the nitrates which have formerly been credited with almost a specific action. Vegetable acids have been warmly recommended, such as citric acid. They take the place of alkaline salts, inasmuch as they are eliminated as carbonic acid. The iodides of potassium and sodium have been esteemed very highly,—justly so, indeed,—particularly as the tendency to chronicity renders desirable the persistent effect of a powerful absorbent. Of the other remedies, which have been given for their alleged specific effect (colchicum, colchicin, veratrum, aconite), I have seen but little effect in acute rheumatism of infancy and childhood. They, too, render better service in the cases which have become or are fast becoming chronic.

Gonorrhœal articular rheumatism is not excessively rare among infants and children, though direct sexual intercourse be not frequent at that age. It is mostly confined to one or a few joints (knee, ankle, shoulder), and of subacute nature; the effusion is liable to be excessive, and apt to be purulent. The latter condition, being dangerous partly to the joint, and partly through its tendency to infect the body, must be watched carefully; for it is often the beginning, or part, of a general pyæmia; in a few instances I have seen the eye destroyed by panophthalmitis in twenty-four hours, and the child died, after weeks of suffering, of the general infection. The cause is often what may be taken for a common vaginal catarrh, but frequently is gonorrhœa. The long time the latter may be concealed, unchanged in its contagiousness, within the vagina of the adult, and the facility of communicating it to the young by direct contact or mediate communication through towels, bedclothes, etc., yield a clue to certain otherwise unexplainable cases. The treatment of the diseased vagina has its own indications. That of the joint affected with gonorrhœal rheumatism must be more local than the average case. An aseptic puncture may be made for the purpose of ascertaining the contents of the

synovial cavity. If there be pus, it must be removed and the cavity washed out, thoroughly disinfected, the limb rested on a splint and gently compressed. If serum in large quantity, puncture may become necessary when other treatment becomes unavailing. Otherwise gentle but steady compression by bandages, with or without mercurial plaster underneath, or by iodoform collodion, are indicated; at the same time the use of salicylate of sodium and iodide of potassium and (or) sodium must be continued a long time.

During and after an attack of acute articular rheumatism there will be noticed, occasionally, small neoplasms on tendons and the insertions of muscles, fasciæ, and periosteum, varying in size, numbers, and sensitiveness, which consist of young connective tissue with numerous cells, last from a few days to several months, and give rise to but little elevation of temperature. Sometimes they are the very last, or only remaining, symptoms of the disease; now and then a new endocarditis has been observed to make its appearance with them. This "*nodulated rheumatism*," "rheumatismus nodosus," is more frequent in children than in adults; the oldest patient in whom I have seen it was a boy of eighteen years. In his case the insertion of the occipital muscle was the principal seat of the nodules, dozens of which, from the size of a pea to a small hazel-nut, could early be distinguished. From syphilitic gummata, fibromata, gout, and cutaneous tubercles they can be distinguished easily. Special therapeutics for this form there is none.

Peliosis rheumatica is the name of a peculiar form of more or less localized purpura. In some cases of rheumatism a large number of small subcutaneous and cutaneous hemorrhages appear mostly on the lower extremities, and mainly round the joints. Now and then they are painful, but frequently not sensitive at all. In this they do not differ from common purpura. In a number of cases of peliosis the heart was not found affected; and the inference has often been drawn

that peliosis is no rheumatism at all. Indeed, purpuric hemorrhages are often noticed in other infectious diseases (typhoid, measles, whooping-cough, pneumonia, Bright's disease, syphilis, mercurialism), and not infrequently round the malleoli and joints in general (maybe in consequence of the impediment to circulation resulting from the smaller amount of subcutaneous fat and consequent tension of the integument in those regions), and in a number of instances the accompanying articular pains of such constitutional diseases are best explained by the presence of hemorrhages inside. Still, peliosis will sometimes appear quite early in acute rheumatism, and these are the cases which have been the reason why they were classified as a specific variety, and peliosis claimed to be a specific rheumatic affection. If so, it requires no special treatment; but the structural condition of the walls of the blood-vessels (and insufficient innervation and the presence of specific bacilli ?), which causes the hemorrhages, indicates the early administration of roborants, cardiac stimulants through the whole course of the disease, and great caution in the doses and quantities of salicylate of sodium, which has rather a disposition to increase the hemorrhagic tendency.

There are a great many varieties, or rather degrees, of peliosis, similarly to what we know to take place in purpura. According to whether the hemorrhage takes place near the surface or in the deeper layers of the tissue, both the color and the massiveness of the hemorrhage will differ. In some cases the result is an *erythema*, which has been called either *papulosum* or *nodosum* from the differences in the results of inspection and palpation. It is observed both in severe and mild cases of articular rheumatism; it is somewhat raised above the level of the skin, sometimes deeply inserted and then circumscribed; and frequently found near the joints. In accordance with the indications furnished by rheumatismus nodosus and peliosis no special therapeutics is required for this form.

Chronic articular rheumatism is but rare in childhood. Mon-

corvo reports the case of a girl of two and a half years, whose rheumatism began with an acute attack, became chronic, and was finally cured by the galvanic current administered for a long time in succession. The youngest case of mine, also a girl, was five years old. She was puny and feeble, and her general nutrition defective. A number of the large and small joints, particularly of the hands, were affected, and the tumefactions of the ends of the bones quite marked. There was neither an affection of the voluntary muscles nor the heart, and no disease of any part of the nervous system, which Mitchell (1831) and Charcot (1868) have found to be the cause of "arthropathic" swellings. The treatment is about the same resorted to in the same disease when met in the adult. Salicylate of sodium must be given in those cases only which exhibit acute exacerbations. Colchicum, aconite, iodides will take its place, and will be required for a long period. Small doses of arsenious acid, from one-three-hundredth to one-five-hundredth of a grain every two or three hours, will answer well. Warm baths, salt-water baths (cold or warm), and sulphur baths will improve many a case. So will "hydropathic" treatment, galvanism, and massage. Others will be benefited by dry heat, sand-baths. For external treatment a diluted tincture of iodine, iodoform ointment, iodoform collodion, or the iodide of potassium and lanolin ointment can render good service. Narcotics are seldom required. The best results are obtained by the protracted use of alkaline waters. From what little I have seen of chronic rheumatism in children, and the many cases of the same disease in the adult, I recommend strongly the use of a lithia water (from one-half to a pint of the Buffalo lithia water), to which is added from a scruple to half a drachm of the bicarbonate of potassium as a daily dose.

Muscular rheumatism can be diagnosticated occasionally in very young children; in those from six to twelve years it is not so very rare. Its nature and symptoms do not differ from

those in the adult. The neck, back, and shoulders are most frequently affected. The best preventive is the habitual use of cold water. Diaphoretics are not very useful. Narcotic and stimulating liniments find their own indications. Oleate of morphia is of but little use; in a severe case I have injected a small dose of morphia with immediate and permanent effect. The interrupted current acts promptly in one or more sessions. The salicylate, antipyrin, antifebrin, and phenacetin have a speedy effect, in proper doses frequently repeated. Semmola's experience in a severe case of neuro-muscular rheumatism is worth remembering. The case was that of a woman of forty years, who suffered from stiffness and pain in a shoulder and right arm, with good passive motility of the joint. After the pain had lasted several months, massage, electricity, quinia, and salicylic acid having proved inefficient, the patient was relieved in a few days by a few subcutaneous doses of one-twelfth of a grain of pilocarpin.

In but rare cases the rheumatic process in the muscle assumes the character of an inflammatory affection. Then there is a hyperplasia of the connective tissue between the fibrillæ, the muscle becomes hard and somewhat shorter, its electrical irritability grows less or disappears, the skin even participates in the process. Such a case I once observed in a boy of twelve years. He was never entirely relieved, but greatly improved by massage, warm bathing, a mild continuous current, and the internal administration of hydrargyrum bichloride. The treatment was continued for more than a year.

14. *Pertussis.*

The mortality from pertussis in New York City is as great as that from typhoid fever. Twenty-five per cent. of all the cases under a year terminate fatally; five per cent. of all those between the first and fifth year, and one per cent. of all those occurring after the fifth. Its mortality, however, is

not the only danger, for not infrequently chronic laryngitis, pneumonia, emphysema, and the result of hemorrhages taking place during the attacks, impair the health of the patient for many years or a lifetime. Thus the tendency of allowing whooping-cough to run its full course on the plea that it is a self-limited disease, or that every child must have its whooping-cough, is certainly not justified.

The prevention of whooping-cough, which is a specific and contagious disease, is certainly not easy, for the reason that contagion may take place very suddenly, and through the first and second stages of the disease, both of which extend over a large number of weeks. Contagion may take place, no matter whether the cause is to be looked for in the presence of micro-organisms or not, by means of the exhaled air, or mucus, or the masses brought up by vomiting. Prevention means protection against the effects of all these factors.

As the disease is spread by contagion only, isolation is an absolute necessity, difficult though it be. In public institutions it is impossible. Thus no patient ought to be admitted to, or allowed to remain in, a public school. Whooping-cough children must not even be permitted to congregate in large numbers, because the cases will become more severe by their mutually affecting each other. In one point only isolation is more effective in whooping-cough than in other contagious diseases,—namely, in this, that the disease does not appear to be carried by persons not thus affected.

The air must be kept pure, uniform, and moderately warm. No wind or draft, however, must be permitted. Utensils must be kept clean and be disinfected, and the masses brought up by vomiting disinfected, destroyed, or removed. The mucous membranes must be kept in, or restored to, a healthy condition, particularly those of the mouth and respiratory organs. Thus no injudicious exposure must be allowed. The digestive organs have to be watched, the stomach must not

be full at any time, the bowels kept regular, the food be digestible.

As long as the cause of the disease is not understood, and therefore no causal indication can be fulfilled, the object of treatment limits itself to this: to relieve the severity and diminish the number of the attacks, to procure quiet nights, to stop the vomiting, to shorten the course of the disease, and to prevent detrimental consequences.

An important indication is that of treating a catarrhal or inflamed mucous membrane. It is quite possible that a sore mucous membrane only is capable of admitting the contagion of whooping-cough as it does that of other infectious diseases, for instance, diphtheria. Besides, by attending to the mucous membranes in time, the occurrence of serious complications, such as pneumonia, may be prevented. Catarrh of the mouth and pharynx ought to be treated with doses of chlorate of potassium of from half a grain to a grain in a teaspoonful of water every hour; and a large number of our expectorants find their ready indications in such cases. All of those which have a depressing effect must be avoided, particularly antimonials. Even ipecac must be given in small doses only. Alkaline waters have a beneficial effect. The muriate of ammonia in doses of from half a grain to two grains every hour or two hours will liquefy the viscid secretion of the bronchial mucous membrane. In a state of evaporation, as described in a former essay, it may be inhaled. The inhalation of other agents, which have been recommended as expectorants, will at the same time act as germicides, so the vapors of benzol, of carbolic acid, and cresolin; and the reputation obtained by gas-works in the treatment of whooping-cough is thus finding its ready explanation.

The effect attributed to astringents in the treatment of whooping-cough is best explained by their action on the mucous membranes. Particularly alum and tannin have been so

employed. Emetics have been recommended for the purpose of relieving the surfaces of sticky mucus difficult to remove. Sulphate of copper or zinc, ipecac powdered, or turpeth mineral are the proper substances to be selected for that purpose.

Schliep has seen good effects of the use of the pneumatic chamber in whooping-cough. He kept the children with their mothers or attendants in compressed air. In a few cases a few sessions of two hours each were sufficient to relieve the patients considerably. In a number of cases from twelve to twenty sessions were required. In all of them he claims decided effects, not only in the reduction of the number and severity of the attacks, but also in the duration of the disease. The explanation of the good effect is looked for as well in the increased amount of oxygen inhaled as in the diminution of the hyperæmia of the mucous membrane. I believe the plan is a good one, particularly if it could be combined with the inhalation of turpentine.

Cases exhibiting a severe degree of pharyngitis and laryngeal hyperæmia, particularly in children who have suffered a long time from chronic inflammatory affections of the parts, will do well, as far as the local symptoms are concerned, under the use of the tincture of pimpinella saxifraga; a drachm distributed over the twenty-four hours will be the proper dose for a child of from two to three years.

Local treatment has been resorted to by many. The pharynx has been treated locally with a solution of quinia (Hagenbach), a two-per-cent. solution of resorcin (Moncorvo), a one- or two-per-cent. solution of nitrate of silver, a five-per-cent. solution of hydrochlorate of cocaine, of four- or six-per-cent. solution of bromide of potassium. Applications have also been made directly to the larynx of quinia mixed with bicarbonate of sodium in different proportions, of mild solutions of salicylic acid, and of powdered sulphur. Inhalations have been resorted to, besides those enumerated above, of sul-

phurous acid, and extolled as highly as any of those which have been mentioned. If they prove anything, they and the great number of the remedies recommended for the same purpose speak for the difficulty encountered in the treatment of whooping-cough, and for the confidence of the practitioner in the patience and submission of his wards. Michael treats whooping-cough as a neurosis, with the same means he employs against other neuroses attributable or attributed to nasal irritation. He claims that seventy-five per cent. of his cases of whooping-cough have done well when exposed to the influence of quinia, bromide of potassium, benzol, tannin, boracic acid, salicylic acid, iodoform, cocaine, bicarbonate of sodium, or prepared chalk applied to the mucous membrane of the nares.

The internal administration of chloral hydrate, or croton chloral hydrate, has been recommended by Lorey in 1879. The daily doses range from eight to fifteen grains. In all cases the attacks became less severe within a short time, but the disease itself was not shortened. Kennedy expresses himself very enthusiastically about the effect of the remedy, which is given by itself or combined with the bromide of potassium. To procure an occasional good night, a single dose of from six to twelve grains has rendered me good service.

The inhalation of chloroform, or, according to some, of ether, can be recommended in those cases in which convulsions have either occurred during severe attacks, or in which the interruption of the circulation is such that cerebral hemorrhage or convulsions must be feared. In the case of a very young infant I have administered chloroform once every hour for every new attack during the course of a number of days in succession for that very purpose, with beneficial result.

Quinia has been used both internally and externally by a number of authors of good repute. It was first recommended by Letzerich, who claimed to have found the cause of whoop-

ing-cough to consist in the presence of a coccus which he intended to destroy by the action of quinia. That coccus has not been found to this very day, but still quinia has found favor for a number of reasons. Rossbach credits the drug with the power of relieving increased reflex irritability. Binz, however, attributes to it an antizymotic action. He gives as many decigrammes daily as the child has years, so a child of five years would take eight grains of quinia a day. He expects to find an improvement after two or three days, inasmuch as the attacks are said to become by that time shorter and less severe. Where it cannot be given internally, he administers it in suppositories or in injections. Where the sulphate or hydrochlorate are not tolerated, the neutral tannate of quinia is selected instead, with this proviso, however, that the latter salt is much weaker than the former, and has to be administered in doses from two to three times as large. It has the advantage of being tasteless. In our own country it is particularly Forchheimer, who reported ninety-seven cases as having been benefited by the administration of quinia.

Antipyrin has been recommended for whooping-cough, since 1886, by Demuth, Sonnenberger, Moncorvo, Guaita Wendt, and many others, as almost a specific. Like all the other chemical relatives of chinolin, it destroys parasites outside the organism. It has been claimed, or presumed, that it displays the same effect in it. Whether that is true remains to be seen. At all events, however, it is a powerful nervinum. It is claimed that it can be given with the same beneficial result in the beginning of the disease and in its most severe stage, and that the latter will terminate favorably in from four to five weeks after the beginning of the treatment. The dose is from a grain and a half to two grains three or four times a day for every year of the patient, with an occasional large dose for the night.

Of all the medicines advised against whooping-cough I prize

belladonna most highly. I have always returned to it after having discontinued it for the purpose of trying one after the other of the many remedies recommended during these thirty years. As early as 1861 I had occasion to express, in the *American Medical Monthly*, the following opinion:

"Belladonna is the most powerful remedy in whooping-cough. I scarcely remember a single case in which its administration, for years past, proved unsuccessful in shortening the duration of the process. The result obtained by me has generally been this: that a well-developed case of whooping-cough, after the diagnosis was made certain beyond a doubt, would last for only three or five weeks longer, instead of running through its full course of months and quarters of a year. The effect is generally not a sudden one. Many cases in which belladonna is given from the first commencement will become worse for a short while, then remain at their height for some days or a week, and gradually improve in both the character and frequency of the attacks. In others the effect is perceptible from the days after their first administration; the cases soon assuming a more favorable aspect. Such has been my uniform experience during the last five years, in each of which the children of this city have been suffering from a more or less severe epidemic.

"My readers, many of whom doubtless have been in the habit of prescribing belladonna in whooping-cough with more or less marked success, need hardly be assured that I claim no priority. Belladonna has been recommended in this disease for many decennia, and has just as long been objected to, as either useless or dangerous. I have touched upon the subject because of my conviction that both the former objection and the latter fear are groundless.

"Belladonna is well known readily to produce symptoms of poisoning. An amount of two and a half or three grains taken by an adult in the course of a day, of either root or

extract, has the effect of dilating the pupils, causing a feeling of dryness in the throat, scintillation and giddiness, and even erythema of the skin. This latter effect is, however, not frequently seen in adults, while the effects on the pupil and brain are very common. It was therefore believed that, as nervous disorders are as common as they are dangerous in infantile age, these effects ought to counter-indicate its use; it was stated that it would cause congestion, sopor, acute hydrocephalus, and idiocy; and the practical consequence simply was that the dose of the remedy, when given at all in a case where it appeared to be indicated, was entirely too small. Thus, doses of a sixtieth, a forty-eighth, a thirtieth of a grain of extract of belladonna, repeated three or four times a day, were deemed sufficient and proper. These doses could not but prove unsatisfactory, and thus it happened that the remedy was misappreciated and given up. The doses, however, administered by me proved successful, because they were really sufficient.

"Infants of six or eight months of age affected with whooping-cough require a sixth of a grain of either the root or the alcoholic extract three times a day; children of three or four years tolerate three doses, each of half a grain. These doses appear to be very large in proportion to those tolerated by adults, but it is a fact which can easily be verified, that the effect of belladonna on the pupil and brain will hardly ever be perceptible in children from these or smaller doses. The succession of belladonna symptoms in children differs, moreover, altogether from that in adults; the erythematous and flushed appearance of the face and neck, sometimes even of the whole surface, is the first symptom in infantile age; whereas it is seldom observed in adults, or in cases of thorough poisoning only. Some of the old authors have advised the administration of belladonna to such an extent as to produce the first symptoms of poisoning; others, however, have in-

sisted on this practice being dangerous and wholly objectionable. I, for my part, soon found that those children suffering from whooping-cough who exhibited general erythema from an apparent overdose recovered soon, while others, in whom no such symptom was observed, remained sick for a long time; and continued experience has proved that the occurrence of this symptom is absolutely necessary for the full remedial effect. To obtain a cure in whooping-cough, the remedy must be given in a dose sufficient to produce erythema, or at least a flushed condition of the face, and, as it were, feverish appearance after every dose of belladonna. Thus the dose is to be gradually increased until this result is obtained. It is a remarkable fact that very young infants may take proportionately large doses: at all events, I do not remember a single case in which less than half a grain was taken in the course of a day. The prescriptions I have been in the habit of ordering are very simple ones. I either give the medicament as a powder, or have the extract dissolved and sweetened according to circumstances.

"The administration of belladonna alone is indicated in such cases of whooping-cough as are not complicated with inflammatory affections of the respiratory organs. The latter take the lead in complicated cases as well in treatment as in the nature and gravity of the symptoms. This is so certain that, whenever a pneumonia coincides with or follows whooping-cough, the peculiar sound of the cough of the latter will disappear, nor return before the inflammatory affection is removed. As this is, moreover, the most dangerous of the two, it requires attention before the other. As to bronchial and laryngeal catarrh, the former especially is a very common symptom in whooping-cough. Where it is but slight it may be considered as unimportant; where, however, it gives rise to fever or dyspnœa, it constitutes a further indication to interfere."

The preparations mentioned above need not be the only ones to be relied on. The tincture of belladonna is a convenient remedy, inasmuch as the dose can be readily and gradually increased. A baby of two years may take three daily doses, the first of which may be six drops. If the flush be perceptible within twenty or thirty minutes, that is the dose; if not, the number of doses must be increased to obtain the effect which must be obtained after every dose. After a few days larger doses are required; there is no case but demands at least twice the amount of the original dose of belladonna within ten or twelve days, or before the disease disappears. Atropiæ sulphas may take the place of belladonna. A child of two years will probably begin with the five-hundredth part of a grain, to be given three times daily, and increased according to the rules stated before.

Since that early time alluded to, Vogel speaks highly of the effect of belladonna, taking the dilatation of the pupils as a guide. As I have mentioned, this effect is rather late in appearing in children, and is not required; indeed, it may become quite uncomfortable. Meigs and Pepper combine belladonna and alum. Evans, in the *Glasgow Medical Journal* of 1880, recommends the administration of a large dose first, to be followed by smaller ones afterwards, and there are not a few authors who have seen immediate good effect following the intended or accidental administration of a large, almost poisonous, dose. Indeed, the number of practitioners now relying on the effect of belladonna in whooping-cough is quite large, no matter whether they look for the beneficial action on the laryngeal and other branches of the pneumogastric nerve or on the medulla oblongata, or rely on its influence in modifying reflex action.

Opium is spoken of favorably by a great many. I cannot recommend it for anything like regular administration, but it certainly has a good effect in procuring good nights when

given in a single dose. A grain of Dover's powder given to a child of two years, at bedtime, will at all events have the effect of procuring sleep. In a number of cases the combination of opium and belladonna acts quite well. The antagonistic effect claimed for these two drugs is not such as to interfere with the combination of their effects as sedatives.

Netter (*La Semaine Méd.*, 1886, p. 321) recommends the oxymel scillæ (No. 277 of the "National Formulary of Unofficinal Preparations") for whooping-cough, and prescribes it in the following manner: After having taken food between three and four o'clock, the child is given a teaspoonful every ten minutes; those under three years take four or five, those over three years six or seven, and adults seven or eight teaspoonfuls in the course of an hour. Food is again permitted at seven o'clock. In this way the administration of the drug is continued. It is claimed that both the number and the frequency of the attacks become less, but nothing is said of the duration of the disease.

I. Widowitz (*Wien Med. Woch.*, 1888, No. 17) has employed the same remedy in one hundred and forty-nine cases. Both the number and the severity of the attacks are stated to have become less after a single administration in fifty-nine; in twenty-four that result was accomplished after the second, and in nineteen after the third or fourth administration. In twelve per cent. there was no favorable result at all. The duration of the disease was not changed. M. T. Schnirer (*Arch. f. Kinderh.*, 1889, p. 447) arrives at the same conclusions, and suggests therefore the combination of oxymel scillæ with some antimycotic treatment. I should rather propose its combination with belladonna. Bromoform in three or four daily doses of from two to six minims has been highly recommended in New York by Dr. Louis Fischer.

VI.

DISEASES OF THE DIGESTIVE ORGANS.

THE indications for the therapeutics of the stomach, both dietetic and medicinal, are by no means simple and clear in every individual case. For it is difficult to make an exact diagnosis of the anatomical condition of the surface and the tissue of the organ, because of the frequent combination of various conditions. Indeed, the boundary line between a simple dyspepsia and a gastric catarrh is perhaps never made out clearly. The epithelium of the mucous membrane does not belong to it exclusively, but spreads in the contiguity of the tissue into the muciparous and the peptic glands. Thus the inflammatory condition of the surface becomes at once a "parenchymatous" affection, though it be possible that an uncomplicated catarrh and an uncomplicated inflammation may have an occasional existence. This, however, will last but a short time, and unless a gastric catarrh, or a dyspepsia, or an intestinal irritation—for the intestine shares the peculiar anatomical condition of the epithelium of the stomach—be relieved at once, the merely functional or superficial disorder becomes organic and deep-seated. These changes may refer either to the tissue or the secretion. Inflammatory thickening, erosions, ulcerations, or (Moncorvo) dilatation of the stomach will be observed in a great many instances. The secretions become abnormal. The normal hydrochloric acid of the gastric juice is almost invariably diminished; now and then a case will be found, but in older children only, in which it will be increased in quantity; still, as a rule, it is wanting or but scantily supplied. Lactic acid, however, is produced in much larger quantities than the first stage of digestion requires, and with it acetic, butyric, and the rest of the fat acids. With this

variety of changes the indications for treatment go hand-in-hand; others are suggested by the multitude of etiological factors. The direct paralyzing influence of heat, the immediate effect of irritant and bulky ingesta, and the poisonous effect of bacteria introduced in the food and rapidly multiplying render the intelligent and effective treatment of many of the cases which occur in the practice of every medical man a matter of great difficulty and responsibility. Nothing is more common, but less appropriate, than routine treatment directed against a variety of cases.

The main cause of the diseased conditions of the digestive organs is to be sought for in improper food. Not even mother's milk will always agree with the baby; cow's milk cannot possibly take its place as a legitimate and satisfactory substitute. Much less reliance can be placed on manufactured or home-made mixtures of unequal composition and doubtful quality. Children of more advanced years resemble adults in this, that they are endowed with more resistance to damaging influences. But the infant and young child are in constant danger of losing their physiological equilibrium by slight changes in feeding or the deterioration of foods. The readiness with which milk, which is indispensable as a food, will decompose, acidulate, and become indigestible, renders the greatest attention a necessity in the interest of prevention. That attention must be first directed to the differences between cow's and woman's milk, which ought to be obviated as much as possible. The former contains more casein and fat, less sugar and chloride of sodium. Besides, the casein of cow's and woman's milk differ both chemically and physiologically. That has always been so, and will be so, though a recent journal article declares the fact—or its assertion—a "bugbear." The former is less digestible, and its amount in the food given an infant must not be larger than one per cent. A large percentage (11–12) of fat is contained in every nor-

mal defecation of an infant fed on breast-milk, thus great care must be taken not to exceed the quantity of fat contained in this normal food when artificial feeding is resorted to. Indeed, to what extent fat administered in excess, and indiscriminately, is apt to produce diarrhœa, is best illustrated by the "fat diarrhœa" which has been a frequent topic for discussion in medical journals. Water, salt, and sugar must be furnished the infant in sufficient quantities.

Water is often wanting in infants' and children's food, and its absence is the cause of dyspeps and anatomical changes in the digestive organs. Its *rôle* in the organism is very manifold. Besides its influence on general metamorphosis, it is required to assist in pepsin digestion. In artificial digestion, albumin is liable to remain unchanged until large quantities of acidulated water have been supplied. The very presence of peptones in the stomach requires water to facilitate their solution and absorption, as is best proven by the immediate relief felt by a draught of water taken during the præcordial heaviness and discomfort experienced after a hearty meal. Infants and children—mainly the former—receive too little water. Whenever they are thirsty, both in winter and in summer, they are given milk,—that is, food; and many a case of dyspepsia, with its results, could be obviated by adding plenty of water to the food. Excess of water is attended with less inconvenience or danger, for it is readily absorbed.

On some former occasions, and lastly in "The Intestinal Diseases of Infancy and Childhood" (G. S. Davis, 1887, Detroit, Mich., p. 44), I have given the reasons why chloride of sodium ought to be added to most foods of infants and children. For instance, vegetable diet contains more potassium and less sodium than all varieties of milk, and milk of herbivores more potassium than that of carnivores. Thus, cat's milk contains sodium 1 to potassium 0.76, woman's milk 1 : 1, 13–4.4, and sheep's and cow's milk 1 : 5.6. The amount

of salt contained in woman's milk depends greatly on the presence of salt in her food. Thus many a defective milk can be remedied by the mother or wet-nurse adding salt to her food. Particularly is that necessary in dyspepsia and gastric catarrh in the baby, one of the main symptoms of which is the presence of large and hard curds in the masses brought up by vomiting or evacuated by the rectum. The addition of chloride of sodium to milk impedes or delays the solid curdling by rennet,—a physiological fact which explains the usefulness of salt in every kind of infant food. For in vegetables, and mainly in farinacea, the disproportion of potassium and sodium is still more evident than in milks.

The removal of a small portion of fat and casein, which gathers on the surface of boiling milk, is welcome, though the quantity thus withdrawn is too small. To diminish the percentage of fat by allowing milk to stand is not permissible, because meanwhile acidulation will set in. The latter will be prevented by boiling, mainly through the expulsion of a large quantity (three per cent.) of gases (carbonic acid, nitrogen, and oxygen) contained in the milk when it leaves the udder. Parasitic growths are destroyed by boiling. Thus I have always advised to boil the milk destined for the use of a baby as soon as obtained, fill it hot into bottles, containing from three to six ounces, up to the corks, close them tightly, and preserve them inverted in a cool place. Whenever a meal is to be prepared, the milk thus preserved ought to be heated again up to or near the boiling point,—preferably in a water-bath. That process ought to be repeated perhaps several times a day; while one bottle is being heated, the others may undergo the same procedure, for every boiling interrupts the beginning of lactic acid or other decomposition. The sterilization of milk in Soxhlet's apparatus, manufactured for that special purpose, and recommended and introduced in New York by A. Càillé, is a still better contrivance. Milk properly

sterilized will keep one or more days, but for general use among those who cannot obtain or pay for the patented apparatus my method will suffice under ordinary circumstances and for people with the most ordinary intellect.

A certain amount of starch is digested at the very earliest age, for saliva is secreted at that time. Its effect persists in the stomach as long as the percentage of hydrochloric acid in the gastric secretion does not surpass 0.06; within the first half-hour of the digestive process there is none at all but organic (mainly lactic) acid only. Thus, though starch pass the oral cavity rather quickly, it will still undergo its change into dextrin in the stomach. In many abnormal conditions this digestive change lasts a still longer time; thus in fevers, severe gastric catarrh, and in dilatation of the stomach. These are the very conditions in which farinaceous foods are best tolerated, for the reasons that the diastatic effect of the saliva is not disturbed, and that albuminoids could not be digested because of the absence in these conditions of hydrochloric acid (and pepsin). In all normal and many morbid conditions the presence of certain quantities of amylaceous foods has some more functions. Besides being nutritious in its own way, starch serves to dilate cow's milk, to reduce the percentage of the mixture in casein, to prevent the latter from coagulating in large masses, and thus to render it more digestible. The reasons why I prefer in most instances either barley or oatmeal, or in others gum-arabic or gelatin, may be studied in the above-mentioned book. Here it suffices to recall the mere facts, which I believe are becoming firmly established. It is a source of gratification to the writer to learn that he has not been wrong in his practice and teaching.

Thus F. A. Hoffmann, in "Lectures on General Therapeutics," Leipsic, 2d ed., 1888, p. 223, says in connection with the rules on infant feeding, annually published by the New York Health Department, which he copies, "Unless woman's

milk can be had there is a great danger in the probability that the sensitive intestinal tract be supplied with injurious material. For such is the very best cow's milk in the cases of very young infants, because the mixture of its constituents differs greatly from that in woman's milk, and its casein is less digestible. Both physicians and manufacturers have tried to compound substitutes for woman's milk, but those only the composition of which is known must be noticed by scientific men and recommended. Another requisite is this, that such a food must be within the means and understanding of everybody, and that a certain supervision be possible. Jacobi's treatise in Gerhardt's 'Manual of Pediatrics' will be found satisfactory by all those who desire to inform themselves of all we know. From my own experience, I confirm his recommendations to dilute milk with barley or oatmeal water. At present the hope has been expressed that all this may be replaced by sterilization of milk, but in practice there will be many impediments and obstacles. Sterilization can have but one result,—viz., remove the danger arising from the decomposition of milk. But, after all, it is cow's milk and not woman's."

In order to be available, cow's milk must be fresh, and not yet acidulated. The difficulty of obtaining it has led to the introduction of condensed milk, mainly in large cities. It is certainly preferable to bad cow's milk. But its composition is not uniform; though a number of the different preparations may be honestly made, there is a surplus of sugar, and therefore condensed milk may be permitted in individual cases, though not advised as a general and regular food for infants. Theoretically, it is an improper food because of its constituents; practically, it is known to give rise to digestive disorders and rhachitis.

From what I have said I draw the conclusion that as long as a baby is not nursed by a healthy woman, the opportunities for acquiring some kind of gastric disorder are very numerous

indeed. *Dyspepsia* is therefore quite frequent. Its treatment consists in more or less abstinence, and in the regulation of diet. As the gastric contents of infants who have been brought up on artificial foods is liable to be very acid, alkalies in small doses, and frequently administered, have a good effect. Bismuth may be added. When there is vomiting, it must be determined whether it is gastric, and from what cause. Those who have been in practice know too well how often they have seen meningitis taken for a gastric disorder, and how common is the occurrence of that symptom in the incipient stages of all kinds of inflammatory fevers. When all these and the local irritation of the stomach (brought on, for instance, by the presence of ascarides) and nephritis can be excluded, only then the vomiting ought to be considered as gastric only. Now and then abstinence only; or the drinking of warm water, or warm mustard water, to facilitate vomiting; or alkalies, or alkalies with bismuth; or resorcin to disinfect the contents; or dilute hydrochloric acid to correct the nature of the gastric acid; or the washing out of the stomach with warm water, or with an alkaline solution, or with a solution of one or two per cent. of resorcin in water; and, finally, after the stomach has been freed of its injurious contents, small doses of opium (from one-hundredth to a fortieth of a grain every hour, or its equivalent in morphia or codeia) will prove satisfactory. Protracted vomiting I have seen getting well with small doses of arsenious acid, from a thousandth to a four-hundredth part of a grain every hour or every two or three hours, according to the age of the patient or the individual indications of the case. Small doses of ice-water or, better still, small ice-pills repeated every five or ten minutes will answer in many instances. Effervescent drinks, iced, such as small doses of Apollinaris, Seltzer, or Vichy, or champagne, may do well in certain cases, but will do so less frequently and less happily than in most adults under the same circumstances.

In *acute gastric catarrh*, when produced by injurious ingesta, these ought to be removed. If vomiting have not occurred spontaneously, or not sufficiently, it must be produced by the above-mentioned drinks, tickling the fauces, friction of the præcordial region, ipecac,—the syrup is very often an unreliable preparation,—or other emetics. In cases of great urgency only the subcutaneous use of apomorphia may be resorted to. Purgatives must not be given in the beginning; large enemata will act more favorably. They may consist of warm water, warm water with antispasmodics, such as asafœtida, or stimulants, such as turpentine. After a day or two a purgative dose of calomel will answer. Fever, unless it be high, requires no special treatment; in urgent cases only antipyrin may be given, either by mouth or rectum or subcutaneously. Tendency to convulsions requires cold to the head, or cold applications to the heart, which will reduce both the irritation of that organ and the temperature of the blood. A warm bath will often do good, mainly when the feet are warm, but the customary bathing and jostling and tossing of a baby in convulsions do more harm than good. Thirst must be relieved by water, carbonic acid water, or water acidulated with hydrochloric acid (1 : 3000–5000).

No solid food. Milk must be given in small quantities only, diluted with water, or lime-water, barley-water, or upon Rudisch's plan (dilute hydrochloric acid 1, water 250, milk 500). Vomiting is to be treated on the plan detailed above, predominance of acids by alkalies, constipation rather by calcined magnesia in small and frequent doses than by drastics. The aqueous tincture of rhubarb, in doses of from ten to thirty minims every few hours, will prove very satisfactory in many cases.

Severe forms of *gastritis*—the corrosive, diphtheritic, and suppurative varieties—require cold applications to the epigastrium, and opium in the most available form; in the beginning, subcutaneously. The corrosive form demands neutralization

of the poison first: salt water for nitrate of silver, diluted acids (vinegar) for lye, alkali (chalk, magnesia, baking soda, soap) for acids, sulphate of sodium or oil for carbolic acid, egg, water, and milk for corrosive sublimate, etc. All of these require a total abstinence, which may be continued for more or less time. How long it ought to be endured depends on the condition of the patient and the good judgment of the medical adviser. Adults will bear it many days, and infants and children from twelve to thirty hours. If such an absolute rest be demanded longer than this period, nutritive injections into the rectum must take the place of the introduction of food into the stomach. Now the rectum and the rest of the large intestine digests no albumin and emulsionizes no fat, but it transforms starch into dextrin, and cane-sugar into grape-sugar. Finally, it absorbs peptones of every kind, egg, emulsionized fat, and starch. Starch-water injections are therefore more than merely soothing. Raw egg in salt water (table salt 7: water 1000) or egg with a solution of ten or twenty parts of grape-sugar in one hundred of water (Ewald), with or without claret or brandy,—the latter never in a high percentage,—are easily absorbed. Water is received greedily. In all cases of rapid elimination of water by vomiting, or of utter exhaustion in gastro-intestinal catarrh with imminent thromboses in the small cerebral veins ("hydrencephaloid"), the hourly or bi-hourly injection of water, or a very mild salt water, into the rectum in doses of an ounce or more will fill the blood-vessels and restore circulation.

Chronic gastric catarrh is sometimes dependent on or interrupted by acute catarrh; the attacks of the latter must therefore be promptly relieved. The several causes of chronic gastric catarrh have their own indications. Both in adults and children venous congestion resulting from pulmonary or cardiac diseases will give rise to it; thus in many cases digitalis in small doses, continued a long time, will be the remedy or

one of the measures of relief. Sedentary life must be avoided, school-hours and private lessons kept within reasonable limits, and regulated by the meals rather than that these should be controlled by the former. Masturbation must be watched: I have seen it to be the cause of gastric disturbances exactly as in adolescence. Diet and food want attention. Most children eat too much, and many too irregularly. Solid food is to be given but scantily; no sweets, no fat. Eating must be slow and mastication careful. Toasted bread or stale wheat bread, milk diluted with cereals or according to the muriatic acid plan, or "peptonized,"—everything of moderate temperature or hot,—will answer. Slowness of digestion, with heavy sensation about the epigastrium, demands additional chloride of sodium, bicarbonate of sodium, effervescent alkaline drinks; fermentation indicates resorcin, or creasote in doses of from one-quarter to one-half of a grain (minim). A few grains of salicylic acid diluted in large quantities of water (1 : 500–1000) may also be tried. Rhubarb and magnesium, rhubarb and bicarbonate of sodium, tinctura rhei aquosa, render excellent service. When there is a great deal of mucus, dilute hydrochloric acid with small doses of pepsin are indicated. When the tongue is thickly coated, with eructations, chloride of ammonium with tinctura rhei aquosa; the tendency to vomit and pain demands bismuth, in older children Carlsbad, Congress, or stronger (bitter) waters. These measures may be continued for a long period; bismuth may be given indefinitely; sulphate of zinc can be administered (doses from one-twenty-fifth to one-sixteenth of a grain every few hours) a long time, nitrate of silver (doses of one-thirtieth or one-fifteenth of a grain several times daily) for not more than a week in succession.

Occasionally the irrigation of the stomach is resorted to with advantage.

The therapeutics of *dilatation of the stomach* is indicated mostly by its etiology, and its success in an individual case

must depend on its causes, which may be numerous: overfeeding in general and with amylaceous material in particular; rhachitis with consecutive muscular debility; voracity, imperfect digestion, and gas inflation; catarrhal inflammation with diminished absorption; general muscular incompetency, as in anæmia and convalescence; congenital imperfection or partial absence of muscular tissue in the wall of the stomach; or peritoneal adhesions of the stomach resulting in triangular or quadrangular shape of the dilated organ. Many of these causes cannot be helped; in those which are amenable to treatment, this is prominently that of chronic catarrh.

Antifermentatives must be given, such as bismuth, nitrate of silver, calomel, and resorcin. The quantity of food taken at once should be small; the meals should be numerous. Nothing should be given that is apt to ferment, like fat and great quantities of starch. Large amounts of fluid should not be given. Milk in small quantities must be given often. Diarrhœa may require tannin and other astringents; it depends upon the condition of the stomach; indeed, most cases of consecutive diarrhœa will be best treated by attending to the stomach. Raw beef is among those articles of food which are most easily digested, and beef peptones are very useful. Raw milk is not so easily digested as boiled. Peptonized milk is preferable in many cases. Rudisch's preparation will do well because of the ease with which it is digested. A bandage should be worn about the abdomen. The faradic and galvanic currents can be used with advantage. According to Ewald, electricity and massage accelerate the passage of chyme into the intestine. It seems to me, however, that it is questionable whether digestion was improved by them, for it may be that both of these applications resulted in premature opening of the pylorus, before the gastric digestion was finished. Preparations of nux vomica—the tincture—or strychnia in three daily doses of from one-one-hundred-and-twentieth to

one-sixtieth of a grain each will improve the muscular tone of the stomach.

In *nervous dyspepsia* therapeutics must be simple, yet the effect is not very encouraging. Food must be digestible and copious. Purgatives should never be given; enemata must take their place, if required. Bitter tonics, country and sea air, cold bathing or sponge-baths, electricity, one large electrode being applied to the stomach and another to the spinal column, are indicated. In these cases, which are not quite rare among older children, particularly those with early and obstinate chorea and other symptoms of anæmia and "neurasthenia," mild preparations of iron are among the very best remedies, and must be continued a long time.

Gastric ulceration, with or without *hemorrhage*, is not quite uncommon in children of from seven to thirteen years. Fatal hemorrhages have been observed even in infants. No matter whether the cause may be found in an embolic process, or a chronic catarrh of long standing, or a local injury (caustic or foreign bodies, stones, a safety-pin in a baby of eight months), the circulation in the parts is interrupted and the normal alkalinity of the tissues destroyed. Thus these are constantly exposed to the injurious effects of the gastric acids, similarly to what occurs in the dead body when the effect of the acids on the non-secreting gastric surface results in softening and perforation of the wall ("gastromalacia").

Thus the first indication is to *keep the stomach and duodenum as alkaline as possible*, at all events between meals. Now, the introduction of any food will give rise to the secretion of gastric juice, which is acid, first by lactic, afterwards by hydrochloric acid; a certain amount of these is required for normal digestion. Whatever there is, however, in the stomach of unnecessary acid or acids, which are not required for the physiological process, particularly the acetic, the butyric, caprylic, or only an excess of lactic acid, must be neutralized. An occa-

sional dose of an antacid is not sufficient for that purpose, but it must be given regularly, and for a long time. I generally give the doses at intervals of two hours. I also give a dose a few minutes before each meal to neutralize every abnormal acid, no matter whether the patient is an adult or a child.

Which antacid is to be selected,—the potassium, sodium, calcium, or magnesium salts? Of the latter, I prefer calcined magnesium to the carbonate, as I do not wish the expulsion of free carbonic acid into the stomach. I use it frequently, but rarely (for a child) in larger doses than from eight to ten or twelve grains daily. A small part of this, say one grain, is taken every hour or two, before meals, mostly in water, which should not be too cold; hot water is even better. More than that quantity is seldom tolerated, because of diarrhœa setting in; still, its purgative effect is very welcome in patients suffering from constipation; these may take larger doses. When the above quantity does not suffice to neutralize the acids, or it is feared that more magnesium will cause diarrhœa, it may be combined with the carbonate or the phosphate of lime. Sodium bicarbonate does not take the place of the calcium and magnesium so readily, inasmuch as it also appears to promote the secretion of gastric juice. Thus, in most cases, I use magnesium or calcium with or without bismuth, or such adjuvants, if any, as may appear to be indicated for other reasons.

This medicinal treatment must be continued for weeks or months; without it I do not see gastric or duodenal ulcers getting well.

The Carlsbad waters, and salines in general, owe their effect partly to the neutralizing and partly to the purgative influence they exert.

The use of lime-water is in part an illusion, if given for the purpose of neutralizing the acid. It is a failure because it contains only a single grain to nearly two fluidounces of

liquid. But when added to cow's milk in sufficient quantities (1 : 3–6) it certainly makes it more digestible.

The very function of the diseased organ involves danger. Both the stomach and the duodenum should be kept as idle as possible, and their labor should be made easy. Undigestible food must not be given, and solid food must not be allowed. Most cases, in older children, tolerate boiled milk, strained oatmeal, barley gruel, stale wheat bread, and a few also raw beef. Some take nothing but boiled milk, or buttermilk, or kumyss. Many, particularly convalescents or adults, will tell you that they do not digest milk. That may be true, but then they gulped it down and it formed a large cheese-cake in the stomach that was not afterwards dissolved and digested. They must boil their milk in the morning and *heat it* several times during the day almost to the boiling point. They must add a small quantity of table salt to it, also, in case the stomach is very acid, some bicarbonate of sodium, or calcium, or magnesium. They must not drink their milk, but pour it upon a plate and sip it with a spoon. Thus prepared, they will digest it, particularly when it is not quite cold. In fact, many require their meals warm or hot.

For the purpose of easier digestion, milk may be peptonized, according to Fairchild's directions; or it may be rendered more digestible by the process recommended by Dr. Rudisch, or mixed with farinaceous decoctions as recommended above.

With an alkaline condition of the surface and an innocuous diet, the ulcers have an opportunity to heal. Their recovery may be aided by the administration of nitrate of silver. A child may take from one-thirtieth to one-twentieth of a grain in a tablespoonful of distilled water four or five times a day, if possible, on a fairly empty stomach. Or a smaller quantity may be given in a pill with or without a small dose of opium, say one-sixtieth to one-fifteenth of a grain in each pill. Sometimes I give but a single dose at bedtime, in addition to

the alkaline treatment. Nitrate of silver must not be given beyond a reasonable time, to avoid argyria.

The tincture of iodine, in doses of from one to three drops for the adult, of one-half to one drop to a child, well diluted with water, has often been recommended. Its action is probably antifermentative here as in chronic gastric catarrh.

When there is much pain and a great deal of acid or other secretion, opiates are indicated, mainly those which are very soluble. Chloral is tolerated badly.

Bad cases require rest in bed, particularly those in anæmic girls (and women).

The stomach will have a better opportunity to get well when at rest than when at work. Thus it becomes necessary, sometimes, to abstain from feeding by the mouth altogether. Rectal alimentation then comes in to great advantage. In conditions of such genuine starvation, the lymphatics are very greedy and absorption from the rectum is very active.

Ulcer of the stomach, in both the young and old, being frequently associated with intense anæmia, the result, in these as in many other cases, is mistaken for the cause. Then iron, the great presumed panacea for anæmia, is often introduced into the stomach which cannot digest it, and in its attempts to do so, pain, ulceration, and danger are increased.*

The therapeutics of *constipation* depends on its etiology and its degree. In no case should the diagnosis be made without a thorough examination, which must be manual in many. The abdomen may be painless, but it is mostly inflated. Fæces come away in large lumps or small and broken pieces. Liver and spleen may be displaced, the former turned in such a way as to protrude its edge and posterior surface. The abdominal veins may be enlarged, appetite diminished; vomiting is some-

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*A. Jacobi, "The Intestinal Diseases of Infancy and Childhood," Detroit, 1887.

times met with, occasionally also attacks of diarrhœa which are the result of the irritation produced by the hardened fæcal masses contained in the colon.

Actual constipation must not be mistaken for an apparent one, which is observed in infants who have a movement every two or three days only ; the amount of fæces thus discharged is apt to be trifling. The baby is emaciated, atrophic, not always fretful. In him the scantiness of defecation is the result of lack of food, and the alleged costiveness is speedily remedied by the furnishing of a sufficient quantity of appropriate nourishment.

Among the foremost causes of constipation is mechanical obstruction, brought on by cystic and other tumors, imperforation, hernia (pervious and incarcerated), intussusception and twisting of the intestine, or by a peculiar condition of the sigmoid flexure described by me in the *Journal of Obstetrics* of 1869, and lately in "The Intestinal Diseases of Infancy and Childhood," p. 184, and in "Non Nocere," *New York Medical Record*, May 19, 1894. There I have detailed the embryological and anatomical facts connected with the subject, which ought to be well understood by this time ; for the cases of constipation depending on the undue length of the descending colon and the multiplicity of flexures which compress each other and thus obstruct the passage are quite numerous in every physician's practice. These cases of constipation are apt to last up to the sixth or seventh year and require constant attention, but medicinal treatment ought to be avoided, unless required by intestinal autoinfection. The fæces may be so hardened and immovable as to necessitate their removal from the rectum by means of the finger or a spoon. On no account must purgatives be given as a regular thing, but an enema must be administered daily for many years in succession. At the above-mentioned age the relation of the several parts of the intestinal tract becomes more normal, and the necessity for mechanical interference ceases accordingly.

An improper condition of food is a frequent cause of constipation. Superabundance of casein is relieved by diminishing its quantity, by replacing the milk of a cow by that of a wet-nurse, the white and heavy one of a wet-nurse by the thinner and more bluish one of another woman, or by reducing the amount of casein in artificial food to one per cent. Besides, the milk thus reduced must be mixed with a glutinous (farinaceous) substance; oatmeal, to remedy constipation, is preferable to barley or any of the rest. Large amounts of starch must be avoided. Milk and artificial food will often lose their constipating effect by the addition of cane-sugar. Babies at the breast are often cured of constipation by the administration of one or two teaspoonfuls or a tablespoonful of water, or oatmeal water, thoroughly sweetened, before each nursing.

Many preparations kindly supplied by the ever-watchful and humanitarian trade contain large quantities of phosphates. They are apt to pass in part into the intestine undissolved and unabsorbed. So will large doses of bismuth. Thus constipation may follow their use. The treatment of such a case is plainly indicated; likewise those which are the direct result of the administration of astringents and opiates. The omission of such medication is the first condition of a cure.

Constipation is often dependent on the partial absence or the viscid condition of intestinal mucus. This is so in fevers, now and then in chronic (intestinal catarrh) enteritis; also when there is too large a secretion from the skin and (or) kidneys, and when too little water is introduced into the system. I have repeatedly emphasized the fact that most infants are given less water than they require.

Incomplete peristalsis resulting in costiveness may depend on a morbid condition of either the muscle of both the intestine and the abdominal wall, or its innervation. Early rhachitis shows its effect in producing muscular incompetency; babies with regular evacuations after birth will become costive

in their second and third month, and remain so although they are alleged to "look the picture of health." Not rarely rhachitis will make headway in muscles, epiphyses and diaphyses, even in cranial bones; while the weight of the patient does not decrease, his skin feels soft though flabby, the limbs and trunk are rotund though bleached. Indeed, there are many in whom constipation is the very first symptom of rhachitis. In all of them it is self-evident that constipation cannot be relieved permanently except by a thoroughly successful antirhachitical treatment. Sedentary habits of school-children have the same effect in producing constipation. It is relieved by change of habit and plenty of physical exercise, and additional fruit diet, but purgative medicines, given persistently, render these cases worse. The binding effects of chronic peritonitis, either general or local, must not be combated with purgatives; a snug bandage round the abdomen gives support and tone to the bowels, and an enema, given every day for months in succession, prevents accumulation and its consequences (dilatation, disorder of circulation, septic absorption). Universal emaciation and atrophy resulting in constipation has its own indications, and chronic cerebral disease (hydrocephalus) may require such local and medicinal treatment as will be detailed further on.

In all forms of constipation in infants or children few medicaments ought to be used. As there is so often an excess of acid in the gastric and even intestinal contents, calcined magnesia finds its twofold indication. It may be given in many small doses or a single large one which need not exceed five or ten grains a day. Doses of a grain or two grains may be continued for many days and repeated from three to six times daily. Rhubarb acts well when combined with it for the purpose of overcoming protracted costiveness. Rectal injections may be given from the common fountain syringe, the nozzle of which must be introduced beyond the two sphincters. In some cases it is desirable to introduce the

instrument to a greater distance; an elastic catheter attached to the nozzle can be used for that purpose, but the very condition of the sigmoid flexure, detailed above, renders the introduction of the instrument beyond the very beginning of the sigmoid flexure a perfect illusion. It happens quite often that an elastic or flexible tube, when introduced beyond the third sphincter, bends upon itself and reappears at the anus. To facilitate the entrance of the liquid into and beyond the sigmoid flexure the injection must be made gently and slowly while the pelvis of the infant is raised.

To facilitate the downward movement of fæcal masses and to stimulate peristalsis, friction and kneading (massage) may be resorted to. Kneading must be performed with the palm of the hand, gently and persistently, or gentle thumping with the closed hand; friction is best commenced in the right side and continued over the epigastrium and down the left side, in the course of the colon. Great caution and judgment must be used because of the frequency of local chronic peritonitis, which may give rise to subacute or acute exacerbations.

Electricity has been used successfully when constipation was the result of insufficient peristalsis. E. Schillbach found that the several portions of the intestinal tract respond differently to the application of the faradic and galvanic currents.* The latter appears to have a stronger effect than the former. Local contractions result from the negative pole (cathode), peristaltic waves from the positive (anode). Thus for the relief of chronic constipation depending upon incompetency of muscular action the former ought to be applied to the interior of the rectum, the latter over the abdomen, along the colon.

In the cases of persistent constipation depending upon an insufficient muscular action of the intestine now and then medication may appear required. I have treated a number of cases of the kind with nux and (or) calabar, adding some

* See Meltzer, p. 378.

purgative extract. A little boy with a decidedly rhachitical history, three years old, took three times a day a sixteenth of a grain of each—extract of nux vomica, extract of fab. calabar, and compound extract of colocynth—for many weeks in succession. But cases of the kind must remain exceptional. As an occasional purgative, for the purpose of relieving the intestinal tract of indigestible and injurious masses, castor oil is probably the best and mildest ; a few grains of calomel will act both as a purgative and antifermentative. The compound powder of liquorice will take the place of oil, when the latter is not tolerated, or is objected to ; also the fluid extract of rhamnus frangula.

Among the drastics, all of which are irritants, rhubarb and aloes are probably the mildest, and are tolerated a long time in succession. Of the salines, chloride of sodium is the simplest. Its main action is osmotic ; besides, it occasions thirst and thereby induces the ingestion of a large amount of water. The continued use of salines irritates the mucous membranes. The combination of the sulphate of sodium with the sulphate of magnesium and chloride of sodium has a mild and happy effect.

A frequent accompaniment of constipation is *colic*. Its causes are, beside constipation, fermenting food, gastro-intestinal catarrh, the presence of ascarides in large numbers, reflex spasm produced by cold feet and chilled skin, diminished tonicity of the muscular layers of parts of the intestine (in general anæmia and rhachitis during early infancy), and, finally, chronic peritonitis, which resulted in adhesions, or such local changes in the walls of the intestine as will produce local contractions or dilatations. Thus as the etiology of colic varies so much, the treatment must vary in order to be rational and effective and adapt itself to the cause. Its symptomatic treatment will often require either an enema or a purgative medicine, antispasmodics or narcotics (assafœtida, opium) ; they are apt to give speedy relief. Gentle friction of the abdomen, the application of dry heat (flannel, hot plate, hot sand-bag),

and the administration of hot aromatic teas, freshly prepared (fennel, anise, catnip, German chamomile), a few drops of essence of peppermint in a teaspoonful of hot water, or the injection into the rectum of large quantities of aromatic teas, at a temperature of 100° or more, will do good; great care must be taken lest atmospheric air enter the bowel.

The predisposition of infants (and children) to *diarrhœal affections* has been treated in a special chapter of my "Intestinal Diseases of Infancy and Childhood" (p. 190). Finding its explanation in anatomical and physiological facts, it demands no correction; but has to be taken into account in every case of diarrhœa to avoid a misconception of what is normal in regard to both the number and consistency of evacuations.

Diarrhœa is always dependent on, or connected with, surface changes of the intestinal mucous membranes, from a simple catarrh to ulceration. Catarrh may be localized, but is generally very extensive. It may descend from the stomach, ascend from the rectum and colon, or originate in any part of the small intestine.

The treatment of diarrhœal diseases depends in part on the locality, in part on the etiology of the individual affection. No "specific" treatment will ever do good, not even the modernized stomach-pump sticking conceitedly out of the coat-pocket of the delighted medical man who appears eager to emulate the midwife of our mothers with the rectal syringe under her arm as her emblem. Thus, indeed, unless it be the intention to fill these pages with prescriptions to be copied thoughtlessly, nothing can be permitted here except general indications for treatment. My readers will have noticed that I have carefully abstained from prescription writing in these papers. They are written for my peers, and not for the very beginner who looks for the most advanced accomplishment in a formula, nor for those who like to be supplied with their medical brains by the loquacious agent of the manufacturer

furnishing diagnosis, indications, formula, and medicine for doctors and mankind, from the ubiquitous satchel.

The causes of diarrhœa are various. Food in improper quantity or quality, mostly improper artificial food, is among the principal causes. But even mother's milk may cause it, as is proven by the fact that there are babies who, while falling sick at the breast of one woman, may recover at that of another. Mothers who are sick or convalescing, or subject to very strong emotions, those who nurse too often, who suffer from tuberculosis or syphilis, who are pregnant, some when they are menstruating, and all anæmic persons, secrete an improper milk. The colostrum secreted immediately after child-birth is apt to give rise to diarrhœa. Milk containing too much fat is the principal cause of what has been described as "fat diarrhœa," by German authors mostly; that containing salts in superabundance, mainly in anæmia, is liable to produce the same effect.

The amount of food introduced may be too large either absolutely or relatively; the latter when the secretion of gastric fluids is insufficient, thus facilitating gastric fermentation in place of digestion; or when the flow and activity of pancreatic juice, limited at a very early age, is still more interfered with by a diseased condition of any kind, and fever of any description.

The infant intestine is not controlled to the same extent as that of the adult by emotional influences; but local irritation is a frequent cause of diarrhœa, and the organ is very sensitive to the diminution or increase of atmospheric moisture and heat. It is quite probable that the overheating of the general surface has results similar in character to what are known in adults also, as the consequence of external combustion on the condition of the duodenum and the general nervous system.

The mucous membrane with its lymph-vessels and glands is easily irritated by such results of fermentation as phenol,

indol, skatol, bacteria, and bacilli; by the alkaline salts formed through the frequent (normal and abnormal) prevalence of acids in the upper part of the intestinal tract; by the direct influence of purgatives, occasionally by even the very smallest doses of arsenic and mercurials, though, indeed, the latter are tolerated very much better by the very young than by the adult; and by exposures to cold. It is also liable to suffer long from the results of typhoid fever, dysentery, and occasionally from severe attacks of malaria.

Disturbances of the circulation depending upon diseases of the liver, lungs, or heart, predispose to passive hyperæmia of the intestine and diarrhœa. Indeed, when it does occur under these conditions, it is an ominous symptom. In no case of intestinal disease the diagnosis ought to be considered complete or the prognosis ventured upon, unless the liver, and particularly heart and lungs, have been examined with great care.

The variety of causes suggest a number of different treatments. Disorders of circulation must be regulated while the local disease is attended to; ulcerations of the intestines are to be treated on some such method as has been suggested in a previous essay on dysentery; the skin must be kept cool by bathing or sponging; the air-supply cool and plentiful.

Most cases of intestinal catarrh (with or without gastric catarrh) and diarrhœa depend on the presence of improper food and the derangement produced by it. It ought to be removed as speedily as possible. When the process of fermentation is still limited to, or going on in, the stomach, or the stomach still contains injurious masses, these ought to be brought up. In such a case the sound judgment of the practitioner has to decide whether emesis is still useful, or whether the stomach ought to be irrigated and washed out. Most cases of "gastro-enteritis" are pre-eminently enteritis; therefore the claim that the washing out of the stomach must not only take place in every case, but is the almost infallible remedy in the very worst

class of cases, will have no other result but that of discrediting that useful procedure in the eyes of those who are inclined to believe implicitly in the value of "new" methods and the pretentious claims of short-sighted enthusiasts. If we were to believe some of the loud talk of the journals, and the reporters' columns in the secular press, gastro-intestinal catarrh would soon be "one of the lost arts."

In fact, the injurious element is in most cases beyond the reach of the stomach-pump; indeed, the latter cannot remove anything but what is dissolved or suspended; the expulsion of large masses, curd particularly, through an elastic catheter is out of the question.

The *rôle* played by bacteria in the stomach and intestines is probably great, but it is surely exaggerated, for the class of the schizomycetæ is numerously represented alike in the healthy and diseased intestine. Even within from four to eighteen hours after birth there are large numbers of bacteria, cocci, bacillus subtilis, and bacterium coli commune (Escherich) in the remnants of digested milk; the latter in the large intestine. How many are introduced into the stomach immediately after birth, by the newly-born swallowing air, cannot be determined. Besides those enumerated above, there is the bacterium lactis aërogenes which is credited with the decomposition of milk-sugar into lactic acid, carbonic acid, and hydrogen, thus giving rise to the gases constantly present within the intestinal tract.

The presence of immense quantities of micro-organisms proves, however, nothing in regard to the etiology of diseases, for they are found in the healthy condition as well, as also in such morbid conditions in which the cause of death cannot be attributed to the presence of parasites or the usual pathological changes. Thus in arsenical poisoning the intestines are swarming with saprophytes.

The intestine can be emptied by either purgatives or ene-

mata; the former act upon the whole length of the intestine, the latter upon its lower portion. Castor oil, so common in domestic practice, deserves all the credit given to it. It acts mildly and speedily. The addition of opium is not wise; the latter may be administered after the former has exhibited its effect; the action of the oil must not be inhibited by the sedative. In many cases a single dose of calomel (one-half grain to six) answers better, being both a purgative and antifermentative.

The surplus acids of the stomach—mostly lactic and butyric—must be neutralized. Magnesium and sodium salts must not be selected for that purpose, for they add to the diarrhœa. Calcium salts, the carbonate or phosphate, are preferable because they have no such effect, but the additional advantage of forming with the fat acid an insoluble salt which acts as a protection to the sore surface. Doses of from one to two grains may be given every hour or two. Beside being an antifermentative in general, bismuth (the subnitrate or carbonate) binds sulphide of hydrogen, and thus has a favorable effect in doses of from a quarter of a grain to two grains. They may be administered with or without the addition of opium. If they be given in liquid form, no syrups must be added to correct the taste, but rather glycerin, which has the advantage of not turning sour.

To combat the existing fermentation, antifermentatives must be given in regular intervals. Calomel, bismuth, alcohol, creasote, salicylate of sodium, salol, naphthalin, resorcin, bichloride of mercury, and others, have been eulogized. To take effect in the intestine it appears that those who are not readily soluble in the stomach ought to prove more useful. Still, I feel positive that resorcin in doses of from a quarter to one-half of a grain in solution, or as a constituent of a powder containing bismuth, chalk, or (and) opium, given every two hours, has rendered me the most valuable services in a great

many cases. Of the two mercurials I prefer calomel by far, in doses of from a twentieth to a quarter of a grain every few hours. The antifermentative effect of alcohol in the dilution in which we are entitled to give it as a stimulant, though the sum total of a daily dose may be large now and then, is not great; salicylate of sodium is less effective than any of the rest, creasote acts more vigorously in the stomach than in the bowels, salol and naphthalin are not easily borne by many.

Opium, by its inhibitory effect on reflexes, diminishes hyperæsthesia, hyperperistalsis, and hypersecretion. The objections to its use in the diarrhœal diseases are theoretical only. Doses of from one-tenth to one-third of a grain of Dover's powder every two hours, in all sorts of combinations, act very well indeed, and may well be considered indispensable, when the above indications are to be fulfilled. Its time has arrived when the odor of the evacuation begins to be normal; but it finds no contraindication in those cases of "follicular enteritis" of a chronic nature which exhibit their tendency to malodorous discharges for weeks in succession.

In acute cases, and when the stomach participates in the process, astringents, such as lead, tannin, gallic acid, alum, etc., are badly borne. In chronic protracted cases they will find their indication. Nitrate of silver does better in many cases, one-fiftieth to one-thirtieth of a grain in two drachms of distilled water (dark bottle) every two hours. In chronic cases only, coto, from half a minim to a minim of the fluid extract, will sometimes act favorably.

Of the stimulants, alcohol may be admixed to food. Bad brandy or whiskey contains fusel oil, which is a paralyzing agent. Whiskey is therefore preferable with us, because it can be obtained in greater purity for less money. It must not be administered unless diluted. Camphor is better borne than ammonia. It is easily taken when simply rubbed off with glycerin and suspended in mucilage (one-fourth to two grains every one or

two hours). The strongest nerve-stimulant of all is Siberian musk. Urgent cases of collapse require one to two grains every fifteen or thirty minutes (best suspended in mucilage) until six or twelve grains have been taken. A very good stimulant in collapse is the injection into the bowels, through a long flexible tube (catheter No. 12) of hot water with some alcohol, and one or a few drops of tincture of opium. In threatening cases of heart-failure strong coffee, hot or iced according to circumstances, by itself or in mixtures, may be used to advantage. Cold tea may be tried in small doses, particularly in the chronic cases of older children.

In acute cases of intestinal (or gastro-intestinal) catarrh with high temperature, applications of water, of from 60° to 70° F., to the abdomen will render good service. The cloth must be wrung out thoroughly, covered with rubber cloth and flannel, and changed when warm. Anæmic children and those with much pain require warm or hot applications, which may be preceded by a warm bath. Frequent injections of water of 100° and more, with or without an antifermentative, such as thymol (1 : 1000 or 2000), answer well in most cases, not only in rectal catarrh.* In great debility, or collapse, the water ought to be from 105° to 112°, and contain some alcohol and opium, or (and) a teaspoonful of the tincture of musk. The addition of gum-arabic to the injection, or the use of glutinous decoctions (flaxseed) instead of water has a satisfactory influence. Starch injections have the advantage of adding to the nutrition of the body by the facility with which the colon changes amylum into dextrin, which will be absorbed. Part of the injected water will always be absorbed, fill the blood-vessels, and may prevent intercranial and other thromboses. Indeed, in many bad cases in which the cerebral symptoms of the so-called hydrencephaloid condition have

* A. E. P. Davis in The Medical News of July 6, 1889.

made their appearance, or are imminent, frequent injections into the rectum of a few ounces of warm fluid contribute considerably to the restoration of circulation.

In hot weather doors and windows must be kept open, the coolest place selected in the house or neighborhood, day or night; for night air is preferable to no, or foul, air, sea air or country air, particularly at some altitude, to the city. When the weather is hot and the body warm, it must be washed with cold or cool water, or water and alcohol (5 : 1), frequently. Cold feet must be kept warm.

The food-supply must depend on the condition of the stomach and the upper part of the intestine, and also on the rapidity of the peristaltic action of the latter. The complication of gastritis with enteritis contraindicates the introduction of food altogether. Abstinence is better in cases of intense vomiting than the use of ice; the latter may quiet the stomach for a while, feel pleasant, but it fills the stomach which ought to remain in absolute rest, and excites peristalsis. As I said in a previous paper, babies tolerate abstinence better than ingesta on an irritated stomach. Beef-tea ought to be avoided; its concentration of salts is irritating. If in convalescence it be given at all, it must be mixed largely with barley-water or rice-water.

In all cases of "summer" diarrhœa milk must be avoided. Bad cases forbid raw milk, boiled milk, milk in any and every shape, for days and longer. Its rapid transformation and fermentation contraindicate even the smallest quantities, also its presence in farinaceous mixtures. The absence of gastric juice (pepsin and hydrochloric acid) in the stomach of a feverish child or one that is being drained of its fluids prevents the digestion of albuminoids. Even mother's milk is often not borne to any extent. When milk is again tried after a while, it ought to be done very carefully; cow's milk thoroughly boiled, or sterilized with six times its volume of

barley-water at first, the percentage of milk to be increased slowly. We must not forget that cow's milk, ever so often boiled or sterilized, is still cow's milk. Milk may be replaced by the white of egg, which must be thoroughly mixed with barley-water, and some salt added, and as much sugar as is required to make the mixture palatable. During the course of a day and night the whites of from one to five eggs may be given according to the case and age. Severe vomiting and diarrhœa demand, as suggested, total abstinence for from two to eight hours or more.

Afterwards, mucilaginous or farinaceous decoctions may be given in small doses at short intervals. A mixture which has rendered me very valuable services is about as follows: Five ounces of barley-water, the white of one egg, from one to two teaspoonfuls of brandy or whiskey, some salt and sugar; a teaspoonful every five, ten, or fifteen minutes according to circumstances. Mutton broth may be added to the above mixture, or it may be given by itself, with the white of egg and some salt.

The *tumefaction of the mesenteric glands* is of frequent occurrence. Its results are very serious, though the non-absorption of chyle does not depend exclusively on the functional incompetency of the glands. The latter has often been taken to be identical with the symptoms comprised under the name of tabes mesenterica, an error which I shall discuss in the second volume of Keating's "Cyclopædia." There it will be shown that the symptoms called by that name, and leading to emaciation and marasmus, are more frequently dependent on chronic peritonitis—mostly of tubercular nature—than on simple inflammatory hyperplasia of the glands. The latter can be more safely prevented than cured. Its original cause is mostly a simple diarrhœa. The irritation of a mucous membrane always leads to that of the neighboring glands; the glands near a nasal catarrh, a stomatitis, a diphtheritic process, a

pulmonary catarrh, produce secondary adenitis. Thus the mesenteric glands near an intestinal catarrh are soon congested, and begin to swell. Cell-proliferation accompanies the changed circulation; when its original cause—viz., the hyperæmia of the mucous membrane—has ceased, absorption of the newly-deposited material will always take place in the same way that the swelled glands of the neck will disappear when a nasal catarrh is treated with cleansing and disinfecting injections. As soon, however, as the newly-formed cells have been transformed into firm fibrous tissue, the possibility of absorption becomes less from day to day. Thus, the prevention of mesenteric glandular hyperplasia consists in the immediate removal of a diarrhœa. Be it ever so mild, it is always a morbid process. Be its name ever so innocent (for instance, "dental"), and the prejudice in favor of letting it alone ever so strong, it leads to anatomical changes in the mucous membrane and the glands which may become permanent. When a diarrhœa has been protracted, it may safely be assumed that the glands have undergone chronic changes. Then the cautious administration of an iodide, preferably sodium, is indicated, in daily doses of from five to fifteen grains, according to the age of the patient, the severity of the case, and the probable duration of the process. It must be continued for weeks, and then may be replaced by three daily doses of from five to twelve minims of the syrup of the iodide of iron.

Primary tuberculization of the mesenteric glands is quite rare; so is primary tuberculosis of the intestine, in spite of the fact that meat and milk containing the bacillus are known to be the occasional cause of tuberculosis of the bowels. Both are, as a rule, the results, or complications, of general tuberculosis, and in this way they, and tubercular peritonitis, are not uncommon. Thus, the treatment of tubercular tumefaction of the mesenteric glands forms part of the measures

undertaken for the relief of the symptoms of the general infection, and leaves but little to hope. Still, there are cases in which the tubercular nature of the swelling cannot be doubted, that still are liable to get well. There are now on record a number of cases of peritoneal tuberculosis in which laparotomy was performed, either through a mistaken diagnosis or purposely, with relief for the symptoms, and apparent recovery. Indeed, there can be no doubt that a number of cases of peritoneal tuberculosis, in which the diagnosis was hardly doubtful, improved considerably, either under no treatment at all, or under measures calculated to benefit the general tubercular condition. Thus, even such cases permit of a hesitation to pronounce a fatal prognosis.

The conditions alluded to must not be mistaken for tumefaction of the mesenteric glands from other causes (for instance, primary lymphoma, the glandular enlargement of leucocythæmia or syphilis, or sarcoma which occurs primarily, or from carcinoma which is met with secondarily in young or older children). Lymphoma and sarcoma are positively improved by the protracted use of arsenic, in increasing doses, such as are discussed in a previous paper. Syphilitic swellings require the persistent administration of active doses of both mercurials and iodides.

In *perityphlitis*, which is a very frequent disease in childhood, absolute rest is required. The patient must use the bed-pan and urinal, and must not be permitted under any circumstances to change his position without being aided. The disturbance of an incipient peritonitis by mechanical causes is a serious matter; recent adhesions are very liable to be torn and give rise to new attacks. No purgatives must be given except a dose of oil in those rare cases where no evacuation has taken place for some time, and the accumulation in the colon of large quantities of fæces is considered probable. In these cases, however, a large enema of soap and water will mostly

fulfil all the indications. Thus, I am not prepared to advise, with a few modern authors, the universal treatment of peri-typhlitis (and peritonitis in general) with the sulphate of magnesium, or a large dose of calomel. The injection, however, first of a few ounces of olive oil, and afterwards of large quantities of soap and water, through a fountain syringe, is indicated after a week or ten days. Opium must be given freely by the mouth, rectum, or subcutaneously, in full doses. In almost every case ice applications must be made for days to the right hypochondrium. The food must be liquid, and given in small quantities at a time. The patient must remain in a recumbent posture for weeks after apparent recovery, and be kept quiet even then, for an abscess may be capsulated and perforation may occur.

When the diagnosis is undoubted and the presence of pus can be safely inferred, there is no objection to an aseptic puncture, which may be repeated a number of times for the purpose of ascertaining whether there is pus or not. Sometimes there is but a small quantity of pus, which may not be easy to discover, but requires an operation. The indications for the performance of the latter are not easily found in many cases. Indeed, the opinions vary with the very best authors—a great many of whom have given the very closest attention and the very best thought to the subject—as to the best time in which the operation ought to be resorted to. Some recommend and practise the operation as soon as perforation of the vermiform process has taken place, some favor procrastination until the beginning of the second week. Besides, there are those who object to any operation when universal peritonitis has set in, and those who perform laparotomy in the very same class of cases. In a number of instances the time of the operation depends on the condition of the patient; immediately after the perforation of the gut collapse is sometimes so great as to render the operation absolutely inadvisable. In these ice, opium, and

stimulants are required to bridge over the imminent danger until the operation can be safely performed. I have seen such cases in which it was considered positively fatal at first, and proved successful a week afterwards. There is no class of cases in which the responsibility of the medical man is greater, and great knowledge and keen judgment are more urgently demanded. Not every case terminates in suppuration. In some there is a great deal of inflammatory exudation. In them the protracted use of the iodide of potassium or sodium, lanolin ointments of the same, and occasional vesicatories will render good services. I have known many who had repeated attacks extending over years, and finally got practically well, not having anything to complain of for long periods.

After recovery, purgatives must not be given for a long time; but, as a matter of precaution, warm enemata must be administered every day.

As there is a difference between peri- and para-metritis, so there are cases of *para-typhlitis* to be distinguished from peri-typhlitis. In these cases, local inflammation, exudation, and suppuration have nothing to do with the vermiform process. Para-typhlitis consists in an inflammation and suppuration in the copious connective tissue between the pelvis and the colon, which at that place is not covered by peritoneum.

Such abscesses are the result of trauma sometimes; not infrequently of pelvic abscess; inflammation of the psoas; caries of the vertebræ; sometimes no cause can be found. They will develop rapidly and become very large. The abscesses are so large that sometimes pints or quarts of pus will either be discharged spontaneously or be removed by incision. But suppuration will not always result from this inflammatory process in the connective tissue, but inflammatory exudation only. When this happens, the treatment consists in the internal use of the iodides, and the applications of ointments of iodoform or iodide and lanolin, or of iodoform collodion (1 : 8–10)

several times daily; cold-water applications which are kept up until they become warmed; or sometimes warm poultices, particularly in the cases of very anæmic children, will be found to be pleasant and useful.

Twenty-five per cent. of all the cases of *invagination* or *intussusception* of the bowels occur in the first half-year of life (two-thirds of them between the fourth and sixth month), and fifty-three before the end of the first year.* Thus, a knowledge both of the condition and the means to remedy it are essential to every person who has many children intrusted to him. The only successful treatment consists in the reposition of the intestine. When it has been accomplished the relief of all the symptoms is immediate. The anxious expression, pallor, and collapse improve instantly, the little patient goes to sleep, and soon takes food. In the commencement of my practice, when the invagination extended down to the rectum I employed large stomach-sounds for the purpose of reducing the invaginated mass, but I have almost invariably found the case to be worse afterwards, because the sound will crowd the parts upon each other. I also used to blow air into the intestine by means of bellows through a long tube; and in order to make the supply more regular I availed myself, twenty-five or thirty years ago, of an apparatus for the production of carbonic-acid gas. After that time, when the siphons containing carbonic acid and mineral waters were invented, I used them for the purpose of filling the intestine more or less slowly with both gas and water. All these measures have proved successful in occasional cases. What has rendered me better service, however, is the following simple plan: The baby is turned on its belly, the hips are raised, the abdomen gently supported by a soft pillow. The mouth and nose, being the lowest part of the body, must be protected. The baby is then anæsthet-

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*See my "Intestinal Diseases," p. 242.

ized with chloroform, and warm water is poured into the rectum with but little pressure. This is important, for the intestine is no iron pipe subject to the laws of hydrostatics only. The injection is frequently intermitted, while the anus is closed by the finger. At the same time the abdomen, in the direction from below upward, is gently kneaded and its contents moved about.

In not a few cases have I seen immediate result from this treatment in the course of the last twenty years. When reduction has been completed, the baby must be kept absolutely quiet, take opium, now and then a rectal injection of chloral in solution, and wear an abdominal bandage just tight enough to steady the bowels.

In adults, Kussmaul reports favorable results from washing out the stomach. When the simple measure which I propose is unsuccessful, after a number of trials, laparotomy ought to be performed. The successful cases of laparotomy are not very numerous, but sufficiently so to justify the operation as the only means that promises a favorable result in irreducible cases. The late Henry B. Sands saved a baby of six months by this operation, and there are other similar cases on record. It is necessary to operate in time, and not delay too long; for, at the best, laparotomy, in these cases, has its serious difficulties.

At an early period all the tissues involved are hyperæmic and soft, with a tendency towards gangrene. In a child of eight weeks, on whom I operated, it took me ten minutes to separate the parts from each other, although I had the invagination, measuring six or seven inches, outside of the abdominal cavity. This delay was due to the softness of the tissues, the close impaction of the three layers, and the presence of a large amount of mesentery in the mass. Besides, the field of operation is very small and the difficulty of returning the intestine into the abdominal cavity very great indeed.

The medicines available for dislodging *intestinal worms* are all strongly irritant. They must not be given unless the

diagnosis has been made positive. It is better that the diagnosis of a gastritis, enteritis, or meningitis, when present, should be made by the medical man than that the child should be punished for his carelessness. Before taking anything to expel tænia, a child ought to be in fair general condition. Moreover, its own tænia, the mediocanellata, is the most difficult to expel. The best time is when proglottides are seen in the movements. Moderate abstinence for days, and a purgative (castor oil), ought to precede the administration of drugs. The parasite must be expelled; for though the symptoms may not be urgent, some day there will come either local or reflected ones.

Spontaneous emigration will be noticed occasionally, but it is rare and not to be expected. After the successful termination of the cure the intestine must be allowed rest. The plainest diet, such as milk, and strained farinacea, and peptones, are indicated for days.

I have administered a great deal of kamala, sometimes ten to fifteen grammes (a quarter to one-half of an ounce), during one hour, early in the morning; the breakfast (milk) to be postponed for two hours. The effect was not uniform, and often negative. It was improved by giving a dose of twenty-five centigrammes to one-half gramme (four to eight grains) four or five times daily, for ten days or more, previous to the larger dose. A few hours after the larger dose castor oil ought to be given.

Kousso, four to fifteen grammes within two hours, after the required preparation, to a child of from two to ten years.

Ethereal extract of filix mas has proved most successful in my hands. A small child may take one gramme (fifteen grains) in an aromatic mixture within one early morning hour. A drachm is tolerated and required by a child of seven or eight years.

Pelletierin tannate is given in doses of one or three decigrammes (0.1–0.3 = grs. iss to v). I have but little experience

with it. It is obtained from cortex punicæ granatum, which was (and is still) given as a decoction, but is too disagreeable and sometimes dangerous a mess for a child or infant.

For the removal of ascaris the general preliminary treatment ought to take place; at least, the bowels ought to be moved gently. The powdered semina cinæ, or flores cinæ, one gramme or more, mixed with a syrup, and followed by castor oil, will work well. Santonin, which is obtained from it, works as well and more pleasantly. From one to six centigrammes (gr. $\frac{1}{6}$–$\frac{1}{2}$–i) several times a day, with a purgative such as magnesia, calomel, or jalap. The latter addition is desirable, inasmuch as now and then poisonous symptoms may appear. Older children will complain of "xanthopsia," yellow vision. Urine and conjunctivæ are yellow, sometimes.

As oxyuris vermicularis is frequently found in the rectum, or its neighborhood, the internal administration of drugs is not indicated. The external results, such as vaginal catarrh, must be treated locally. The worm is removed by a small piece of blue ointment introduced into the rectum, or rectal injections of vinegar and water (1 : 3–4), corrosive sublimate (1 : 1500–6000), or decoctions of onions or garlic. It is difficult to dislodge, as it also inhabits the colon and even the small intestine.

Anchylostoma duodenale has attracted a great deal of attention of late, and may become of more practical importance to us when the blessing of immigration from the parts where the worm is indigenous will go on as hitherto.

The male is from six to ten, the female from ten to eighteen, millimetres in length ($\frac{1}{3}$–$\frac{1}{2}$ inch). The mouth is bell-shaped; there are two dental prominences above and four below. Particularly the female is thus characteristically endowed, so that it sucks and bites at the same time. Eggs are found in the fæces. They are smaller than those of ascaris. It was found in large numbers among the Italian workmen of the St. Gothard tunnel, the tile laborers of the Rhenish provinces,

and the Hungarian miners and their children. The cause of its presence is looked for in the muddy water they drink, which is filled with the ova, and the clay they work in, which contains the larvæ. The general symptoms are very severe and dangerous,—debility, paleness, utter exhaustion as in pernicious anæmia, relative diminution of red blood-cells. This "Egyptian chlorosis" was explained by Griesinger by the presence of anchylostoma, as early as 1854. Besides, there is pain in the epigastrium, constipation, mucus and bloody discharges, sometimes real hemorrhages and dyspnœa.

Anchylostoma duodenale requires santonin, thymol (adults took two to ten grammes daily), and principally extract of filix mas.

Umbilical hernia is of very frequent occurrence, but seldom attended with danger. Incarceration takes place very rarely; still, Treves and others have reported successful operations for such accidents. As there is a predisposition to the development of this variety of hernia, so there is a tendency towards spontaneous recovery. The round umbilical aperture will normally change after a number of months, or even a year, into a narrow fissure, more fat will develop, the muscles will become stronger, and then the intestine will be retained within the abdominal cavity. To accomplish this still more certainly, it is desirable to retain the contents of the hernial sac inside the abdomen. For this purpose, trusses are very unavailing. Strips of adhesive plaster will serve very much better, but in most cases they are objectionable because they irritate the sensitive skin of the baby.

Whatever application is made to the hernia directly must be larger than the aperture. It should not be too hard. Linen compresses, and those of woven lint, plates of cork covered with linen or lint, may be applied and held in position by means of a bandage. Knitted bandages will suit better than the ordinary bandage of linen, cotton, or flannel.

Inguinal hernia in the newly-born or the very young is apt to recover spontaneously. When the short and straight inguinal canal becomes longer and more oblique, in the course of a few years, and the amount of fat goes on increasing, the rupture may disappear; but all these predisposing factors never succeeded in effecting a cure by themselves. This was accomplished only when the hernia was retained inside the abdominal cavity completely and constantly, by means of a truss, which must be worn for years. It must not be removed except when the baby is sleeping quietly. Trusses are uncomfortable in the beginning, and give rise to cutaneous irritation, particularly under the influence of urine. So much the more is it necessary to keep the truss clean, and always to select one which fits exactly without exerting too much pressure.

Hernia is easily reduced into the abdominal cavity. But there are on record quite a number of cases in which incarceration and strangulation required operative interference. The operation should not be delayed after reduction proved impossible, even under the influence of an anæsthetic. An instance of a successful operation on a case of strangulated *femoral* hernia, which occurred in a girl of eleven years, has been reported by St. Germain. Rees succeeded in reducing an inguinal hernia by aspirating from the intestine a quantity of turbid liquid. An exceptional case of the kind, however, must not be recommended for general adoption.

Catarrh of the rectum behaves very often like a merely local disease. Indeed, it may occur as the result of a local irritation of the anus (scratching, sitting on muddy stoops) and oxyuris, foreign bodies, or hardened fæces. In all these cases the treatment has to be directed to the cause, which must be removed. Warm injections of water, flaxseed tea, starch decoction (with a little opium in tenesmus) are ample. Real proctitis, leading to ulceration (other than dysenteric) or fibrous

hyperplasia, will be but infrequent results. But it may occur, the infiltration may become copious and lead to an invasion of the surrounding cellular tissue. This periproctitis gives rise to abscesses, and often to fistula, either external or internal, complete or incomplete. These, as well as the periproctitic abscesses, due to pyæmia, sepsis, or the severe form of typhoid fever, require early incision.

Prolapse of the anus and rectum is the consequence of catarrhal and inflammatory irritation and softening. It will follow chronic catarrh and dysentery. It is produced by debility of the sphincter, which is often congenital, sometimes the result of neighboring diseases; also due to drastic purgatives, or constipation with the incidental straining. Such straining, resulting in prolapsus, is also produced by the presence of polypus or worms in the rectum, by stone and catarrh of the bladder, and phimosis. A predisposition arises from the peculiar shape of the rectum in the young. It is straighter, inasmuch as the sacrum is not scooped out as it is in the adult.

The temporary reduction of the prolapse is readily accomplished, particularly in such cases as those in which the sphincter is feeble, but the intestine will come down again. Attention must be paid to defecation. The children must not be allowed to strain. Thus the chamber must be placed in such a position, and raised to such an extent, that the feet cannot touch the floor, or the child must not be permitted to sit up during defecation.

Hippocrates makes the following remark on this subject: "In children suffering from stone, and protracted genuine dysentery, the rectum is apt to protrude. It should be pressed in with a soft sponge, and touched with a snail. Then the patient should have his hands tied, and be suspended a short time, and thus the rectum will slip in. If it comes down again, a band should be placed around the loins; a bandage

must be attached to this, and the rectum, after being moistened with a decoction of lotos, be replaced with a soft sponge. Also, the intestine must be washed with this decoction and the bandage carried up between the legs to the umbilicus. During defecation the baby must sit with extended legs upon the feet of the mother, its body leaning against her knees."

Many appliances have been devised to retain the rectum inside. Adhesive plaster has been used as best it could, and a number of instruments have been invented for the purpose of retaining the rectum in position, while leaving an opening for the passage of the fæces. They have been made of hard rubber, lead, and other materials.

Others have used a tampon, and some a compress to hold the nates together; but a tampon will certainly dilate the paralyzed sphincter more than it was before.

Curling confines his efforts to compressing the nates.

The main attention must be given to the treatment of constipation or diarrhœa, of the local catarrh, the rectal worms, the presence of polypi, the presence of stone in the bladder and phimosis, and all the causes of straining and prolapse which have been enumerated above.

But there are direct indications which can be fulfilled. Astringents have been used locally in the form of injections; principally alum and tannin, in solutions of one or two per cent. Ice has been applied locally, and injections of from half an ounce to an ounce of ice-water can be used with advantage three or four times a day.

One enema must be given daily for the purpose of emptying the colon and avoiding the possible straining.

In most cases there is considerable swelling, sometimes real hypertrophy of the mucous membrane and of all the tissues. Swelling and hypertrophy must be reduced. A part of the hypertrophied tissues has been excised. Caustics have been used, for instance nitrate of silver. It must be carefully neu-

tralized immediately after the application by chloride of sodium in solution. Concentrated nitric acid has been employed for the purpose of destroying some of the superfluous tissue. The best remedy, however, for this purpose is the actual cautery. It should be applied either in long welts or stripes, or at half a dozen or a dozen points. It matters not whether the galvano-cautery, or Paquelin's thermo-cautery, or the common actual cautery is selected.

For the purpose of strengthening the sphincter, I have used frequently, for dozens of years, an ointment consisting of extract of nux vomica, one part, in ten or fifteen parts of fat, to be applied to the lower part of the rectum from three to five times a day, or every time the bowel protrudes. The internal administration of strychnia is of very little avail; but that of ergot is serviceable. The subcutaneous injection of strychnia (sulphate one-sixtieth to one-thirtieth grain dissolved in water, once daily) in the neighborhood of the sphincter will be beneficial, particularly when supported by the action of the interrupted electric current, which may be applied for a few minutes once or twice every day.

Fissure of the anus is by no means rare in infants and children, particularly in the latter. It gives rise to symptoms similar to those encountered in adults: severe pain during defecation, tenesmus, dysuria. Many cases of alleged flatulency and colic, and excruciating screaming spells, are due to fissure. The more severe form follows a direct injury by foreign bodies, hard fæces, etc.; a mild form is due to slight erosions and ulcerations, the rhagades of congenital or acquired syphilis, or the sores made by erythema, eczema, or herpes, and by vulvo-vaginitis. The mildest form is that which is found on a very loose and dilatable anus. This yields readily to a mild treatment of the sore with a solution of nitrate of silver. Cases depending on syphilis require both a general and local treatment, vaginal catarrh must be stopped, and eczema healed.

The treatment of the severe form has consisted in the relief of occasional diarrhœa, and that of the more frequent constipation by enemata and mild purgatives, in the application of astringents, such as lead, copper, zinc, or alum; or of caustics, such as nitrate of silver (Esmarch) or of nitric acid. This treatment is painful and tedious. Boyer advised incision through the whole of the sphincters. The open wound may bleed and give rise to ulceration, or sepsis. The proper treatment consists in dilatation of the sphincters. Josseline directs it to be gradual, thereby protracting uncertainty and pain. The best and speediest method, however, is forcible and instantaneous dilatation, without anæsthesia. The operation takes so little time that it is hardly required except in very puny or convulsive infants or children. The introduction of two fingers of the same hand is rarely sufficient; three or four do better. The easiest way is to use the two index fingers; a sufficient dilatation is recognized by the distinct sensation that the muscular fibres have given way. The external wound is trifling and but superficial.

In the rare cases of fissure and polypus combined the treatment has to be directed to both.

Polypi of the rectum are tumors of the size of a pea up to that of a cherry or hazel-nut, or more. They are single or numerous, quite soft, or more frequently of greater consistency, composed mostly of cells or cellular tissue, quite vascular, and contain often a harder adenomatous nucleus and a Lieberkuhn gland imbedded in them. They are either pedunculated or sessile, on a broad base. They are sometimes found between the two sphincters, mostly above and near the inner sphincter; not infrequently, however, all over the middle portion of the rectum, and sometimes quite near the so-called third sphincter.

Among the symptoms we meet with abnormal defecation (constipation, diarrhœa, or both in alternation), sometimes enteralgia or tenesmus, and frequently a discharge of mucus

or blood. Tenesmus is found about polypi when seated near the internal sphincter, or between the two sphincters. Blood is seldom mixed with mucus, mostly quite clear, from half a teaspoonful to a teaspoonful, sometimes more, so that the constant repetition of these small hemorrhages is sufficient to result in anæmia. The tumor is often pushed into or through the anus during the evacuation of the bowels.

The treatment consists in the removal of the tumor by means of the snare, the galvano-caustic snare, by pincers, or by the fingers, or by ligature. The latter is easy of application in all cases in which every movement of the bowels succeeds in rolling out the growth like a foreign body. In these many excursions a polypus with a thin pedicle is often removed spontaneously. When that occurs there is hardly a show of blood. Indeed, there is seldom much bleeding after removal. It is true that some writers report the occurrence of hemorrhages, but in infants and children, with whom varicosities of the blood-vessels are exceedingly rare, I have never seen a hemorrhage of any account after breaking the pedicle with my finger in the rectum. The latter is very accessible indeed to an index-finger of moderate size.

Sessile polypi do not give rise to urgent symptoms, and are not easy to find, sometimes. The astringent injections which are to remove them must be mild. Solutions of one per cent. of alum, injected several times daily, will be found sufficient, or a two-per-cent. ointment, or suppository.

The diagnoses of diseases of the *liver* are more numerous than its diseases. Primary affections are rare. *Enlargement* is frequently assumed to exist when the size is normal. In the fœtus and infant the liver is proportionately large, but appears still more so because of its lower part not being covered by the ribs (which in the young are more horizontally placed) as it is in the adult. Besides, the tympanitic intestines encroaching upon the liver from below and behind, and the rhachitical con-

traction of the chest-wall, render a much larger surface of the organ accessible to percussion and palpation. Thus, actual and primary enlargement is not a common occurrence. Secondary enlargement, however, may depend on constitutional—either chronic or acute—disorders, such as alcoholism, syphilis, leucocythæmia, chronic tuberculosis, suppuration of bones or glands, malaria, or typhoid fever. The therapeutics of these kinds of enlargement depend, therefore, on the character of the different causes.

Another series of enlargements is that which results from changes in the circulation. Diaphragmatic pleurisy can constrict the vena cava inferior and thereby lead to hypertrophy of the liver, ascites, and death. Pneumonia in its acute stage impedes the hepatic circulation, temporarily mostly; when it is chronic, the consecutive hyperæmia may lead up to hypertrophy; the same effect may be produced by the persistence of pleural effusions on either side. More frequent yet is the secondary hepatic enlargement of heart-disease, not so much in the congenital form, in which the amount of blood is greatly reduced by the low state of general nutrition, as in acquired (mostly rheumatic) endocarditis. The number of such cases increases with every year of life; indeed, children of eight or ten years, with chronic valvular diseases and consecutive enlargement of the liver, are subjects of frequent observation. Thus, indeed, the treatment of the hepatic disorders is rather that of the primary disease than of the secondary hepatic changes.

Fatty infiltration of the liver is, in the very young, not often complicated with much increase in size. For, indeed, to a certain extent it is normal. But, in ill nutrition, protracted diarrhœa, chronic phthisis, and after severe cases of diphtheria or scarlatina, an actual fatty degeneration is liable to occur, with enlargement of the organ. Sometimes it is found combined with interstitial inflammation (cirrhosis), particularly in cases of syphilis, rhachitis, tuberculosis, or after measles or

scarlet fever. All of these facts are here alluded to in order to show that the intellectual physician can accomplish a great deal by attending to an evil before it is developed. Nothing is easier and more luckless than to prescribe iodides, calomel, or purgatives for an established local disorder, and fold the hands at the sight of an impossibility; nothing more efficient and happy than to watch *and treat* in time rhachitis and measles and scarlatina and the whole army of primary ailments. *Obsta principiis.* Noiseless prevention counts more than the loud officiousness of the recipe fiend after the evil has been permitted to advance to maturity.

Besides the cirrhotic induration of the liver, complicated with fatty infiltration, there are rare instances of genuine cases of *cirrhosis,* mostly connected with, or depending on, alcoholism, syphilis, rhachitis, and tuberculosis. The atrophic form is rare and mostly due to syphilis; the hypertrophic, with more or less jaundice and but a mild degree of splenic enlargement, is more frequent. Still, the records of the journals and transactions exhibit but seventy cases altogether. Ascites is not so frequent in the young as it is in the adult; it is more often observed as the result of chronic peritonitis than of cirrhosis, and of portal obstruction of any kind. The energetic suppression of the alcoholic habit (more frequently found in children and adolescents than many presume) and the treatment of syphilis (not always hereditary) may result in recovery. Ascites gets well sometimes after a single paracentesis. Mercury and iodides are very effective, not only in syphilitic cases. In every sort of cases, and in every age, I have succeeded in relieving cirrhosis, and sometimes permanently, by alternating, by the week or fortnight, the administration of iodides (potassium or sodium) and mercury (bichloride or the green iodide, and sometimes calomel).

The therapeutics of *congestion* of the liver is that of its causes, the lungs and heart, phosphorus-poisoning, infectious fever, and very high temperatures. While nothing is more

preposterous than the abuse of antipyretics in the presence of moderate temperatures, nothing is indeed more reprehensible than to allow paralysis of blood-vessels and even disintegration of tissues to take place from excessive pyrexia. The same is true of hepatic *inflammation* and *suppuration*. In our country the former, when general, is mostly traumatic, the latter the result of pyæmia, umbilical phlebitis, dysentery, perityphlitis, and pleuritis, besides an occasional case produced by pylophlebitis, or ascaris, or a contusion. Many a case of abscess need not have occurred if the dysenteric rectum had been disinfected by frequent enemata, a perityphlitic or pleural abscess been incised in time, and the umbilical phlebitis prevented by keeping the cord aseptic. Multiple abscesses will always terminate fatally; a single abscess may get well by either aspiration or incision and drainage. Of the two I prefer the latter, though, indeed, I have seen a successful result from a single aspiration followed by antiseptic irrigation.

The treatment of *jaundice* depends on its causes. The dangerous form met with in the septic new-born might be prevented, but cannot be cured. That which results from syphilitic stricture of the bile-ducts may recover, even after months, through a thorough mercurial treatment; complete obliteration of the bile-ducts leaves no hope, except in those cases which can be proved to be inflammatory. In them persistent alternation of mercury and iodides will relieve, or restore health. With mercury alone, aided by but little iodide of potassium in the rectum, a child of ten years with large and hard liver (probably fatty previously) got well of icterus which lasted five months and was complicated with secondary nephritis. The mild form depending on the sudden post-natal change in the hepatic circulation corrects itself; that which follows a gastric and duodenal catarrh in the newly-born, the infant (rarely), or the child, will get well with proper diet and medicines, which have to be adapted to both individ-

uality and age. As a rule, the amount of food ought to be diminished, but little meat (chicken) permitted, and milk and farinaceous foods preferred. Alkaline waters (Seltzer, Vichy, Waukesha, Poland), bicarbonate or phosphate of sodium, bismuth, hydrochloric acid, resorcin, calomel, will be found appropriate in a great many cases; in others, copious cool enemata or tinctura rheï aquosa. Jaundice depending on atmospheric influences has been observed to occur epidemically. Such cases require, besides the treatment outlined above, rest in bed, warm bathing, and diaphoretics. Jaundice from gallstones, though it has been observed in the very young, even in the newly-born, is excessively rare. The rules for both dietetic and medicinal treatment of biliary calculi must be the same in all periods of life. Strictly nitrogenous food must be avoided or taken in small quantities only, and milk and fruit (oranges, grapes) and fresh vegetables permitted. Of all the medicinal agents known to me, the sulphate and the salicylate of sodium, administered for months in succession, have answered best as preventives, to guard against a repetition of the attacks.

Diseases of the *spleen* are rarely of a primary character; most cases of pseudoplasm are congenital, and not amenable to any medicinal treatment. The majority of changes occurring in the spleen are connected with, or dependent on, constitutional ailments, and result mostly in *enlargement* of the organ. Malaria, leucocythæmia and pseudo-leucocythæmia (Hodgkins's disease), and amyloid degeneration have their own indications. Rhachitis and syphilis are liable to produce induration depending on hyperplasia of the connective tissue. Tuberculosis of the spleen is a frequent complication in the very young, with general tubercular infection. Heart-disease may lead to *embolism* and *abscesses* (the latter forming also a part of general pyæmia), typhoid fever to softening and enlargement. This condition expands the peritoneal covering and causes perisplenitis, though it be not quite distinctly

accessible to diagnosis. For indeed the younger the infant the less is percussion—being hampered by the shortness of the chest and the frequent occurrence of tympanites—able to reveal the exact size of the spleen. Unless it can be felt below the margin of the ribs, it must not be assumed to be hypertrophied. There are even cases in which it can be so felt, and still there is no enlargement, for in rare instances the spleen is found floating or descended.

The therapeutics of the constitutional disorders above alluded to has been discussed in previous papers. Quinia, ergot, and arsenic have been shown to be efficient in some and absolutely inert in others. The combination of quinia and ergot, with or without iodides, is probably among the most powerful remedies in chronic cases. Acute instances of swelling and inflammation require ice energetically applied, purgatives, and large doses of ergot; the presence of pus demands incision and drainage. To ascertain that condition exploring punctures can be made with safety. To what extent extirpation of the organ can be rendered serviceable in chronic cases remains for the future to demonstrate. Many of them that are dependent upon disorder of circulation or nutrition are more amenable to a preventive than to a curative treatment.

Peritonitis, either acute, subacute, or chronic, is a frequent disease at any age, and quite common in the young. The several forms will interchange and combine or alternate with each other; the chronic variety may remain dormant through an indefinite period, and suddenly break out with full force. All the forms of septic and infectious diseases give rise to it, from the sepsis of the newly-born to scarlatina, erysipelas, variola, dysentery, and typhoid fever (much more frequently without than with perforation). Trauma and perforation from any source, straining and contusion, indigestion, diarrhœa, and constipation (less frequently in the young than in the adult) will lead up to it. Inflammatory processes in the neighbor-

hood, such as perityphlitis and pleuritis, or simply local irritation, as from incipient hernia or retained testicle, are among the frequent causes. Perhaps the most frequent origin is that from a previous attack which occurred at a period ever so distant. After all that has been said in these brief lines, it is easy to see to what extent preventive treatment can prove effective. The watching and mitigation of infectious disease with a typical course, the speedy disinfection of the intestine in typhoid fever and dysentery, the prevention of chronic constipation or diarrhœa, the proper attendance on perityphlitis and pleuritis, the application of a truss and alleviation of the difficulties of a strangulated testicle, are just so many safeguards against attacks of peritonitis in individual cases.

When an acute attack of peritonitis, either local or general, has made its appearance, absolute rest is required by both the whole body and the affected organs. No unnecessary exertion, no motion of the body, no sitting up to evacuate either bladder or bowels, no straining is permissible, no food other than liquid,—that is, milk and such farinacea as contain least starch, viz., ground barley or oatmeal, preferably the former; for meat requires more pepsin and hydrochloric acid than a stomach at a temperature of 104° or 106° is competent to furnish, and the system has no worse enemy than half-completed or not absorbed peptones. Peristalsis must be stopped, for any disturbance of the consolidation of beginning adhesion is revenged by the tearing of newly-formed blood-vessels, the occurrence of hemorrhages, and the increase of danger. Opiates must be given by the mouth, rectum, or subcutaneously, or by combined methods, in doses sufficiently large not only to benumb pain or to procure an occasional sleep, but to obtain a condition of constant drowsiness, even sopor, and an effect on the pulse. When there is much vomiting, food ought to be withheld for half a day or a day. There are cases in which even ice pills furnish a new source of gastric irritation;

still more frequent is the contraindication to carbonic acid gas, which, it is true, gives great relief in some cases either in alkaline water or in champagne. In the later stages of the disease, when the necessity of feeding becomes urgent, vomiting may often be avoided by giving, either subcutaneously or on the tongue, undiluted, one or a few drops of Magendie's solution five minutes before the partaking of food. In the first days of acute peritonitis water is a greater necessity than food. When it cannot be introduced into the stomach, an ounce or two may be thrown into the rectum every hour or two hours without annoying it, and without inducing peristalsis of the intestinal tract.

Ice-bladders or, if they be too heavy, iced cloths are applied to the abdomen to advantage; particularly when the inflammation is still local. When they are objected to, water of the usual temperature may be employed first, and the latter reduced gradually. Cold must not be employed too long in very young or anæmic children; in these, indeed, warm applications are tolerated best. As long as an acute peritonitis is still local (pericystitis, perihepatitis), leeches can be expected to do good. No purgatives must be given; in children peritonitis caused by constipation is exceedingly rare, and the recommendations of magnesium sulphate and other strong remedies as given in puerperal and other forms of peritonitis—though they may prove justifiable in the adult—do not refer to the infant or child. If it be desirable to relieve the intestinal tract to some extent, the incipient state of peritonitis may permit of a tepid enema gently administered, with or without the addition of a teaspoonful or half a tablespoonful of oil of turpentine added to half a pint or a pint of warm water. Rest to the intestinal tract is such an absolute indication that the locking up of the bowels for a week or ten days becomes a frequent necessity. The tympanites of peritonitis is not the result of constipation, but depends on

the paralytic condition of the muscular layers of the gut, brought about mostly by the œdematous effusion into its tissue. But when it becomes very annoying, or dangerous through pressure upon the diaphragm, some relief may sometimes be obtained by introducing one or more tubes of india-rubber into the intestine. External applications must not be made because of the danger attending renewed peristalsis. The question whether puncture of the intestine is advisable, with a view of allowing gas to escape, cannot be answered for every case. Experience has shown that such punctures accomplished this purpose, but also that overextension of the intestinal wall destroyed its elasticity and prevented the puncture from closing immediately. I have seen liquid fæces which had escaped into the abdominal cavity through the fine apertures made by the needle of the aspirator.

When the case turns out to be one of suppurative peritonitis, the accumulation of pus may be circumscribed (a local abscess) or the whole abdominal cavity is affected. In such cases there have occurred occasional perforations into and discharges through the intestine, ureters, bladder, or umbilicus, but it is not windfalls or godsends we have to calculate upon. The choice is between an absolutely bad prognosis and the incision of the abscess, or laparotomy with proper after-treatment. The latter operation has also been recommended as a curative agent in tubercular peritonitis, and the number of reported successes is increasing. While we know that local tuberculosis is quite liable to heal spontaneously, we are still not justified in attributing the recovery of laparotomized tubercular peritonitis to that spontaneity alone, but must remember that a good empirical observation is of at least as great an objective value as a laboratory experiment made under different circumstances, or a microscopical drawing.

Chronic peritonitis, whether the outcome of an acute attack

or an independent affection, has its own indications. The majority of cases are either traumatic or the results of previous diarrhœa, typhoid fever, or tuberculosis. Rest in bed, warm bathing, warm poultices, offer great relief. Baths containing iodine, such as St. Catherine's, Kreuznach, and the internal administration of iodide of potassium or sodium (of iron only when there has been no elevation of temperature for some time) will contribute to the absorption of part of the exudation, particularly when the latter is very massive. An occasional vesicatory will be found opportune. Iodoform may be used as an ointment or be applied with collodion (1 : 8–12), twice daily, for a long time. Tincture of iodine is less efficient and more irritating. Ascites may require paracentesis, but I have seen many a case improved by iodides only, in connection with other diuretics. Sparteine sulphate (scoparius) is one of the best, in daily doses of, altogether, one-half to one grain; roob Juniperi, in a number of teaspoonful doses daily, is also very effective. Both or either may be combined with the iodide. When the solid exudation is obstinate, the blue ointment may be used in addition to the iodide; it may be rubbed into the inner aspect of the thighs or forearms, particularly the former, twice daily; not, however, into the abdominal wall. Nothing is easier than to transform a mild chronic form into an acute peritonitis by friction and similar traumatism, and nothing more certain than that the modern "massage" craze has multiplied the cases. On the other hand, there is no better means of alleviation and prevention than the rest secured to the abdominal organs by the permanent wearing by the patients, or those who ever suffered from peritonitis, of a bandage easy enough not to annoy, but sufficiently snug to hold in position the jumble of formerly diseased and still vulnerable intestinal convolutions.

VII.

DISEASES OF THE GENITO-URINARY ORGANS.

THE preventive treatment of the *kidneys* ought to begin with the first hours of the newly-born. After the second day, and frequently through a period of some two or three weeks, the urine, usually thin and limpid in the infant, is liable to eliminate a large amount of uric acid and urates. They are deposited in the pyramids and papillæ of the kidneys in orange-colored crystals and amorphous powder, and are sometimes so copious as to accumulate in the pelvis of the organ and also in the bladder. Not infrequently are the cloths of the baby discolored by them. The presence of this "*uric acid infarction*" is due to the sudden change in the circulation of the blood; it causes an unprecedented elimination of nitrogenous material which cannot be kept in solution, and thus removed, because the newly-born is not supplied with a sufficient amount of water. Its speedy removal is of great importance, for it acts as a local irritant, and may give rise to a slight or larger renal hemorrhage, to albuminuria (which is a frequent occurrence because of the defective construction of the epithelium of the glomeruli), and even to nephritis. Besides, its presence in both the kidneys and the bladder is a ready cause of the formation of renal calculi; indeed, the vast majority of renal calculi and of the centres of vesical calculi consist of uric acid. The consideration of these facts conveys at once the conviction of the necessity of supplying the newly-born with ample quantities of water. Much suffering and illness can thus be prevented.*

The *malformations of the kidneys* and its (mostly congenital) malignant *pseudoplasms* furnish but few indications for

* See my paper on Nephritis in the Newly-Born, N. Y. Med Journal, January 18, 1896.

treatment. Abnormal shape and unicity of the kidney (sometimes amounting to horseshoe kidney), cystic degeneration of obstructed uriniferous tubes, carcinoma and sarcoma, are unfortunately not uncommon. Of the latter I collected nearly four dozen in my paper on the subject presented to the Eighth International Congress. No treatment can be advised but that of removal at a time when the growth of the tumor is not yet too large. Fortunately, the diagnosis can be made with satisfactory certainty, and besides, as a rule, there is but one kidney affected. Metastatic deposits in the other kidney take place, if at all, at a late period of the development of the pseudoplasm.

Echinococcus and hydronephrosis furnish the usual indications to the surgeon. More than one-half of the latter are congenital, and therefore unfavorable. The secondary variety is caused by congenital hypertrophy of the bladder, pseudoplasms, calculi obstructing a ureter, disease of the prostate gland and urethra and its neighborhood. Thus the prognosis of the causal treatment is very doubtful in most cases, and a direct surgical treatment—aspiration, drainage, and irritant injections—is demanded.

Most cases of *floating kidneys* in infants and children are congenital; in a few older children, of ten and twelve years, symptoms attributable to that anomaly originated in a fall or jump from a height. Fortunately, it is a rare occurrence; still, I have met with at least eight in the course of thirty-six years. I never could advise anything better than a snug and well-fitting abdominal bandage. I have not seen a case in which I felt justified in advising the removal of the organ.

Among the symptoms connected with actual or apparent renal disease there are two of such importance as to render a special consideration advisable,—viz., *hæmaturia* and *hæmoglobinuria*. The former is always the result of a rupture of blood-vessels which may be occasioned by many causes. Calculus in a kidney or the bladder, nephritis and cystitis, neo-

plasms, thrombosis of the renal vein, or an infectious disease, such as purpura and cerebro-spinal meningitis, are among the principal causes of hæmaturia. For the time being we are here dealing with that depending on renal hemorrhage only. The indications furnished by the presence of infectious diseases and thrombosis are clear, but the efficacy of the means considered appropriate is very doubtful. Stone in the kidneys requires flushing the organ with alkali according to the method to be soon discussed. The action of ergot, either as a fluid or the solid extract, may be tried. If the stomach be rebellious the remedy may be administered in the rectum. Heart stimulants are often indicated, but it must not be digitalis that is to be selected, because of its local effect on the kidneys. Strophanthus or sparteine are preferable. Astringents, such as are eliminated through the kidneys, lead, tannic and gallic acid, will render good service if given in more than the doses of the books. The application of ice over the bleeding kidney is superior to any other remedy, provided the patient be not too young; for very small infants do not bear the persistent use of ice.

Nephritis, in the acute, subacute, and chronic forms, is a very frequent disease in infancy and childhood. As it is not always primary, but quite often a secondary affection, it is liable to be overlooked until it is too late. When this excessive frequency will be generally recognized fatal results will become less, and prevention will be appreciated at its full value. The enumeration of the cases of nephritis will always be incomplete, but the list of those conditions and diseases leading to it comprehends the principal ailments of infancy and childhood. First of all, there are the acute infectious diseases: scarlatina, diphtheria, measles, rubella, varicella, malaria, typhoid and cerebro-spinal fevers, amygdalitis, parotitis, and pyæmia. There are constitutional disorders, such as syphilis, purpura, and diabetes, also extensive

eczematous dermatitis, changes in the superficial circulation resulting from sudden exposure or the persistent influence of a low temperature. Besides, stasis and thrombosis, depending on pulmonary and cardiac diseases and diarrhœa, have the same result. Irritation of the kidneys by medicinal agents also leads up to nephritis; thus, for instance, chlorate of potassium, mineral acids, salicylic, carbolic, and pyrogallic acids, turpentine, naphthol, styrax, petroleum, tar,* large does of lead, phosphorus, arsenic, mercury, and manganese,—part of which are used for internal, part for external medication; finally, irritation of the organ by the uric acid infarctus of the newly-born, or by renal calculi, which are by no means rare in the very young, gives rise to inflammation. Most of these injurious substances exhibit their detrimental effect the more the younger the infants; in them a single external application of a solution of carbolic acid suffices to produce nephritis. The large number of causes of nephritis, as enumerated above, if heeded, teaches at least two lessons: first, that the supine expectancy in the treatment of infectious diseases is very liable to become criminal; and, secondly, that the effect of every irritating remedy, both internal and external, must be carefully watched.

When acute nephritis has been fully established, the first indication consists in the procuring of relief for the congestion of the kidneys. The child must be in bed, the skin warm; a warm bath will fill the cutaneous blood-vessels and relieve the internal circulation; dry cups and hot poultices applied to the renal region will have a similar effect. The

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* Balsam of Peru has also been charged with occasioning nephritis. Bräutigam and Nowack, after having made daily examinations of the urines of twenty-two patients, though administering internally fifty-two and eight-tenths grammes in eleven days, and in another case eighty grammes in twenty-four days, found that it has no such detrimental effect, provided it be free of ethereal oils. (*Centralbl. f. Klin. Med.*, No. 7, 1890.)

mucous membrane of the intestinal tract must share in the action of the skin; therefore, sulphate of magnesium must be administered in doses sufficient to produce three or four daily evacuations, or calomel in small doses frequently repeated for the purpose of obtaining the same result. The arterial tension must be reduced by nitrites, particularly when there are cerebral symptoms; besides aconite in frequent one-quarter-minim doses, small doses of opium frequently given, or chloral hydrate, may be tried for the same purpose. Digitalis must be avoided with the utmost care, but when exhaustion is threatening, strophanthus or sparteine sulphate may be administered alongside the nitro-glycerin. Iodide of potassium acts favorably in the same direction; the sulpho-ichthyolate of sodium has been recommended for the same purpose by Senator, who gives to an adult pills containing from one decigramme (gr. iss) to one gramme (gr. xv) daily.

The greatest care must be bestowed on the diet of the patient. Whatever is irritating must be avoided; for instance, alcohol, spice, or iron. The food must be exclusively liquid, and compatible with the vulnerable condition of the kidneys. As the first products of the metamorphosis of albuminates are eliminated through these organs, and some of those products, such as phenol, kreatin, and extractive materials in general, are positively poisonous, it follows that strongly nitrogenous foods—the opposite opinion of Oertel and Loewenmeyer and their followers notwithstanding—must be abhorred. No eggs must be taken, and, as a rule, no meat; now and then an exception may be made in favor of veal, spring lamb, chicken, fish, or oysters; but, as a rule, the diet in acute nephritis must be confined to milk and farinacea. Barley, wheat (stale bread), hominy, rice, and potatoes are permissible, also green vegetables and fruit. The beverage consists of water or an alkaline mineral water. Lemonade is permissible unless it interfere with the digestion of milk. Neither in the acute,

nor subacute, nor chronic form of nephritis must muscular exertion be allowed, for it is this that increases the metamorphosis of the albuminates. Moderate exercise, however, is not contraindicated in the chronic form; in the latter the elimination of albumin is not increased by exercise.

The surrounding air must be fairly warm when the patient is in bed, quite warm when he is about. The function of the skin must not be suppressed; a moderate amount of perspiration is beneficial. Thus it is that there is a constant indication for warm bathing and a warm climate, for both diminish the labor of the kidneys (as also of the lungs). As a moist air interferes with the action of the skin, a dry climate is preferable. Hot bathing must be avoided except in the occasional emergencies of uræmia.

Subacute nephritis, with its limpid and sometimes copious urine, changeable percentage of albumin, occasional œdema and gradual diminution of strength, occasional presence of arterial contraction, and of cerebral symptoms, is often overlooked. It is a frequent sequela of scarlatina and diphtheria. Depletion, hot-air and hot-water baths, and iron, which gets deposited in the epithelium of the uriniferous tubes (which is thereby subjected to premature elimination), must be avoided in most instances. Digitalis is contraindicated during high arterial tension; indeed, there are but few cases which permit its administration. Small doses of opium benefit the circulation in most cases of uræmia complicated with high arterial pressure; so do the nitrites (nitro-glycerin), chloral, and sparteine. Mercury in small doses (corrosive sublimate, gr. $\frac{1}{15}$ to $\frac{1}{10}$, largely diluted, 1 : 6000, or 10,000 at least) may be given daily, week after week, and may be combined in afebrile cases with small doses of iron. The air must be warm, a dry warm climate selected, a warm bath given every day, with gentle friction. Large quantities of water, both pure and alkaline,

must be shunned, for the functional activity of the kidney must be diminished as far as compatible with a normal circulation. This rule is particularly stringent during the presence of local or general dropsy. Here the amount of liquid consumed ought not to be greater than the quantity of urine discharged. Mild diaphoretics and purgatives will also relieve the labor of the kidneys. When the amount of uric acid in the urine is persistently so large as to point to the presence of a lithæmic disposition, salicylate of sodium may be administered daily, to the total (daily) amount of ten or fifteen grains.

Chronic nephritis is of frequent occurrence. The presence of occasional headaches, or vomiting, or a slow convalescence from any ailment, is suspicious, and calls for the examination of the urine. As albuminuria is not always present, and the amount of albumin very changeable, that examination must be repeated at short intervals. The absence of dropsy or œdema proves nothing at all, particularly in the very young infant, in whom chronic nephritis without dropsy is a frequent occurrence after pleurisy, pneumonia, erysipelas, or in syphilis. Indeed, the most dangerous cases are those in which no dropsical symptoms are apparent. Many a case of chronic nephritis could be prevented by the discovery of the acute or subacute stage preceding it, and by heeding its many causes. Of late I have seen a few cases complicating or rather depending on purpura, in which evidently the presence of small hemorrhages in the renal tissue gave rise to the initial irritation. In these cases the constant use of phosphorus (gr. $\frac{1}{150}$ twice or three times daily) administered during two or three months in succession added greatly to the final recovery.

Now and then a case of chronic nephritis will recover. The majority of those I have seen getting well took corrosive sublimate. Children of five years may safely have one-fiftieth of a grain in half an ounce of water three or four times daily for many weeks in succession. When its inter-

mission is deemed advisable, or together with the mercury, iodide of potassium may be given in doses of six or ten grains daily. At the same time iron may be administered, the chloride (or one of the milder preparations), from ten to twenty minims of the tincture daily. A gentle stimulation of the kidneys by preparations of juniper, or the bitartrate or citrate of potassium, is advisable. Strong irritation of the kidneys must be avoided; digitalis is apt to do harm, except in complications with valvular lesions of the heart. To increase diuresis through strengthening the action of the heart, sparteine or caffeine render better services; the latter, however, must be carefully avoided when there are any cerebral symptoms whatsoever. Among the best diuretics, through fortifying the heart while diminishing arterial tension, is nitroglycerin. To combat the latter condition, small doses of opium are often useful. In cases of obstinate vomiting it is often the only reliable remedy.

Chronic nephritis is apt to call for immediate and strong measures during some of its worst sequelæ. Uræmia (occasioned by the accumulation of urea in the blood, the presence of cerebral œdema, of arterial contraction and heightened blood-pressure, and by reflex irritation of the motory centres) results in vomiting, diarrhœa, coma, and convulsions. Strong purgatives may be required at once (calomel, gr. v to x; elaterium, gr. $\frac{1}{20}$, or croton oil, gr. $\frac{1}{20}$ to $\frac{1}{10}$ every hour, to be followed by sulphate of magnesium), or strong diaphoretics (hot-air bath, hot-water bath, hot-water pack, pilocarpine, subcutaneously, in doses of from a fifteenth to an eighth of a grain), and occasionally, when the symptoms of cerebral hyperæmia predominate, a few leeches to the septum narium (the preferable place), or the mastoid processes, will save a case from imminent destruction. When, however, much water is eliminated from the body through all these procedures, a new supply must be introduced either by the stomach or by the rectum. Injec-

tions into the subcutaneous tissue of large quantities of salt water, which have been advised for that purpose, I have not had an occasion to require or recommend. Other sequelæ or complications have each their own indications; œdema of the glottis cannot wait for the effect of the above medication, and demands either scarification or intubation. Hydropericardium and hydrothorax require paracentesis when the symptoms are urgent.

The frequency of *renal calculi* has been alluded to before. Indeed, they are quite common, have been observed to occur in the fœtus, and give rise to many attacks of screaming spells, with dysuria, local pain, retraction of the testicles, to the occasional presence of pus, blood, and gravel in the urine, and to vomiting and convulsions. Most of them consist of uric acid (very few of oxalates, cystin, or the phosphate of ammonium and magnesium), and have their positive indications for treatment. Particularly in those cases which occur in gouty families, the diet has to be limited to but a moderate quantity of strongly nitrogenous food. Meat may be permitted once a day, white rather more than black. Celery, parsley, asparagus, and all irritants must be avoided. The patients must be encouraged to drink much water, alkaline waters to be preferred. All of these contain more sodium than potassium; this latter having a greater affinity to uric acid, the bicarbonate of potassium, in daily quantities of from ten to twenty grains, may be given in Seltzer, Vichy, Bethesda, Poland, or Waukesha water, large amounts of which ought to be administered. The natural lithia waters contain less than the occasion calls for; the carbonate of lithia taken during a day ought to amount to from three to eight grains. Thus the artificial lithia waters, if carefully prepared, have the advantage over those furnished by nature.

The presence of a stone in the kidney, besides giving rise to the symptoms enumerated above, may produce renal catarrh,

and secondary catarrh in the ureter and the bladder. When it leads to pyelitis or pyelonephritis, surgical interference is called for. When one of the kidneys is healthy, nephrotomy or nephrectomy may save life.

Of *cystitis*, infancy and childhood exhibit every possible form, from the catarrhal to the ulcerous or diphtheritic. It is more frequent than Ashby is willing to admit. Exposure to low temperatures, chilling of the parts by sitting on cold stones or the wet grass, trauma, vulvo-vaginitis, the administration of cantharides or other irritants, the drinking of beer, severe indigestion, typhoid fever, variola, or diphtheria, and the presence of stone in the bladder are just as many causes. Dysuria, retention or incontinence, vesical and rectal tenesmus, the presence of mucus, pus, and blood in the urine, fever, and secondary peritonitis or "typhoid" symptoms are among the possibilities. Trauma demands absolute rest in bed, and either cold or warm applications, besides opium, which may be administered internally or in suppositories; exposure ("cold"): warm bathing, diuretics and a narcotic; the cystitis of infectious fevers: rest in bed and tonics; that following the use of cantharides (administered internally or in vesicatories): from two to ten grains of camphor daily, internally; severe indigestion: the correction of the alimentary disturbances by abstinence, purgatives, and plenty of water; hyperacidity of the urine: the use of alkaline waters; hyperalkalinity: that of hydrochloric acid; vesical calculus: its removal, preferably by the suprapubic operation. In most cases the patient ought to be kept in bed, to drink plenty of carbonated alkaline water, abstain from cold beverages, live mostly on milk and farinaceous food, keep his body warm, particularly abdomen and feet, take a dose of calomel, and an opiate for occasional relief. But by far the best symptomatic remedy in the spasmodic pain of cystitis is hyoscyamus; from two to four grains of the extract may be taken daily for an indefinite

period. The chronic cases require the internal use of boracic acid or chlorate of potassium (from 15 to 30 grains daily), turpentine, gallic or tannic acid, uva ursi, and salol or salicylates; the latter if there be no nephritis at the same time. In a number of instances the local treatment of the bladder is indispensable; the bladder may be washed out with warm water, or a warm solution of boracic acid (two or three per cent.), or nitrate of silver (one-quarter or one-half of one per cent.). This procedure is best performed under chloroform.

Some of the symptoms met with in cystitis may occur without the presence of the latter. Painful *spasm* during micturition, *retention* of the urine, or *incontinence* are very frequent under the influence of quite a number of different conditions; it is upon the latter that the treatment depends. The urine may contain, besides a superabundance of uric acid, salts or bile, or irritants of a nature which cannot always be determined accurately. Thus, urticaria of the surface, when resulting from ingesta, is quite often complicated with vesical spasm, so that it appears that the same cause acted simultaneously on the external and internal integuments. *Dysuria* may also depend upon a painful condition of the urethra, resulting from acidity of the urine or the transmission of a vulvovaginitis, or congenital contraction of the urethral orifice or adhesion (mostly acquired) of the labia majora, which is easily corrected, or a balanitis resulting from the irritating effect of urine retained round the glans penis by phimosis. The indications for treatment in all of these cases are so plain that the enumeration of the etiological factors appears to be sufficient. There are besides cases of "*irritable bladder*," as well as in the adult, in which the result of the treatment gives sometimes the explanation of the cause. In a few cases the introduction of a catheter was sufficient to relieve the spasm of the neck, in others the administration of hyoscyamus proved satisfactory.

Retention of urine by local atony and paralysis is rare in children, except by hyperextension during school hours; still, it may occur in the course of spinal diseases. Now and then there are mechanical obstacles. In the newly-born the colliculus seminalis is often quite large and requires the introduction of a sound. Large stones in the bladder, or a smaller one near the neck, or one impacted in the urethra, or a string tied round the penis and buried in the swollen tissue, or epithelial closure of the urethral orifice, or an œdematous prepuce are more or less amenable to a diagnosis and speedy amelioration. The injection of warm or cold water into the bladder, warm bathing or hip-bath, the correction of the epithelial adhesion of the prepuce, and the use of the catheter or sound find their ready indications. Retention during infectious or cerebral diseases requires great attention. Unconsciousness is a frequent cause, and frequent percussion of the bladder ought to be resorted to when the brain becomes insensible to the expansion of the organ.

Evidently the causes of retention are very numerous; one of the most puzzling cases was one in which the accumulation of urine was very great. The introduction of an elastic catheter, though it entered to its full length, availed nothing; a metal catheter entered with difficulty until it suddenly appeared to overcome a difficulty, and the urine was expelled with great force. The autopsy gave the explanation of the singular occurrence. The whole bladder was lined with a thick diphtheritic membrane, which was easily detached but did not admit the elastic catheter. This was deflected along the wall of the bladder, while the silver catheter succeeded in perforating the pseudo-membrane.

The great variety of the causes of *incontinence of urine* requires tact and discrimination in the selection of remedies. General anæmia and muscular debility indicate a diet carefully selected for its nutritiousness and digestibility. Gentle mas-

sage of the whole body, sponging with alcohol and water (1 : 6) or with water, and efficient friction with thick towels, sea-bathing, and the use of medicinal roborants, such as iron or arsenious acid, will always prove beneficial. The elixir pepsini, bismuthi, et strychninæ of the National Formulary is a good preparation in insufficient gastric digestion, with atony of the stomach; a child of three years may take a teaspoonful three times a day.

Attention must be paid to the capacity of the bladder. In every case, particularly in the evening, the quantity of fluid must be restricted. The sigmoid flexure and the rectum must be empty in the night, and the patient should be encouraged to evacuate both bladder and rectum before retiring. After a few hours' sleep the children ought to be taken up and roused sufficiently for both purposes.

Muscular debility of the neck of the bladder (sphincter) requires general and local stimulation. Strychnine or other preparations of nux vomica prove effective to a certain extent by improving both the general innervation and the appetite; in desperate cases an occasional subcutaneous injection into the perineum (gr. $\frac{1}{40}$ to $\frac{1}{16}$) has rendered good service; an ointment of one part of extract of nux vomica in from ten to sixteen parts of fat, introduced into the rectum (size of a coffee or lima bean) several times daily, will also act well and can be continued for some time. The same indication is fulfilled by ergot, the fluid or the solid extract of which may be employed internally. The interrupted electrical current is perhaps the most powerful local stimulant; one of the electrodes must be applied to the perineum, the other to the hypogastrium or the lumbar region. The advice to apply the negative pole to the interior of the urethra or bladder and the positive somewhere externally is bad, because of the danger of urethritis and cystitis.

Whenever there is oxalic acid or sugar or an excess of urates and phosphates in the urine, the source of the disturbance

must be attended to. The digestive disorders forming the source of the anomalous condition require a corresponding change in the diet (diminution of nitrogenous food) or correction of the functional disorders of the stomach and liver. Until that can be accomplished the prognosis is very uncertain. Vesical catarrh, nephritis, and the presence of a calculus in either the kidney or the bladder have their own indications. The hyperæsthesia of the body of the bladder, complicated or not with catarrh,—it is often found without it,—requires belladonna or its alkaloid. Both belladonna and atropine are tolerated in much larger doses by children, in proportion to their size or age, than by adults. In many cases a single evening dose of extract of belladonna (gr. $\frac{1}{4}$ to $\frac{3}{4}$ to 1) or sulphate of atropine (gr. $\frac{1}{100}$ to $\frac{1}{75}$) answers well, sometimes to an unexpected degree. Bromide of potassium (gr. vi to xxv), camphor (gr. ii to v), extract. humuli fluidum (♏ iv to x), or the elixir humuli of the National Formulary, in teaspoonful doses, given at bedtime, answer a similar purpose.

Causes of reflex contraction located in the vagina, penis, or rectum require local correction. Vaginal catarrh is as obstinate because of its inaccessibility as it is frequent. Polypoid excrescences about the vagina or in the urethra (of the female) must be removed; if there be phimosis, circumcision is required. But a great many cases which are presented for that purpose can easily be remedied by gentle dilatation of the prepuce. Firm adhesion of the prepuce requires careful detaching. Intestinal worms must be expelled, and the fact remembered that oxyuris has its original seat in the upper part of the colon and the lower part of the ileum, so that rectal injections have but a temporary effect in most cases. Fissure of the rectum, mostly of small size and located posteriorly, requires forcible dilatation,—a procedure which demands little time and no anæsthetic, but is very efficient.

Irritability of the neck of the bladder and the prostatic

part of the urethra has been treated by Henry Thompson with cauterization by means of a two-per-cent. solution of nitrate of silver. A solution of one part in a thousand of distilled water will be found sufficient, or a solution of one or two parts of tannin or alum in a hundred. Still, it is a better plan to introduce either an elastic catheter or a metal sound into the bladder, every few days, for two or four minutes. A few drops of a solution of cocaine instilled into and distributed in the urethra a few minutes before the insertion of the instrument will in many cases render general anæsthesia superfluous.

The latter, however, cannot always be dispensed with. In the case of a girl of three years, with chronic catarrh of the bladder and incontinence, anæsthesia was required a dozen times, for two purposes,—first, to inject a solution of nitrate of silver (1 : 1000) into the bladder, and, secondly, to dilate forcibly, with increasing amounts of water, the organ, which had habituated itself not to hold more than a few drachms of fluid at a time.

Masturbation, which is so frequently the cause of irritation of the prostatic portion and thereby of incontinence, has its own indications. Its cure is by no means easy. Infants can be watched and forcible prevention of self-abuse (mostly by the thighs or hands) exercised; but children of more advanced years require an unusual amount of firmness and supervision. Bodily punishment will avail but little; in the treatment of incontinence from whatsoever cause, nothing.

The development of the genital organs begins in the sixth week of embryonic life, that of the urorectal septum, by which the urethra of the penis is formed, about the middle of the third month. About the same time the anterior part of the urethra is developed by the invagination of the epidermoid integument of the glans penis. This invagination extends backward to the valvula Guérin in the fossa navicularis. Here, where the

two parts of the urethra are to meet, the opportunity is furnished for the occurrence of many anomalies.

That invagination may not take place at all. In that case there is no indication of an anterior urethra. There may be a superficial epithelial obstruction of the urethra after it has been formed, with retention of urine behind it; or a partial contraction or narrowness of the external orifice, particularly in cases of genuine phimosis; or a genuine stricture in the pars cavernosa, of which instances have been reported by Guyon, Englisch, and Demme; or an extensive obstruction mostly complicated with rectal anomalies, and retention of urine, dilatation of the ureters and renal pelves; or, finally (in a few reported cases), obstruction of the neck of the bladder, with the same disturbances unless the urachus be forcibly kept open.

The emission of urine begins about the middle of fœtal life. Sometimes the connection of the two parts of the urethra has not been established; in that case there is a dilatation behind the fossa navicularis with a constantly-growing lake of urine. Its pressure may succeed in breaking through the obstacle with or without the formation of a valve, or it will burst the lower wall of the urethra behind the obstacle and form a mild form of hypospadias. If the urethra be perforated farther back, the hypospadias may be scrotal or perineal. That hypospadias may occur in this way, and not only by an arrest of development, is proven by the occurrence of cicatrices, and such contraction as depends on cicatrization only.

Many of these anomalies are the subjects of surgical interference. Fortunately, all of them are but rare, as the careful reports gathered by Kauffmann in "Deutsche Chirurgie," and Boker in "Gerhardt's Manual" will prove. Epithelial obstruction of the external orifice can be remedied by puncturing and dilatation of the external orifice; one such case I have seen thirty years ago, and never since. Membranous obstruction in the fossa navicularis has been pierced; even a case of

fœtal imperforation of the glans penis has been perforated by Rauchfuss with apparent success. Congenital strictures have been treated with bougies. The narrow orifices of hypospadias have been dilated with bougies, or the knife, or both, and laminaria tents used to render the effect permanent. And hypospadias has been greatly benefited by operative procedures, with better success in modern times than the plastic operations of Dieffenbach could boast of.

The *prepuce* begins to be evolved about the end of the third and in the beginning of the fourth month of embryonic life. Within a month afterwards it extends to the middle of the glans. Its covering epithelia are pavement. They form from six to eight superjacent layers, and extend as far as the urethra and sometimes into the fossa navicularis. They are also those which constitute the more or less numerous accumulations, principally about the corona glandis, which were formerly taken to be fat, the so-called epithelial pearls. They are met with as early as the fifth month of uterogestation. They are sometimes so large as to raise the adjoining part of the prepuce from the surface of the glans and to form small cavities around themselves, thus contributing to the spontaneous separation of the *preputial adhesions.*

These adhesions are vastly more frequently soft agglutinations than solid unions. The causation is simple: as the prepuce and glans are in close juxtaposition, the epithelia of both remain moist, and thus become coherent. It is only in those cases in which the prepuce does not snugly cover the glans—for instance in hypospadias and epispadias—that no, or but partial, cohesion takes place. Still, there are cases in which the union of the two surfaces becomes quite firm, partly in consequence of the occurrence of an inflammatory exudation, and partly because of the existence of an extraordinary amount of superficial papillæ, which, according to Englisch, grasp and join each other. Thus the soft cohesion of the prepuce and

glans penis is a physiological condition, and therefore met with in almost every male child. The degree, however, to which it is developed is liable to differ. The prepuce of the newly-born being long, it may cover the whole glans down to the orifice of the urethra, and then by its overlapping adhesion give rise to retention of urine, and in consequence of irritation by urine, and of the traction invariably connected with the slightest changes in the shape of the organ during micturition, to pain, redness, muco-purulent secretion, sometimes moderate extravasation, and erections which again produce a local irritation of the surface. It is the erections, when frequently repeated, and when occurring more normally in later years, combined with the effects of the cavity formations round the epithelial pearls, which usher in the gradual and final separation of the prepuce from the glans penis. That process takes place between about the ninth and thirteenth year of life. Thus, in the vast majority of cases, no interference is required. The more gradual the separation takes place the safer it proves. It is only artificial disjunction which may become a danger by secondary changes. The only reason for interference is in retention of urine and balanitis, both of which are often found together. The separation succeeds in most cases quite easily by holding the glans gently but firmly between the fingers and pushing or pulling the prepuce in the direction of the corona. Towards the end of the operation the pearls make their appearance; the separation, however, must be completed without interfering with them, and the prepuce then carried forward again to avoid paraphimosis; for there will be some slight œdema by which the latter might be occasioned. Before that is done, the application of vaseline, or zinc or lead ointment, or a dust of boracic acid or subnitrate of bismuth, or of a mixture of one part of salicylic acid, fifteen of bismuth, and twenty of talcum, is advisable. Carbolic acid is contraindicated because of its tendency to facilitate

bleeding, though that be ever so slight. In most cases it is best not to repeat the procedure for some time, in order not to disturb the healing and hardening process. Every wound or tear may bring on cicatrization and secondary phimosis. In some cases the separation does not take place quite readily; in them a blunt probe introduced between the two layers will overcome the obstacle. Probe and fingers will succeed, if care and time be taken, not only to accomplish the end in view, but also to avoid tearing, bleeding, œdema, and inflammation. The occurrence of cicatrization is always a serious matter. I have succeeded without it in many more cases than I could take notes of; for the number of cases in which you will be consulted in reference to the advisability of circumcision—which is one of the modern onslaughts upon the genito-urinary organs—is very great. Twenty-nine out of thirty alleged cases of unconquerable phimosis are exactly of the kind in which a patient reduction and separation prevent both a surgical operation and a surgical fee. The solid cohesion which requires the use of the knife, and a careful and expert operator, is very rare; I have seen but one that was complete, in a life-time. I cannot imagine that a total synechia is curable without a plastic operation, or a total removal of the prepuce after its separation; for new adhesion must follow the operative separation in the absence of mucous membrane.

From what I have said it follows that we cannot recognize the existence of an actual *phimosis* in the young before the epithelial agglutination has been relieved. The actual cases may exhibit a long or a short prepuce, be partial or total, congenital or acquired, atrophic or hypertrophic. The last species is often dependent on changes in the internal lamina of the prepuce, which, when originally contracted and tight, is subject to inflammatory and exudative processes; the atrophic form is due more frequently to a defective development of the integument, which thereby becomes attenuated.

Both of these forms are liable to be congenital, and either is found as well among infants and children as in later life. The degree of the phimosis depends upon the development of those anomalies, and also upon the degree of the presence of the elastic layer described by Reiner and situated between the two laminæ of the prepuce.

Phimosis may be acquired by pathological changes of the tissue depending on accidental morbid processes. Dropsy may so swell the prepuce as to result in it. The frænulum, congenitally short or otherwise, may suppurate and cicatrize. Inflammation and ulceration from whatever cause, irritation and tears following inconsiderate or unsuccessful attempts at separating epithelial adhesions, and the cicatrization of circumcision wounds are apt to render the edges of the prepuce unduly rigid.

The symptoms of phimosis may be both local and general. Irritation by contact with urine, and pouching of the prepuce by mechanical retention, is quite frequent. Smegma becomes rancid when the original epithelial adhesion has been separated. Retention of urine, or incontinence, or both combined, are often met with. The former and the spastic dysuria produced thereby result in straining, vesical symptoms resembling those met with in vesical calculus, prolapsus of the rectum with more or less constant tenesmus, the protrusion of hernia, the formation of struma, have been observed. Like balanitis, which is frequent, cystitis and hæmaturia have been observed. The local irritation gives rise to erection, sexual excitement, and masturbation in the youngest of infants. Headaches are said to be frequent and temporary, and permanent nervous symptoms in great numbers have been attributed to phimosis. It has become quite customary, though less so to-day than ten years ago, to attribute severe nervous derangements to it. A London neurologist has made the statement that in twenty-five cases of epilepsy he found congenital phimosis eleven

times. The so-called reflex paralysis from genito-urinary causes has played and is still playing an important part in American pathology. Numerous cases of infantile poliomyelitis and cerebral paralysis, spastic paraplegia and paralysis, chorea, epilepsy, contractures, and idiocy have been explained by the presence of phimosis. The numerous cases alluded to of alleged phimosis, in which the separation of the preputial adhesion and apparent phimosis was easily accomplished, were exactly such as had been condemned to be operated upon for a serious spinal or cerebral disease. There was a time when, in a New York medical society, one of the authors of the theory of genito-urinary reflex paralysis related cases of contracture and convulsions. When reminded of his cases being convulsive and not paralytic, he retorted he was no physiological theorist, but he cured his patients. In another meeting, years afterwards, I stated that I had never seen a case that obliged me to assume a causal connection between paralysis or contraction on one hand, and phimosis on the other, and was sustained by neurologists of rank, who also denied ever having seen a case which necessitated the assumption of a genito-urinary etiology. Still the bugbear is alive yet, many a prepuce is sacrificed, many a fee pocketed, many a diagnosis not made, and many a case either procrastinated or not cured.

Many a case of moderate phimosis is best treated by the gentle method of gradual retraction, many a one is improved by the normal erection of micturition, and from other causes. Thus it was that dozens of years ago an experienced pediatric surgeon, Guersant, could state that he seldom operated for phimosis before the fourth or fifth year. Forcible dilatation, if resulting in fissures of the edge, must be frequently repeated to avoid hard cicatrization and consecutive contraction. Such cases as are not amenable to that treatment require the knife or scissors. The incision of the inner lamina alone, which has

been recommended, is very apt to be incomplete, though painful, and to lead to swelling and imperfect results. The atrophic variety requires a dorsal incision by either knife, carried on a director, or a pair of scissors; the inner lamina is often not thoroughly divided, and requires the repetition of the incision; when the scissors cannot be carried over the whole length of the glans, it has become necessary to first cut down on the corona glandis, thus to enable the operator to carry the scissors over the entire length. The cut edges are mostly subjected to Kocher's continuous suture, and the whole surface treated antiseptically with bismuth or corrosive sublimate. The lower corners are mostly rounded off. This is particularly necessary in the cases of hypertrophic phimosis which are subjected to the same surgical treatment. Most of this class, however, demand complete circumcision, care being taken that more is removed of the dorsal prepuce than of the opposite side, that the inner lamina is separately divided afterwards and the epithelial adhesion carefully separated. The prepuce must be drawn forward sufficiently to protect the glans against being injured; more than once have I seen it mutilated. In one case the mutilated glans became infected with diphtheria. The wound must be sutured, and treated antiseptically. One of the saddest cases of my whole life, and one of persistent distress, was the death from erysipelas from that simple operation performed on a boy of three years. Infections of circumcision wounds by bacteric poisons are quite frequent; such of diphtheritic invasions I have published in my treatise of diphtheria sixteen years ago, and before that in the second volume of "Gerhardt's Manual" (1876); many more I have seen since; and syphilis and tuberculosis have been known to follow many instances of either surgical or, more frequently, ritualistic circumcision.

Diphtheria of the prepuce, or rather the genito-urinary organs in general, the female included, may occur as an origi-

nally local affection—such as those alluded to—or a part of the general infectious diseases. The latter are mainly diphtheria, scarlatina, and measles. The last named is the very malady which appears to predispose the system to the most vehement forms of local invasions. The aphthous vulvitis of little girls, and noma, are mostly found after measles, and diphtheria, when found after the same eruption, is more apt to destroy life, with general symptoms. In many cases of localized diphtheria, however, the constitutional symptoms are but few, provided that effective local treatment is immediately resorted to. Absolute cleanliness of the parts, sponging and bathing, is first in order, after that, local disinfection. Applications of lime-water will suffice for mild cases; solutions of one or two parts of sulpho-carbolate of zinc in one hundred of water, or from one- to five-per-cent. solutions in water of acetico-tartrate of aluminium, will act well. These two may be used to advantage as a vaginal injection in the case of the smallest girls. The point of a small hard-rubber syringe can be lengthened by a thin india-rubber tube, from half an inch to an inch in length, which passes the hymen easily and permits an irrigation of the otherwise inaccessible parts. In many cases solutions of the bichloride of mercury proved successful: for occasional applications, of one in from three to five hundred of water; for frequent use, of one in from two to five thousand. Iodoform as a powder, or in from eight to fifteen parts of vaseline, has rendered very effective services.

Noma of the vulva and vagina requires more determined local treatment, besides assiduous roborant and stimulant administrations. Mineral acids in full strength, strong solutions of corrosive sublimate, have proved efficient in many cases in which the progress of the disease was not too rapid. I have had most successes with the actual cautery. Pyoktanin I have used lately in a case of noma of the face, and in one of the vulva, and found it absolutely worthless.

Paraphimosis results from manipulation. The separation of the epithelial congenital adhesion and the dilatation of a phimosis are liable to be followed by œdematous swelling. In both cases the prepuce must be drawn back over the glans. If that be omitted, the prepuce—relatively long in the child—becomes swelled, and often gangrenous. Fortunately, the penis itself is not often drawn into that process. For the purpose of reduction, the glans penis, which is considerably swelled, is persistently compressed by both hands while the prepuce is drawn forward. A good deal of force is sometimes required, and not infrequently an anæsthetic. Sometimes gradual compression by bandages (cotton or rubber) must precede the attempt at reduction; in some cases, however, a careful incision of the prepuce, the more careful when no director can be introduced between glans and prepuce, is unavoidable to relieve the constriction.

The treatment of the more common forms of *balanitis* and *balano-posthitis*, occasioned by the decomposition of smegma, or masturbation, or gonorrhœa, or trauma, such as the constriction of the organ by a string, is not always quite simple. When there is much œdema it may become necessary to incise the prepuce to get at the sore surface. In most cases, however, astringent or disinfectant solutions can be applied readily either directly or through a small syringe. Solutions of acetate of lead, sulphate of zinc, alum, tannin, the sulphocarbolate of zinc, the acetico-tartrate of aluminium can be employed in different strength. Among the poor, when assiduous attention is out of the question, ointments or powders are preferable. Ointments are best made for this purpose with vaseline. Warm bathing and sponging will improve the chances of rapid improvement.

A similar local treatment is adapted to the *vulvar and vaginal catarrh* of both the adult and the infant or child. It is very common among the latter, and quite obstinate because of the

comparative inaccessibility of the parts, no matter whether the catarrh is simple or specific. The causes of the former are very various. A predisposition may depend on the structural debility, with chronic inflammation, of most tissues, which we are in the habit of calling scrofulous. Local exposure to cold, sitting on house-stoops, the irritation brought on by masturbation, or by foreign bodies, mud, cotton, carpet-fuzz, glass, wood, all of which I have found in the narrowest vaginæ; also oxyuris emigrating from the rectum, the use of soiled cloths and towels, and the neglect of the most common cleanliness, are among the most frequent causes of vaginal catarrh. Specific vaginal catarrh (gonorrhœal kolpitis) is by no means rare. The infection, though most often indirect, and conveyed by towels, bed-sheets, etc., gives rise, nevertheless, even in the smallest children, to glandular swellings, endo- and parametritis and peritonitis, also to urethritis, though the latter appears to be less common in children than in adults. That contagion should take place through the air, according to Bouchard, I have never been able to observe. Besides the local treatment, in conformity with the details given above, absolute cleanliness of the body and clothing, and frequent (general and hip) baths are required. Masturbation must be guarded against, and foreign bodies sought out and removed. Rectal oxyurides require injections with water, or garlic decoctions, or cod-liver oil. They must be frequently repeated, and resumed after the intermission of weeks, because of the repeated immigration into the rectum from the upper parts of the intestine, where the nematoid has its habitat. In specific cases the transmission of the virus to the eyes and to other persons must be guarded against. To reach the recesses of the vagina, partial or total removal of the hymen has been advised; but I have met with no such indications. Besides the solutions enumerated above, nitrate of silver has been advised. I have used it, in solutions of one in from five hundred to a thousand, in a number of cases of ulcer-

ative catarrh. In some the restitution of the superficial losses of substance appeared to be more rapid. In stronger solutions and in substance it has been employed in tubercular ulcerations, in reference to which I have no experience. In many cases of vaginal catarrh the surrounding parts are sore and suppurating, or eczematous. Lead or bismuth ointments, or bismuth powder, with or without salicylic acid, will effect a cure of that complication.

A frequent result of vaginal catarrh of long standing is a moderate degree of *atresia* of the vagina. It is usually of an epithelial character only, and can be remedied by tearing the adhesion with both hands, or by piercing with a probe and dilating the artificial opening. Astringent applications will prevent the renewal of the closure. Diphtheritic inflammation of the vulva and vagina I have known to result in pretty firm occlusion. In one case the reopening required some force, and the continued use of bougies and astringent applications to prevent a repetition of the union. The *imperforate condition of the hymen*, mostly congenital, is but the same process of epithelial and inflammatory cohesion accomplished during fœtal life. According to its early or later formation, and according to the presence or absence of vaginal complications, it requires either the probe or the knife. Such a complication is mostly the result of either an arrest of development or inflammatory malformation. An early adhesive inflammation of the vagina will obstruct it in its entire length, or a transverse obstruction of the ducts of Müller may produce an absence of the vagina below the external os uteri.

Vaginal hemorrhage, of a slight degree, has been observed in the newly-born, without any complication, least so with bleeding from other organs. It is mostly very slight. In masturbating infants and children, and some of those who suffer from a severe vaginal catarrh, some blood may be noticed. It requires no special treatment; nor was there an indication or

an opportunity to interfere in the very rare cases of genuine menstruation in the very young, which have been reported.

In connection with vaginal catarrh I mentioned *masturbation* as one of the causes. Still, it is not only a cause in some cases; in many others it is its effect. Indeed, masturbation is so frequent that a few words on the subject may be deemed permissible at this place. But lately, in the April, 1890, number of the *Archives of Pediatrics*, a clinical lecture of mine was published. There, and in a previous essay published in the *American Journal of Diseases of Children and Women*, of 1875, I demonstrated the frequency of that habit in infants and children; more in girls of the earliest infancy, more in boys of advancing years, and a variety of causes leading to it. Such are local irritation (sometimes by nurses) of the genitals in the very youngest, excitation in those older, feather beds, excess of animal food, and stimulating beverages, rancid smegma, eruptions on the penis, vaginal and vesical catarrh, renal calculi, preputial adhesion, phimosis, oxyuris, and constipation. Among remedies, I recommended the relief of the causes as enumerated, and partly alluded to in the course of these remarks: cooling diet and coverings, attention to kidneys, bladder, and rectum, relief of external irritation by clothing, removal from the bed upon awakening, cold bathing and sponging, mechanical prevention, and timely punishment.

Cryptorchis is the absence of the testicle from the scrotum. Normally it descends in the ninth month of utero-gestation, or during the first weeks of extra-uterine life, but sometimes at a later period, or not at all. In the latter case, particularly when incarcerated in the canal, it is apt to undergo malignant degeneration. When in its descensus it gets under the femoral arch, resembling a crural hernia, or to the perineum, it is subject to inflammation, and requires the application of ice, and occasionally a local depletion, or a puncture for the relief of effusion; and sedatives for the removal of reflex convulsions.

In most cases of incomplete descensus the testicle is found in the inguinal canal, slightly movable, and often complicated with hernia. No matter whether this complication is present or not, the treatment consists in the application and constant wearing of a truss so adjusted as to keep the testicle below and the intestine above. Its effect can be enhanced by frequent and gentle massage. This simple treatment I have found effective in so many cases that Ashby and Wright's advice—not to rely on it, but to operate and either fix the testicle below or remove it altogether—appears to me almost incomprehensible. Indeed, I can approve of their view only in those cases in which the testicle and intestine are bound by adhesions.

Orchitis is occasionally found in children. The acute form is either traumatic, or alternates with parotitis, or no cause is obvious. The treatment has to be conducted on general principles, and consists in the local use of ice, of purgatives, and, occasionally, of antipyretics and narcotics. Leeches resulted, in a few of my cases, in extensive swelling of the scrotum. Chronic orchitis is mostly combined with epididymitis, the result of trauma combined with a scrofulous disposition. It is apt to lead to induration, caseation, and tuberculization. If that occurs, the organ ought to be removed to avoid general tuberculosis.

Primary *tuberculosis* appears to begin mostly in the epididymis, and requires removal, as well as *dermoids*, *sarcomata*, and *carcinomata*. Of the latter, I have lately seen a case in a boy of four years. It was removed nineteen months ago, and no new local trouble has arisen. Not even the lymph-bodies of the neighborhood are attacked, but the disease appears to have invaded the lungs.

Syphilis of the testes requires a strict anti-syphilitic treatment. There is no objection to the internal administration of mercurials and iodides; but in the first few weeks a daily hypodermic injection of a soluble mercurial salt will improve the chances of recovery.

Hydrocele is a frequent occurrence. A few drops of serum are normally found in the tunica vaginalis propria. Larger accumulations of serum are met with in more than ten per cent. of all male infants,—mostly on the right side, seldom on both. In the majority of cases there is no longer a communication with the abdominal cavity. When it remains, a hernia may complicate the hydrocele, and the diagnosis may be more difficult because, in such a case, the fluid is apt to return occasionally into the abdomen. Spontaneous absorption is not very rare, and suppuration uncommon. I have injected alcohol and diluted tincture of iodine, and setoned the scrotum with either silver wire or silk. All of these methods are bad. Simple punctures, one or more, made once or repeatedly, will allow the escape of the fluid, which frequently does not return after the first procedure. It is best to dislodge the integument a little, so as to have no direct escape of the serum. The cases in which the communication with the abdominal cavity is still patent require the application of a truss after the serum has been allowed to previously return to the abdomen.

The *pseudoplasms* of the young female urogenital organs offer no special indications of their own. Tumors of the ovaries were mostly found, on operation, to be dermoid cysts, and very rarely carcinoma or tuberculosis. The same and sarcoma are but rare occurrences in the vagina. Cysts have sometimes been found above the hymen, and soft *polypi* more frequently in the *urethra*. They are either easily recognized or mistaken for a simple prolapse of the urethral mucous membrane. They give rise to vesical tenesmus and dysuria sometimes, and also to (mostly slight) hemorrhages. Evulsion, chromic acid, the scissors, and the actual cautery, now and then two of these means combined, have been used. Ligature never succeeded in my hands. It would always cut through at once, produce some bleeding, and necessitate at once some other method.

VIII.

DISEASES OF THE RESPIRATORY ORGANS.

Acute nasal catarrh (acute catarrhal rhinitis) is found either as a sporadic or epidemic ailment; the latter is rarely depending on erysipelas, still less frequently on gonorrhœa, more frequently in influenza, measles, or whooping-cough. The sporadic form is sometimes local and unilateral; in that case it has a local cause, such as a traumatic lesion, a foreign body; when bilateral and general, it is mostly the result of sudden thermometric or barometric changes, or exposure. Now and then the irritation of trifacial branches of the maxillæ will, when dentition is abnormal or unusually difficult, give rise to vaso-motor and secretory changes of the nasal mucous membrane, which is supplied with ramifications of the same nerve. Acute nasal catarrh may be attended with high temperatures, considerable swelling, and obstruction (thus rendering respiration extremely difficult, particularly when the patient is newly born or quite young), and secondary affections, such as swelling of the cervical lymph-bodies, acute pharyngitis, amygdalitis, and otitis. The indications for treatment are various: the local hyperæmia and swelling is to be reduced, the secretion to be removed, fever to be relieved, and secondary affections either to be prevented or treated.

Hyperæmia and swelling may prove dangerous to very young babies. In them the nasal cavities are narrow, and so easily obstructed by an acute catarrh that now and then a newly-born infant that has not yet learned how to breathe through the mouth is in danger of suffocating. Some of the cases require constant attention; day and night the mouth must be kept open by gentle pressure on the chin to enable the little patient to breathe through the mouth until the nares become

viable. Particularly in cases where the mucous membrane is thickened from birth, or a nasal polypus is present, or a swelling of the pharyngeal or the palatine tonsils, the danger of suffocation is great. In a single case have I been compelled to apply the galvano-cautery to the left nasal cavity of a newly-born whose acute catarrh obstructed the narrow channel. Astringent solutions are indicated for a similar purpose, or ointments which may be applied by means of a camel's-hair brush. Still, I cannot express much satisfaction at the effects obtained. Better is a two-per-cent. solution of hydrochlorate of cocaine, which may be applied with a brush, or by means of the atomizer, from time to time. Camphor inhalations have been praised. The secretion must be removed now and then by wiping out the nose and bringing on sneezing. The wiping out may be done with a probe covered with absorbent cotton, the latter to be introduced dry, or moistened with an alum or cocaine solution. The passage may also be kept viable by a physiological salt solution (1–130), or an astringent, or disinfectant wash of alum, sulphate of zinc, subnitrate of bismuth, and boracic acid. The latter is not always satisfactory. In most cases, it is true, it acts very mildly, but I have seen catarrhal secretions increased by it. These applications may be made in different ways. An atomizer, the nozzle of which is covered with a small piece of india-rubber tubing, will do no harm; injections, unless made very gently, are liable to injure the ear; irrigation by merely emptying a pipette or a small spoonful of a solution into the nostril will prove satisfactory. Otherwise the rational general treatment of a catarrh may be resorted to: moderate temperature of the room (68°–74° F.), moist air when the secretion is thick and viscid, or scanty, an occasional warm bath, a dose of quinia about noon if there be a considerable rise in the afternoon, an occasional dose of phenacetin or antipyrin during the day or small doses of the tincture of

aconite at intervals of two hours; probably a single dose of opium as a sedative and diaphoretic, late in the evening.

Chronic nasal catarrh derives its therapeutical indications from its many occasional causes; for instance, frequent returns of acute catarrh, dusty, cold, and moist air, the pressure of a foreign body, or the deviation of the septum. This condition may be congenital, even hereditary, or due to a fracture of the septum, or to its dislocation from the ethmoid, or vomer, or superior maxilla. It results in obstruction, and behind it in accumulation of mucus which disintegrates and irritates. Other causes of chronic nasal catarrh are enlarged tonsils, chronic pharyngeal catarrh, and adenoid vegetations, with their influence on respiration, digestion, the sense of smell and taste, and intellectual development. Scrofula, tuberculosis, and syphilis, with their effects on mucous membranes, bones, and cartilages, are frequent causes of chronic nasal catarrh. Less frequent are the effects of furunculosis, which is rarer than in the adult; of croupous inflammation; of diphtheria of the nose, which may be met with independently of pharyngeal diphtheria or ushering it in; or of eczema of the upper lip.

Syphilis, tuberculosis, and scrofula have their own indications. Thus, a chronic rhinitis occasioned by these demands mercury, arsenic, creasote, cod-liver oil, iron, phosphorus, according to general rules. Abscesses are to be opened, the small furuncles incised, necrotic bones removed. Foreign bodies must be extracted, adenoid vegetations removed, and hypertrophied tonsils resected, or—in occasional cases—treated with the galvano-cautery. Many a case of chronic nasal catarrh will be relieved, or nearly cured, by these measures, or, on the other hand, there is many a case of chronic pharyngitis which gets well through the treatment of the nasal catarrh. Indeed, there are very many of these complications in which the determination of the primary seat of the affection is very difficult, or even impossible. If there be a considerable devi-

ation of the septum, not to speak of the excessively rare cases of bony union, it must be corrected. In very young infants that correction can be accomplished by manual pressure. The cleansing of the nasal cavities is of at least as much importance as in acute catarrh. They must be washed out from two to four times a day with some warm fluid. According to the case, this may be salt water, or a solution of boracic acid (two to four per cent.), or alum (half per cent.), or acetico-tartrate of aluminium (one per cent.). The same precautions must be used which were advised above. If larger quantities of the fluid be used the injection must be made very gently, and the child taught to keep its mouth comfortably open. Chlorate of potassium has been used in solutions of from one to three; resorcin, of two per cent.; creasote has been applied similarly; iodine or tannin, in combination with glycerin. Cocaine solutions have been used with good results. Its immediate result is evident, and it is better than a merely temporary makeshift. What I have seen to do a great deal of good is nitrate of silver. A solution of from one-fourth of a grain to two grains in an ounce of distilled water may be sprayed into the nasal cavity once a day, or every other day. When a carious bone is underlying the chronic catarrh, an iodoform ointment (1 : 8 or 15 vaseline) may be applied several times a day, to advantage. Hypertrophy of the mucous membrane and submucous tissue, with ulcerations or granulations, add greatly to the difficulties of the case. Lactic acid in powder or strong solutions has the reputation of destroying morbid tissues, mainly granulations, and of leaving the healthy tissue intact. Still, I cannot say that it has rendered me very appreciable service in cases I considered adapted to its alleged powers. The exuberant tissue will, however, be beneficially influenced by an application, every few days, of a solution of iodine (1 : 8 or 1 : 4), of iodol or aristol, of subnitrate of bismuth, of a strong solution (ninety per cent.) of carbolic acid every

four or five days, of chromic acid once every week or ten days, and last and best, of the galvano-cautery under cocaine anæsthesia. For the purpose of compressing the swelled soft tissues and correcting a deviation bougies are also used, made with zinc, tannin, or carbolic acid. I must admit that chromic acid and the galvano-cautery are my choices in the worst classes of cases. Even many cases of ozæna are doing well under their influence. Others require the frequent use of stronger solutions of nitrate of silver as a spray, or hypermanganate of potassium solutions, or acetico-tartrate of aluminium in one- to three-per-cent. solutions, or iodol or aristol insufflations, or a combination of a few of these remedies.

Polypi, either congenital or acquired through chronic catarrh, though not frequent, will be met with in every medical practice. They are either soft and consist of mucous membrane, or harder and are composed of a dense connective tissue. Those with an admixture of sarcomatous tissue (not often round cells, more frequently spindle-shaped cells with copious stroma) are relatively rare. The cold or galvano-caustic snare is required by those which have a rather bulky pedicle. Evulsion with a common polypus forceps suffices for those which are distinctly pedunculated, and for such as consist in the main of mucous membrane. A firm tampon is seldom required by excessive hemorrhage after evulsion. In most cases the bleeding ceases spontaneously; or a tampon of moderate size covered with powdered alum or tannin is demanded; or the cauterization of the stump with chromic acid, either dry or in concentrated solution, by means of a camel's-hair brush or a probe covered with absorbent cotton. This application may be repeated after a while to guard against a return.

Foreign bodies are often found in the nasal cavities of babies and children. Paper-balls, shoe-buttons, dry peas and beans, flies and bugs, cherry-stones, and beads are readily admitted.

Their diagnosis is by no means always easy. Chronic catarrh, being their usual result, gives rise to the mistaken diagnosis of caries, syphilis, or tumor. The cases in which the presence of a foreign body caused delirium and convulsion, and could be taken for meningitis, are, fortunately, rare. In many, chloroform anæsthesia is required to ascertain the nature of the difficulty. The consecutive catarrh and ulceration require mild or disinfectant washes or injections; pincers, or the ear-spoon, or Daviel's spoon will generally suffice to dislodge the foreign body. When the symptoms are urgent (convulsions, high fever), an ala nasi has been incised to facilitate the required extraction.

Epistaxis depends on the rupture of one or more blood-vessels, either large or small, normal or abnormal. A normal blood-vessel may bleed in consequence of a traumatic injury, or of an erosion by chronic catarrh, ulceration, diphtheria, or syphilis. Bleeding from the nose may point to the presence of a polypus, or be the indication of obstruction in distant parts of the circulation in the abdomen, the lungs (chronic pneumonia, emphysema), the thyroid body, or by cardiac disease. The compression of the abdominal viscera by enforced confinement in the school-room, overheated and ill-ventilated at that, and consecutive constipation are a frequent cause of epistaxis. Blood-vessel walls become abnormally fragile in constitutional and infectious diseases, such as early chlorosis, tuberculosis, hæmatophilia, leucocythæmia, general amyloid degeneration; in purpura, scurvy, and typhoid fevers. Perhaps the most obstinate form of epistaxis, which is fortunately infrequent, is that which depends on the congenital incompetency of the heart combined with smallness of the large arteries, and results in the most serious cases of chlorosis. All these different causes of epistaxis suggest their own indications. The constitutional diseases resulting in local hemorrhage demand such management as has been indicated

in other essays of this series. All of them may require local treatment. It is obvious that in every case of epistaxis the congestion of the nasal mucous membrane must be diminished if possible, and the formation of a clot must be facilitated. By raising the arms over the head, and forced inspiration, the chest is expanded and a large amount of blood accommodated in it; hot hand- and foot-baths have been resorted to for a similar purpose. Ice may be applied to neck and throat, pieces of ice introduced into the bleeding nostril. The local use of water (injection, washing) is not desirable, inasmuch as it is liable to prevent the coagulation of the blood on the bleeding surface. Solutions of alum or tannin will answer better. The use of a tampon is often required to stop the loss of blood. The introduction of a wick of absorbent cotton, or lint, by means of a pair of fine pincers, or, better, by loosely wrapping it round a smooth probe (whalebone or other), or of the same covered with alum or tannin, or soaked with perchloride or subsulphate of iron ("hæmostatic cotton"), will sometimes prove satisfactory. In but a few will it be found necessary to close the whole cavity from either side, by means of a tampon introduced through the mouth into the posterior nares, at the same time obstructing the nose anteriorly. This procedure is not so annoying and irksome as it appears to be, because in but a few cases nose-bleeding is bilateral.

Chronic catarrh and ulceration of the nares must be treated according to the principles taught above, and the most frequent causes of epistaxis among children attended to according to their own indications. I cannot impress too much the necessity of attending to the intestinal congestions and disorders of school-children. Constipation of a lifetime is often the result of the cramped position on an improper chair or bench, and of the inability to evacuate the bowels at the proper time. Children suffering from constipation, particu-

larly those who are affected with what I have described as congenital constipation, may require this daily injection and may be benefited by an occasional (vegetable) purgative. This is sometimes all that is required to relieve their epistaxis. That many are relieved only when taken from school and allowed the free use of their limbs in open air is self-evident. Another large class of nose-bleeders is that which originally suffered from chronic pneumonia or chronic heart-disease with general and persistent anæmia. Very many of these cases improve instantly under the sufficient use of digitalis and iron.

Acute laryngeal catarrh, acute laryngitis, is too common a disease to justify in these pages a discussion of its etiology or diagnosis. In regard to the latter, I refer to a single point only, —viz., that of the temperature, which is always elevated. An *uncomplicated* acute laryngeal catarrh is always attended with fever, while an *uncomplicated* laryngeal diphtheria ("pseudo-membranous croup") is not so accompanied. Dozens of years ago I brought out this fact, and a large experience has since convinced me of its reality. The other symptoms are unmistakable, from the different degrees of dyspnœa to those of hoarseness or aphonia. The treatment requires the most perfect possible rest. Talking must be prohibited, crying avoided if feasible. For that reason, if for no other, opiates are indicated; partly to relieve the local irritation which produces cough, and partly to secure sleep for the purpose of equalizing circulation and resting the excited muscles. The temperature of the room ought to be equable, from 68° to 75° F., the air moist. The latter eases the large windpipes and procures recreation, while dry and cold air increases metamorphosis. Whatever beverages are given must be warm. A general warm bath, warm applications (hot water, poultices, cold applications which are permitted to become warm), are both pleasant and beneficial. Plenty of water ought to be furnished, mild alkaline mineral water by preference. An

infusion of ipecac with bicarbonate of sodium, in small and frequent doses, will aid in liquefying a viscid mucous secretion.

The worst form of the acute catarrh of the larynx gives rise to attacks of dyspnœa ("croup"), which occurs quite frequently in the night after the children have been asleep for some hours. The drying up of the pharyngeal mucus is very apt to give rise to both cough and dyspnœa, and therefore it is a good plan to wake the patient from time to time sufficiently to make him drink. Average moisture of the air may not be enough. Water ought to be kept boiling constantly, so as to fill the air of the room (or a tent, which ought to be spacious) with steam. Spraying the throat with cold water is useless compared with the effect of warm vapors. That leeches, which I used sometimes in bad cases of feverish and croupous catarrh, thirty years ago, ever resulted in any good I am not prepared to say. But a promptly administered emetic (ipecac, sulphate of zinc or copper, turpeth mineral, apomorphia) has often relieved the spasmodic dyspnœa accompanying these (mostly nocturnal) attacks of pseudo-croup. The effect of emetics, however, and their indispensability have often been exaggerated. Mostly, they are less required for the relief of the babies than for tranquillizing the fears of the mother and allowing the family physician to stay in bed.

Chronic laryngeal catarrh may develop out of a protracted acute catarrh, or the affection may be primarily mild, but result at an early time in thickening of tissue. Even at the earliest age this process may be observed. One such case I saw with Dr. Hopkins, of Brooklyn, in a newly-born baby, which got well after the protracted daily administration of a few grains of iodide of potassium, after several months only. Constant warm applications, or cold ones which are permitted to become warm, will favor absorption. Those which are complicated with, or perhaps dependent upon, a chronic laryngeal catarrh are often favorably influenced by the use of

tincture of pimpinella saxifraga, half a drachm or a drachm of which may be taken daily, in ten or twelve doses, in a solution of chlorate of potassium, in such a way that the dose of the latter be a cautious one, and the dilution in water of the tincture be not excessive. This drug has long been "obsolete," but deserves to be reappointed to its former place in practice. The majority of such cases will do well when being treated with solutions of bicarbonate of sodium or iodide of potassium.

Diphtheritic laryngitis, pseudo-membranous croup.—It is not necessary to discuss here pathological questions, or to reassert the histological identity of diphtheria and "croup." When pharyngeal diphtheria has reached the larynx in its descent, or bronchial diphtheria resulted in its ascent in sudden laryngeal stenosis, the usual antidiphtheritic treatment avails but little. That neither general nor local depletion has any effect, except that of hopelessly reducing the patient's strength, has long been recognized; also, that vesicatories add a new diphtheritic membrane on the surface to those on the mucous membranes. Emetics are of no use unless a peculiar flapping sound betrays the presence of half-detached membrane in the air-passages. In such a case they are apt to save life. At all events, I have never been so fortunate as to observe the universally beneficent effect attributed to their frequent administration in an average case. Massage of the larynx has been recommended by Bela Weiss. I cannot say that the few cases in which I advised the procedure were successful; it may be that the constant repetition of the advice to use mercurial or other ointments over the larynx is based on the observation of an occasional good effect of the friction ("massage") attending their employment. Locally, lactic acid, in more or less saturated solution, has been eulogized as a solvent of the membranes in the larynx, when often applied either by brush or spray. Most of the cases

in which I have seen it used were not successful, but this untoward result is, unfortunately, not exceptional. I have seen, or believe I have seen, papayotin (1) to dissolve membrane when applied in a mixture of glycerin and water (āā 2). Particularly would that occur in pharyngeal diphtheria slowly descending. Lime-water is still used as a spray and has its admirers. Lime slaked in a small room, or under a tent, is decidedly more effective, for during that process a large quantity of lime is carried up and is inhaled; at the same time the softening and solvent effect of the steam is obtained. The latter is not always as beneficent as it appears. In many the application, externally, of cold water to the neck, or ice-bags, is vastly preferable. But in most cases of anæmic and highly-nervous children the latter are not tolerated. Constant inhalations of turpentine, or carbolic acid, from a kettle containing boiling water have impressed me as beneficial in a large number of cases. In the foundling asylum (service of Dr. Reid and Dr. O'Dwyer, Dr. Clark, house physician) I have observed a good effect in a few simultaneous cases of the inhalations, by heat, of calomel.

The patient remains in bed as much as possible, and may continue such expectorants as he perhaps took for previous catarrhal symptoms; may also take diaphoretics, warm beverages; an occasional opiate for that indication and to procure some rest. The continuation of chlorate of potassium, when the invasion of the larynx is complete, is rather superfluous. Antipyretics are out of the question unless there is a very high temperature depending on a complication (general diphtheria, pulmonary inflammations). Pilocarpine injures by debilitating the patient; the cases which are really benefited by it are excessively rare. Mercurials have resulted in more actual recoveries than any other internal treatment. The cyanide and iodide have been recommended. For ten years I have employed the bichloride in doses of a milligramme

($\frac{1}{60}$ grain) or more once every hour. The smallest babies take one-fourth or one-third of a grain daily for days in succession easily. Almost never will a stomatitis follow, and no gastric or intestinal irritation, provided the dilution be in the proportion of at least one in eight thousand. An occasional slight diarrhœa may require the addition of a few drops of paregoric. I can repeat a former statement, that never have I seen cases of croup getting well in such numbers, either without or with tracheotomy or intubation, as with mercurial treatment. When this treatment proves unsuccessful, intubation or tracheotomy must be resorted to. A small, frequent, and intermittent pulse, aphonia, cyanosis, and marked retraction, with every inspiration, of the supra-clavicular fossæ and the epigastrium, are the indications for the operative procedure. I shall not here be tempted to defend the two operations; I shall not even be tempted to discuss the criminality of allowing a child to suffocate without resorting to mechanical relief; or to compare the two operations with each other. I can only say that for years I have not seen a case in which intubation would not take the place of tracheotomy, and have therefore not performed the latter. Intubation has come to stay; it is not one of the many temporary devices which have been brought out to be instantly forgotten. In most cases it takes the place of tracheotomy; in none does it make it impossible when required in the opinion of the operator. The latter operation may be preferred or become necessary for the purpose of getting at the trachea and bronchi for the mechanical removal of membrane and other local treatment, rare though the cases be in which such procedures are attended with success.

Neurotic affections of the larynx of infants (and children) are quite frequent, particularly *spasm of the glottis*, under the influence of the inferior laryngeal nerve, which controls both the contractors and the dilators of the glottis. The treatment

is directed by its manifold causes. In neuropathic families the hygiene of the infant is of the utmost importance. Fresh air, cautious exposure to cool or cold water, and early addition of liquid animal food to mother's milk or to the artificial feeding are of importance. Rhachitis, being the most frequent cause of laryngismus stridulus (p. 103), requires early attention; digestive disorders must be corrected, and the general irritability relieved by bromides or camphor. Monobromate of camphor may be given for weeks in daily doses of from one to three grains. Emotional disturbances must be avoided. The attacks (some beginning with apnœa, mainly those of laryngismus stridulus) must be watched, the baby taken up so as to ease the larynx, the head raised, the tongue (if aspirated and doubled up) drawn forward, the throat tickled, water dashed into the face, and chloroform inhaled if the local spasm be followed by a general convulsion.

Paralysis of the glottis is not so frequent; in the infant quite rare, and very rarely congenital. Diphtheria, hysteria, and cerebral diseases may give rise to unilateral or bilateral paralysis, anæmia may create a predisposition, glandular swellings prove a proximate cause. Complete paralysis depending on that of both posterior muscles produces a very severe dyspnœa, which is relieved during expiration and cannot be tolerated long. Intubation or tracheotomy may be demanded for immediate aid. Otherwise, attention to the predisposing causes, reduction or removal of glands, and mainly the systematic application of the interrupted current through the breadth of the larynx will offer relief and gradual, sometimes rapid, recovery.

Neoplasms of the infant's or child's larynx are by no means rare. Many of them are congenital; mostly so the numerous *papillomata*. *Fibromata* and *enchondromata* are also met with, and *epithelioma* has been observed. Sometimes they develop their first symptoms after an incidental inflammatory

affection. The rules for their removal are about the same as in the adult, only the latter are more amenable to operations through the mouth. Indeed, none but older children can be thus treated, and in exceptional cases only. Laryngotomy is performed with or without previous tracheotomy, according to surgical rules, exactly as for the extraction of foreign bodies. There is one danger more urgent in infants and children than in adults; that is hemorrhage, slight or copious. Blood flowing down into the narrow air-passages, even in small quantities, is liable to result in lobular pneumonias of a dangerous character. In order to facilitate the exit of a *foreign body* from the trachea or the bronchi after tracheotomy, it is best not to introduce a tube, except temporarily. The trachea may then be sewed to the integuments, or may be kept open by hooks joined by an elastic band, according to A. Caillé.

Congenital stricture of either the larynx or the trachea (rare, fortunately) may be mistaken for laryngeal tumor.*

Diseases of the *thyroid gland* are not often observed in infancy and childhood; still, even *carcinoma* and *tuberculosis* have been noticed. *Syphilitic gummata* have been found, and would, if diagnosticated, demand specific treatment. *Atrophy with myxœdema* has been reported in a girl of twelve years; its treatment consists in the administration of thyroid gland. *Inflammation* has been known to follow trauma and infectious or common catarrh of the nose and naso-pharynx. The treatment should consist of local applications of ice, hydrotherapeutic measures in general, saline purgatives, irrigations (both cleansing and antiseptic) of the nares and pharynx, and perhaps iodine both internally and externally during slow absorption. *Goitre*—struma—is mostly met with in the lateral lobes, and therefore is not liable to annoy respiration until it becomes

* The contiguity of the thyroid and thymus glands will explain their being treated of at this place.

very large ; should it do so, it compresses, particularly when behind the sternum, the trachea, vessels, and nerves. The usual forms found in the adult (lymphatic, cystic, even colloid and fibrous) are observed. When congenital, it is apt to be absorbed ; the age of puberty also predisposes to spontaneous decrease. Most cases presented were in children from seven to ten years old. An occasional pulsation is not, of itself, pathognomonic of Graves's disease. An epidemic—infectious and contagious—form of goitre has been observed in schools, but was only a temporary ailment. Tincture of iodine, strong or modified, may be applied once every few days, or iodide of potassium in glycerin (1 : 2–8), or a potassium iodide ointment with lanolin (1 : 4–10) may be rubbed in several times daily. Potassium iodide may be given in doses of from five to fifteen grains daily. With iodide of potassium injections into the tissue of the enlarged gland I have had no experience. The cystic form requires puncture with injection of Lugol's solution ; if the secondary swelling be too large and annoying, ice should be applied. Or the cyst, or cysts, may be incised and tamponed with aseptic gauze. If extirpation be preferred, it must not be total, because of the consecutive occurrence of cachexia strumipriva, tetany, and myxœdema.

Diseases of the *thymus* gland are not yet amenable to treatment. Inflammations, abscesses, syphilis, tuberculosis, sarcoma, lymphadenoma, and carcinoma have been observed. Its physiological dignity for the fœtus and young infant is certainly great. Nearly forty years ago Friedleben proved that it cannot be done without, simultaneously with the spleen. It is largest (normally) from the third to the twentieth month ; about the ninth month it was found, in abnormally large cases, 1.5–2 centimetres in thickness. As the distance between the manubrium sterni and the vertebral column is but two centimetres about the eighth month of life, the slightest increase of an enlarged thymus through disturbed circulation, by crying or

otherwise, may prove suddenly fatal. Such cases have occurred, though laryngismus stridulus does not, in the vast majority of cases, depend on the condition of the thymus (p. 103). It has been found persistent in many (all ?) cases of acromegaly and local gigantic growth.

Bronchial catarrh, bronchitis, in all its localizations, from the windpipes of large size down to the capillaries, requires an equable temperature of about 70° F., moist air, and rest in bed, though there may be no fever except a slight one towards evening. Plenty of water,—no ice,—preferably alkaline mineral waters, must be given; older children may be prevailed upon to take gum-arabic water, flaxseed tea, or other glutinous decoctions which relieve the accompanying pharyngeal irritation. Mitigated mustard-plasters (mustard 1, flour 4 to 8) or embrocations of turpentine are administered to advantage. Underclothing must be changed when moist with perspiration. A cotton-batting wrapper round the chest (the sheet spread out and two arm-holes cut into it) acts favorably both by keeping up a uniform temperature and by gently irritating the surface. As a rule, it acts better than warm poultices, which are liable to moisten the clothing and bedding, and thus add discomfort and the danger of a new attack. Where, however, the surface is dry, they may be applied, or, better still, in most cases, a cool sheet well wrung out of water, wrapped round the chest and changed every hour or half-hour after it has got hot. Bicarbonate of sodium from ten to fifty grains daily, according to age, and an equivalent of a grain of ipecac distributed over the day, or (and) ten or fifteen grains of ammonium chloride with extract of licorice in repeated doses during a day when expectoration is viscid and requires liquefying, will answer in most cases. Apomorphia (gr. $\frac{1}{100}$) every two or three hours will act as an expectorant, so will terpine hydrate in frequent doses of gr. $\frac{1}{4}$–$\frac{1}{2}$, particularly in chronic catarrh. Complication with asthma and in-

sufficient expectoration is benefited by iodide of potassium in daily doses of gr. iv–xv. Insufficient expectoration with general debility demands the carbonate of ammonium (gr. $\frac{1}{4}$–1) every half-hour or at longer intervals, aq. camphor (one-half to one teaspoonful) often, or camphor (gr. $\frac{1}{6}$–i) every half-hour to every two hours. The German preparation of liquor ammon. anisatus has been introduced into the Formulary of the American Pharmaceutical Association; from two to six doses may be taken every hour or two hours. Accumulation of mucus in the bronchial tubes, with inability to expectorate and danger of suffocation, may demand an emetic, and asphyxia cold affusion and raising the infant and carrying him about: frequent change of position is advisable in every severe case. When, in bad cases of capillary bronchitis, cyanosis is on the increase, and the voice has not been heard for some time, it is absolutely necessary to make the baby cry. Slapping with a wet handkerchief, swinging, or closing the nares for a few moments, and all the means recommended for the asphyxia of the newly-born, are demanded. The interrupted electric current may be used with the rules and restrictions recommended above (p. 42). Cough, when irritating and harassing, requires narcotics. Small doses of an opiate at regular intervals, or (and) a larger one at bedtime, or repeated doses of extr. hyoscyam. (gr. i–iss altogether) through the day, and an opiate for the night, act very beneficially.

The *chronic* form of bronchial catarrh demands similar medication. Preventive measures are the habitual use of cool or cold water and the treatment of such constitutional disorders —for instance, rhachitis—as are known to create a predisposition. Terpine hydrate, and terebene in ten- or twenty-drop daily doses will act well. Chloride of ammonium may be evaporated on a hot stove or tin and inhaled. Turpentine inhaled with steam or spread on sponges or towels is also useful. The pneumatic treatment (inhalation of compressed air) has been

recommended again by Biedert. The frequent complication with pharyngeal catarrh demands the local treatment of the fauces; a mild solution of nitrate of silver (1 : 500) may be used as a spray. When tuberculization is feared, the protracted use of cod-liver oil, guaiacol several times daily, in drop or two-drop doses, and creosote, together with a change of climate, preferably moderate altitudes, are indicated.

Fibrinous bronchitis is by no means so rare as it was formerly reputed to be. Indeed, during epidemics of diphtheria it is not uncommon. Still, the pseudo-membranes found in the bronchi are not always of the same nature. While some are diphtheritic, others consist of dry and coagulated mucus resembling the membranes of "enteritis membranosa." In accordance with this difference of the prevailing condition, a case may last days or months. Antipyretics are still less indicated than in the common forms of bronchitis. Inhalations of steam, frequently repeated or kept up constantly in urgent cases, inhalations of turpentine with or without steam, of chloride of ammonium, often repeated, and fumigations through one or two days of from five to fifteen grains of calomel every hour or every few hours, under a tent, will act well. The internal use of iodide of potassium in daily doses of from ten to fifty grains, and in cases of undoubted diphtheria, of the bichloride of mercury as required in diphtheritic laryngitis (p. 319), are indicated and useful.

Bronchial catarrh, croup, and some forms of pneumonia are proximate causes of a collapse of pulmonary tissue, *atelectasis*, the congenital variety of which has been treated of before (p. 44). The predisposing causes are general atrophy with its muscular debility, and rhachitis through its narrowing the shape of the thorax. In this condition, replete as it is with urgent danger, the baby must be carried about, the posture in bed must be changed frequently, he must be made to cry, electricity must be used, and, besides an occasional emetic, stimulants such as

alcohol, camphor, ammonium carbonate, and musk should be employed frequently and copiously.

The epidemic bronchitis, *influenza*, can be prevented only by avoiding contagion, which is even more difficult than it is to escape measles. Its treatment depends a great deal on the variety; gastric and intestinal symptoms require early attention, for nervous exhaustion is imminent in every case, and many patients suffer more seriously from the sequelæ than from the original attack. Still, antipyretics cannot always be avoided. Phenacetin, antipyrin, and salicylate of sodium may be thus employed, particularly when muscular pain is one of the prominent complaints. Quinia also finds its ready indication. Opiates are often required, either in small and frequent doses or in a single larger dose to secure sleep. Inhalations of steam, two per cent. of carbolic acid having been added to the water, have been highly recommended, but whatever adds to the bronchial irritation and produces cough must be avoided. Rest in bed is required long after apparent recovery, for nervous symptoms are liable to appear during convalescence.

The nature and symptoms of *asthma* do not differ from those of the same affection in adults; nor does the treatment. Peribronchitis, emphysema, and nasal reflexes are the main causes, and must be attended to. In the latter class of cases brushing the mucous membranes of the nose and pharynx with a cocaine solution of from two to ten per cent., or the use of cocaine spray, may, in appropriate cases, relieve an attack; the cauterization (actual) of the hypertrophied tissue and the removal of a polypus may occasionally be the only things required for an actual cure. Unfortunately, this class of cases is not so numerous as it was believed to be a number of years ago. Those depending on peribronchitis and emphysema are more frequent. In them the protracted use of three daily doses of from two to five grains of potassium iodide, together with a sufficient bedtime dose of chloral or

of an opiate to meet the night attack, will have favorable results. Tincture of lobelia, two or three drachms, fluid extract of quebracho or of grindelia, one drachm daily, will often have a beneficial effect in high degrees of dyspnœa. The inhalation of stramonium, of nitrate of potassium paper, or of pyridin vapors is often resorted to; unfortunately, with so little permanent result as to give any number of proprietary medicines and nostrums a large field of activity.

The *periodic night cough*, described as a special variety in some of the books, is either a mild attack of asthma or is pharyngeal or tubercular; most pharyngeal coughs, however, are met with in the morning, after waking up. These nocturnal attacks may be obviated by a drink of alkaline water at bedtime, to be repeated at every waking up, and by a dose of a bromide, or of chloral, or of an opiate at bedtime. Quinia is useless.

Emphysema of the infant lungs is often overcome by the elasticity of the pulmonary tissue, and therefore its prognosis, no matter whether produced by forced inspiration (in pneumonia) or by forced expiration (severe attacks of coughing), or even that resulting from ill nutrition of the alveoli, is not so bad as mostly in adults. Its treatment is that of chronic catarrh, and by gymnastic exercise of the respiratory muscles and general roboration. Besides, forcible expiration ought to be practised extensively; during expiration the chest wall ought to be well compressed. Snuff should be used half a dozen times daily, and copious sneezing procured. Expiration into the diluted air of one of the many pneumatic apparatuses is also recommended.

Pneumonia.—There are three anatomical varieties of pneumonia in infancy and childhood: the catarrhal or lobular, the fibrinous or lobar, and the interstitial. Nearly two-thirds of the cases belong to the first, one-third to the second, and a limited number to the third class. Not one of them, how-

ever, is always found pure and uncomplicated. Indeed, complications of the lobular with the lobar, of either of them with the interstitial, and possibly of each of the three with pleurisy, are quite numerous. The lobular form is almost always, the lobar quite frequently, preceded by bronchial catarrh, which has its well-understood sources in exposure, sudden changes of temperature, local irritation by foreign bodies, rhachitical or tubercular mediastinal and bronchial glands, measles, typhoid fever, hooping-cough, etc. Thus, the preventive treatment of pneumonia has its positive and distinct indications. Nasal catarrh is never so slight as not, possibly, to endanger the lungs. Rhachitis, glandular tuberculosis, measles, and hooping-cough must not be left alone to find their slow road to their legitimate termination for better or for worse. Every child, while well, should be armed against the results of exposure by regular invigorating ablutions and frictions with cold water, and when exposure has taken place and the consequent fever made its appearance, a warm bath, acetate of ammonia, camphorated tincture of opium, tincture of aconite, hot drinks, salicylate of sodium, or another one of the antipyretics and diaphoretics, with uniform temperature and rest in bed, may be the means of preventing pneumonia.

Acute lobular pneumonia is less a systemic disease than is the lobar form; its direct and immediate influence on the nervous and muscular, inclusive of the cardiac, systems is less marked; it is not so frequently complicated with pleurisy. Thus, there is less danger at first in lobular pneumonia; there is more at a later period, because its duration is liable to be so long as to make the prognosis uncertain. The danger may come from the heart, but it mainly lies in suffocation, which depends less on the extent of inflammatory exudation than on collateral congestion and œdema.

Interstitial pneumonia runs the most protracted course.

Fever is liable to be high and prolonged over weeks and months; recovery is but rarely complete, induration and retraction of the pulmonary tissue, with bronchiectasis, being quite common.

Thus, it becomes evident that no uniform course of treatment can be dictated either for all forms of pneumonia or for all cases. The former are several, the latter are individual. After all, the patient is to be treated, and not the Greek name of his disease. Still, there are certain rules which ought to be enforced in every case.

Insist upon absolute rest of body and mind, exclude visitors, light, and noise.

Keep the temperature of the room between 68° and 72° F. and the air moderately moist.

Let the patient select his own position.

Isolate a lobar case.

Give liquid food, and plenty of water, or lemonade, or hydrochloric acid in water.

Relieve the circulation from accessory incumbrances; a dose of calomel will facilitate the action of the diaphragm by emptying the bowels and relieving flatulency, and will diminish the tension of the arteries.

The main dangers in acute pneumonia are: high temperature, heart-failure, and suffocation, which may result from the condition either of the lungs, or of the right heart (the left not being at fault so often as it is in the adult), or of both.

What degrees of temperature may be allowed to last, and what are to be interfered with? Is it 103°, 104°, 105°? It is well understood that persistent high temperature disintegrates tissue, but this effect is not equally attained in all cases. Many a child bears 104° quite easily, while others succumb to 103°. Moreover, a temperature which is badly borne the first day or two appears to be an indifferent matter afterwards. Thus, antipyretic treatment may be indicated at

first and be no longer required later, particularly in those cases which exhibit a decided morning remission; for it is mainly a persistent height of temperature that is injurious, not its occasional, though regular, rise. Thus it is that, for instance, relapsing fever, with its enormous temperatures but complete intermissions, has but a small mortality.

The habit of depressing temperatures in all cases which exhibit a temperature of 103°, or thereabouts, is bad; it is not the temperature that is injurious, but the absence or insufficiency of resistance that the tissues offer to its action. To lower temperature we have a number of remedies. The latest additions to our antipyretic treasures are very well known and too universally employed. Phenacetin, antipyrin, and acetanilid have more frequently lowered temperatures than they have saved lives. Their doses, uses, and dangers are well understood by all practitioners. Wherever they are found incompetent, their combination with quinine has proved more effective. The latter, by itself, is, however, no longer the *sine quâ non* which it was formerly believed to be. In all cases with marked remission it acts well, but it is during the remission only that it should be given. Half a gramme to a gramme may be thus employed. It may be used internally or hypodermically. Now and then injections into the rectum, or suppositories, are required or advisable when the stomach cannot be relied upon. The preparation to be used in the rectum must be one of those which are most soluble: the bisulphate, muriate, bromide, or carbamide. No acid should enter into the solution; large quantities of glycerin are objectionable. The rectal dose should be at least fifty per cent. larger than that employed internally.

The internal administration is often hindered by the taste of the drug. Thirty parts of the compound known as elixir simplex cover the taste of one part of the sulphate, provided the mixture is made with each dose and not kept ready; thus,

the drug should be prescribed in the form of a powder, to be mixed with the elixir when needed. Preparations of coffee, either infusion or syrup, hide the taste of quinia quite well; so does, to a certain extent, licorice extract; so does chocolate. The neutral tannate of quinine is tasteless, but the dose must be two and a half times larger than that of the sulphate. The muriate agrees best with an irritable stomach, the bromide with an impressible brain. The latter is slower in producing cinchonism. The best preparation for hypodermic injections is the carbamide of quinia, which dissolves easily in five parts of water, remains in solution, and yields no deposits of quinia in the subcutaneous tissue. I have employed it for at least a dozen years, and observed serious local irritation in but one instance.

The best antipyretic is cold. Its use has been praised and condemned, as everything deserves to be that is employed either properly or thoughtlessly. Most cases will do quite well with sponging, or with friction by means of wet and cold towels. The latter plan acts both as a refrigerant and a stimulant. Cold bathing was once eulogized immensely, then abhorred and warm bathing substituted. The rationale of cold bathing is the cooling of the surface (that is, of fourteen square feet in the adult; more than proportionately in the young) with its immense surface circulation. So long as this circulation continues active, new blood will come to the surface every moment, and the whole body is thereby cooled. When it is no longer active, the heart weak, the extremities cold, cold bathing is dangerous. The rule I have prescribed many years ago was this: no cold bath for cold extremities; no more cold bathing when once, after it, the extremities remain cold or cool. In these cases after a cold bath the surface becomes colder than before, it is true; the interior, however, warmer than it was. I have reported the case of a little child, twenty years ago, who was the first to teach me that lesson.

A few cold baths had reduced his temperature and his tendency to convulsions. Then another seemed to be indicated. It appeared to render the required service, but the baby became convulsed. The temperature in the rectum had risen from 104½° to 106°. A hot bath, instantly given, restored the external circulation, and ten minutes afterwards the rectal temperature was below 102°.

A great promoter of circulation, and thereby of radiation from the skin, is surface warmth, and particularly warm extremities. Warming-pans ought always to be applied to the feet and legs when cold is to be employed. In place of cold bathing, I have mostly employed cold packing from the chest down to the thighs, the arms usually outside the pack. Nothing is easier than to wrap a baby up in a single wet towel, which is covered by a small blanket; in an urgent case it should be replaced by another one (spread out beforehand) every two or five minutes. From twenty to forty minutes' packing will reduce the temperature from 106° to 101°, and below. In many instances the rapidly falling temperature demands artificial warming immediately afterwards. When the frequent changing of the pack is undesirable, it may be allowed to remain, and frequently cooled by rubbing a piece of ice over the whole surface. If water collect under the patient, it can easily be absorbed by towels or sponges. A temperature of 108° in a baby of four months, suffering from pneumonia, was reduced to 104° in twenty-five minutes; after that it sunk rapidly to 94½°, and artificial warming of the surface was required.

From what has been said it is evident that very feeble and anæmic babies do not tolerate cold, though their temperature be ever so high; in such cases a warm bath, or tepid packs either with water or alcohol and water, or a warm bath gradually and gently cooled down while the little body is constantly being rubbed, should take the place of the cold pack; or cold applications to a part, perhaps the anterior aspect of the

chest, are found to suffice. They both reduce temperature and relieve local pain. In many cases a light ice bag over the heart acts both as a refrigerant and a stimulus to the organ at the same time.

The acceptance of these views I urgently recommend to those to whom they are in part new. Before and after 1870, when I recommended (*New York Medical Record*) cold water in typhoid fever, scarlatina, variola, ophthalmia, diphtheritic conjunctivitis, diphtheria, lobar and other pneumonia, heart-disease, local inflammations, phlegmon, synovitis, and peritonitis, I had ample opportunities to test what I am here advocating. Those who want to inform themselves thoroughly on matters connected with this subject I refer to Dr. Simon Baruch's well-known book.

The heart furnishes urgent indications for treatment in many cases of pneumonia. When in a healthy condition, its innervation and force are not easily disturbed; still, every pulmonary disease taxes its powers. Lobar pneumonia requires cardiac stimulation at an earlier period than the lobular kind. There is none, however, but demands it at some time or other. That being the case, I earnestly advise *not to wait*, for heart-failure is more easily prevented than cured. Be our treatment ever so expectant, it must not be indolent and indifferent. In order to correct the faulty pulmonary circulation the heart must be stimulated at an early period. But how?

Alcoholic beverages are employed for this purpose by many, for alcohol is certainly a cardiac stimulant; it is believed by many to lower arterial tension,—a function which is doubtful, at least in pure inflammatory disorders; moreover, it is believed to be an article of food. In the small quantities in which it is administered it certainly is not. Much of it is eliminated unaltered through the lungs, which are thus burdened with that additional labor while in a condition of exhaustion and incompetency. Besides, kidney complications, which are not

rare in pneumonia, and brain affections, which are frequent, particularly in small children, contraindicate the use of alcohol. I dare say that the pneumonia of a fairly developed infant or child contraindicates rather than demands the administration of alcohol at an early period of the disease. Later on the conditions change, and alcohol may be required in large doses, always, however, much diluted. A recent writer has indeed proclaimed that the doses of alcohol given by medical men in the diseases of children are in direct proportion to their ignorance, but epigrammatic pronunciamentos do not do away with the good effects of alcoholics among the rest of the stimulants.

Digitalis stimulates and contracts the heart, but *also* the arteries, and thereby increases the peripheral resistance. A few large doses may restore the equilibrium of the faltering circulation, and should then be stopped. I have not infrequently given the equivalent of from one to four grains of digitalis in a single dose, which was repeated one or more times. This mode of administration insures all the coveted effect on heart and pulse without any irregularity, and gives both a result in a few hours and the indication to cease, while the usual small doses exhibit their action after days only. We may afterwards continue its use in small doses, either alone or in combination with strophanthus, sparteine, or caffeine, all of which have no such disagreeable effect on the arterial tension as digitalis; or we may give them without digitalis. To give doses of tincture of strophanthus of less than a drop, or sparteine sulphate of less than one-quarter or one-eighth of a grain, every hour or two, is useless. Such effect as we require we have a right to demand *speedily*, and the doses must be large enough to enforce it.

Whenever the peripheral circulation becomes insufficient, with small pulse, digitalis alone must not be continued; it must be combined with nitro-glycerin or sodium nitrite, the former in hourly or bi-hourly doses of from $\frac{1}{500}$ to $\frac{1}{100}$ of a grain, the

latter in doses of from $\frac{1}{10}$ to $\frac{1}{4}$, or these remedies may be given alone until the pulse is revived. They are principally required when the feebleness of the heart is mainly perceptible in the right ventricle. There are cases of pneumonia in which the arterial pulse is good, but the external veins large, the nails blue, the skin cyanotic, with great dyspnœa and pulmonary œdema, together with perspiration, increased cardiac dulness, enlarged liver, intestinal oversecretion, and albuminuria,—symptoms which point directly to incompetency of the right ventricle. In these cases the external circulation must be restored at once, and the nitrites will contribute to fulfilling that indication. Besides, local depletion by leeching will sometimes do good. In the adult we would open a vein; a child of advanced age may also be saved in this way. Once, and once only, when I was younger than I am to-day and more courageous or less cowardly, I opened the engorged jugular vein of a young child suffocating from pneumonia. The tenement-house people for whom I did it thought it the proper thing and nothing else, while I was not quite so confident: the child got well. Cupping, both dry and sometimes wet, large sinapisms, and mustard baths will serve a good purpose. Concerning the latter method, Dr. L. Weber published an elaborate article some twelve years ago. "General mustard bathing I have now and then resorted to in severe inflammations of the lungs, as well as in those of the brain. I prepared a hot bath and threw mustard into it *ad libitum* in order to produce a very powerful derivation to the skin in a very few minutes, and I think it had most beneficial results."* It is in these cases also that the inhalation of oxygen (better through the nose than the mouth) and artificial respiration will contribute a great deal towards saving time and life.

The distressing cases of catarrhal pneumonia engrafted upon the extensive bronchial catarrh or capillary bronchitis

* Jacobi, in New York Medical Record, August 15, 1870.

of the very young will sometimes get well only after we succeed in making them cry, together with artificial respiration, inviting the respiratory muscles to reflex efforts by dashing cold water on them, using for brief moments the interrupted current, etc.

Direct stimulation of the heart may require the use of strychnia in small and frequent doses (a baby of one year not often more than a thirtieth of a grain during twenty-four hours), and carbonate of ammonium one-half of a grain or a grain in anise-seed water or in milk every half-, one, or two hours. In cases of urgent necessity the stimulants must be used subcutaneously, the sulphate of strychnia in repeated doses of $\frac{1}{100}$ grain at least, the salicylate (or benzoate) of sodium and caffeine in doses of from one to five grains (equivalent to one-half of that amount in caffeine) every one or four hours; or camphor will serve the same purpose. Its solutions in alcohol or ether are quite painful. I always employ it in four or five parts of sweet almond oil; of this I inject from six to twenty drops, according to indications; very slowly, because it passes through a fine needle with more difficulty than does a watery solution.

In connection with these remarks we are enabled to judge of the claims of the routine treatment with strychnine, digitalin, and aconitine which was imported a few years ago. It is easily perceived that it finds its indications like a ready-made coat which fits many, but not all, and would not be worn unless first tried on. But, then, a coat is not so easily believed to fit everybody as is a newly eulogized treatment.

When, during hepatization and the period of incipient resolution, expectoration is insufficient, the remedy is inhalation of steam, with or without turpentine. The latter may be spread through the room by means of large sponges, or on towels which are soaked with it, or it may be evaporated on boiling water. The easiest way is to fill the whole room with the vapor. Inhalers

are insufficient and annoying. Give camphor, aqua camphoræ in teaspoon doses or more, or one-quarter- to one-grain doses in diluted mucilage, or benzoic acid powders in the same doses, or ammonium carbonate. Ipecac may derange the stomach, senega is either an adjuvant or a placebo. Drinking of plenty of water, mainly alkaline waters,—Seltzer, Vichy, Poland,—also doses of bicarbonate of sodium or iodide of potassium, will increase and liquefy the bronchial secretion. Ammonium chloride is of but little use in hepatization; but evaporated in amounts of ten or twenty grains every few hours on a hot stove or over a flame, it fills the room with a white cloud which greatly stimulates the bronchi. Warm poultices will serve the same purpose. Their place is during hepatization for the purpose of aiding absorption, not in the first stage of pneumonia. When nursing is insufficient, and there is danger of wetting the clothing and bedding, it is best to substitute for them a cotton-wadding jacket, covered or not with oil silk or, better, flannel, which protects against exposure and keeps up a uniform temperature of the skin.

Pleural pain is relieved by gently strapping the chest, when tolerated,—it mostly is,—by sinapisms, which must be kept on a few minutes only and repeated from time to time; warm poultices; a few doses of sodium salicylate or phenacetin; in urgent cases by a subcutaneous injection of morphia. Vesicatories are injurious; they chafe, irritate, annoy. Their only —rare—indication is in the long persistence of hepatization, with or without chronic pleurisy.

Irritating, hacking cough demands small doses of opium. Much of this cough is pharyngeal, and is relieved by frequent drinking of small quantities of water. Sleeplessness and great general irritation demand a dose of opium for the night. A sleep of an hour or two affords great relief to the cough and to all the symptoms. As a general rule, however, the habit of giving opium in the first stage of pneumonia is a bad one.

The bad odor of complicating gangrene demands inhalations of turpentine, eucalyptol, or carbolic acid; the presence of abscesses in the lung, surgical interference, unless there be a spontaneous rupture through a bronchus. Most abscesses are within reach of the knife and actual cautery, for generally there is a sufficient amount of pleural adhesion to render access devoid of all danger.

Complication with malaria, which is rare, requires quinine; intermittent pneumonia, which is also uncommon, quinine and ergot; complication with nephritis, the avoidance of digitalis and alcohol and the substitution therefor of sparteine, camphor, and nitro-glycerin; with atelectasis, the stronger stimulants, and artificial respiration by the different methods—make them cry; with cerebral disease, while acute, ice and purgatives and bromides; when chronic, iodide of potassium.

Hypostasis and hypostatic pneumonia, so common in infectious diseases and in conditions of great debility, require frequent changing of position from one side to the other and the early administration of stimulants in large doses, together with friction of the entire surface with cold or hot water, or with alcohol and water. The most powerful of all internal stimulants—Siberian musk—should be given frequently,—viz., every half- to one or two hours,—in doses of from one-half to two grains, until from six to fifteen grains have been taken in the course of half a day.

Interstitial pneumonia is treated on the general principles laid down before. Later, iodide of potassium in sufficient doses, a mild tincture of iodine externally, and an occasional vesicatory. When it has become chronic, digitalis may be given for months in small doses to keep up both a sufficient circulation through the indurated lung and a competent nutrition of the heart muscle, and iodide of potassium alternating with iodide of iron. Persistent and careful pulmonary gymnastics must be continued for years.

Pulmonary œdema requires the causal treatment of its origin, which can be traced to cardiac, pulmonary, or renal disease. Urgent cases—for the disease may prove fatal in a short time—require dry cupping, now and then the emptying of the lungs by an emetic (apomorphia subcutaneously when vitality is low and the expelling muscles are unable to act), and stimulation of the excreting organs and of the heart. A powerful purgative—calomel, croton oil, or elaterium—is an active derivant. Digitalis in large doses (a few minims of the fluid extract at once) will stimulate the heart. The salicylate or benzoate of sodio-caffeine in subcutaneous injections, one to five grains, repeated five or six times at intervals of fifteen minutes, acts beautifully. Acetate of lead stops oversecretion in a good many instances. Pilocarpine (gr. $\frac{1}{20}$ to $\frac{1}{6}$) subcutaneously has relieved, and saved, many a case resulting from renal disease.

Pulmonary hemorrhage is not frequent, for tuberculosis of the young lung produces hepatization and vascular obstruction rather than cavities; and though hooping-cough gives rise to hemorrhages, they are tracheal and bronchial rather than pulmonary. Cardiac diseases may lead to venous obstruction and thereby to hemorrhages. Digitalis, lead, alum, ergot, narcotics, and ice temporarily to the chest, with a hot (mustard) bath of the lower half of the body, as well as absolute physical and mental rest, are indicated.

Infarctus, with its sudden onset and vehement dyspnœa (sometimes chill), is the result of embolism, in the newly-born, from the umbilical vein or the ductus arteriosus; later, from a marantic thrombosis of the sinus, the renal, femoral, or portal vein, or from caries of the petrous or some other bone; from valvular disease, from an infectious malady, or from an extensive burn. The causal indications must be obeyed, if possible. Ice applications to the affected part, opiates and digitalis, and stimulants when required, symptomatic treatment afterwards (antipyretics).

Some of the cases are followed by *gangrene*. This condition, however, generally results from the presence of foreign bodies, from acute infectious diseases,—diphtheria, measles, noma, typhoid,—or from (lobular mostly) pneumonia. A few cases are also on record as having resulted from careless pneumatic treatment. Mineral acids largely diluted with water, as also quinia and lead, have been copiously used. Besides stimulants given to the required extent, I have relied mainly on inhalations of turpentine, either from a paper bag in which a sponge has been kept soaked, or from a kettle with boiling water, or of terebene; internally, of terebene, from twenty to fifty drops daily, or creosote a few drops daily. (See p. 339.)

Such *pseudoplasms* as have been or may be observed in the young lungs demand treatmeut on general principles. *Carcinoma* has been noticed a few times, also in the mediastinum. *Sarcoma* is more common, also in the pleura. The treatment should consist in increasing doses of arsenic, and in the injection, according to Coley, of the toxin of the coccus erysipelatos and bacillus prodigiosus. *Echinococcus* of the lungs and pleura (fluid without albumen and sodium chloride, and with scolices) demands puncture and the injection of Lugol's iodine solution. *Actinomycosis* has been reported by Soltmann; the case occurred in the posterior mediastinum of a boy of six years.

Hernia of the lungs has been observed below the clavicle and on the back. The soft elastic tumor changes its size with respiration. In such cases the lung is either normal or emphysematous. The cough disappears on the application of proper bandages. *Deformities* of the chest wall, with or without a defect in bones or muscles, particularly the *funnel chest*, in which the lower part of the sternum is so drawn in as to almost touch the vertebral column, can never be removed, but the consecutive contraction of the intra-thoracic space can be partially counterbalanced by systematic gymnastics and functional improvement of the lungs.

In close connection with the congestive and inflammatory diseases of the thoracic organs are many changes in the *bronchial and mediastinal glands* which can more easily be prevented than cured. A protracted catarrh of the bronchi results in glandular hyperæmia and hyperplasia; a nasal catarrh of the newly-born and the nursling descends rapidly with the same effect, or the consecutive glandular tumefactions of the submental and submaxillary regions implicate the adjoining tiers of lymph bodies; rhachitis, scrofula, and tuberculosis are also causes of bronchial and mediastinal adenitis. Pressure on veins and nerves, also on the trachea; attacks of coughing without crowing inspiration; fremitus, feeble or increased; respiration, increased and bronchial, or feeble; dulness over the sternum down to the second rib, but not extending to the exterior margin of the lungs; dulness posteriorly about the hilus of the lungs, more marked to the left than to the right (location of thoracic duct on the left), are among the principal symptoms. Fever, if present, depends on complications or on absorption from the glands while undergoing changes. Antirhachitical, antiscrofulous, and antitubercular treatment are the indications. Mercurial ointment, iodide of potassium ointment, inunction of green soap, iodide of potassium internally, iodide of iron, increasing doses of arsenic, ice externally if there be any local pain, and the treatment of sequelæ or complications (catarrh, lobular pneumonia, dyspnœa, protracted fever) will be demanded, but will not always prove successful.

Pleurisy is of frequent occurrence during the first decade of life; empyema is, indeed, more common during infancy and childhood than in advanced age. The majority of cases of pleurisy which occur in the newly-born are of pyæmic origin, and depend mostly on umbilical phlebitis; still, cases with serous and the usual forms of purulent secretion are not uncommon in the very young. Pleuritis may be the direct result of exposure ("cold"), of broncho- and fibrinous pneu-

monia, or of pericarditis and peritonitis. It frequently accompanies pulmonary tuberculosis, diphtheria, acute rheumatism, and eruptive fevers. Thus, there is but rarely a causal indication for treatment; prevention is best secured by giving the utmost care to the management of those diseases which cause its outbreak. Its symptoms are often deceptive, for even pain is not always present, though it is one of the most frequent symptoms. The pain is sometimes quite local; at other times, however, it extends over a large surface. Its locality does not always correspond with the seat of the pleuritis. The extension of the peripherous ramifications of the intercostal nerves is so great that the children often complain bitterly of epigastric pain down to the umbilicus on the affected side. The disease requires absolute rest and immobilization of the chest. Broad strips of adhesive plaster, which irritate the surface and render local applications difficult, I have discarded long ago. A broad bandage or a moderate-sized towel fastened round the chest with safety-pins is more appropriate and is well tolerated. An ice bladder applied to the diseased region will often render the best service; it must not come in contact with the bare skin. Where no bandaging is required, a cloth well wrung out of cold water, of the size of half a square foot, more or less, or surrounding the whole chest, may be applied every fifteen or thirty minutes. It must be covered with rubber cloth and flannel. In very bad cases the pain should be relieved by a subcutaneous injection of morphia; its internal administration is generally useless and sometimes hurtful. Local depletion by cups or leeches, I am glad to say, I have shunned these twenty-five years; dry cupping may relieve such children as are old enough and intelligent enough not to get excited and not to harm themselves by screaming and active resistance. Mustard plasters must not remain longer than a few minutes, and may be repeated every few hours. Warm fomentations will relieve anæmic and feeble children; if possible, they ought to be avoided

in the beginning of the disease, when the indication to limit congestion and secretion is paramount. A dose of calomel sufficient to relieve the bowels (sometimes with an opiate) and the use of salicylate of sodium in doses adapted to the age of the patient are the remedies which will bring relief. Vesicatories are still less indicated in the first stage of pleurisy than later on; they irritate both the skin and the patient, cause sleepless nights, and add to the discomfort of the occasion, and discomfort and sleeplessness impair the prognosis. If there were a benefit to be derived from blistering, the condition of the pleura might be improved, perhaps, but the sick injured, probably.

If the temperature be so high as to hurt the patient, antipyretics should be given. Probably from three to ten grains of quinine administered before noon will lower the afternoon rise. If required, a dose of phenacetin, with or without a moderate dose of codeia, may be given at eight or ten o'clock at night.

When the fever decreases, or when the heart begins to get weak previously, digitalis, strophanthus, sparteine, or caffeine, with or without ammonium carbonate or camphor, are indicated; no improvement, either through diaphoresis or through diuresis, need be expected so long as the heart remains weak. At the same time an acetate, or a citrate, or an iodide may be given. Pilocarpine, which has been recommended, is a two-bladed sword, and requires a stronger constitution than almost any baby and most children can boast of; in pleurisy there is no vital indication that can be fulfilled by pilocarpine to such advantage as may be derived from it in certain cases of acute pulmonary or intra-cranial œdema. Externally, at this period, tincture of iodine diluted with alcohol may do some little good, particularly in cases of "dry pleurisy." It is this form mainly which will be benefited by warm fomentations and the use of iodides. When the main indication is to absorb effusion, absti-

nence from drinking, and the use, in fair doses, of table salt, which increases diuresis, will be found useful. Diuretin, in four daily doses of from two to five grains, may stimulate the action of the kidneys to such an extent as to result in the absorption of the pleural effusion; but my own experience with this modern drug has not been so favorable as many of the eulogies contained in the journals appeared to promise.

The indications for operative interference with the pressure of pleural effusions, no matter of what description, are various. It is demanded when the difficulties of either respiration or circulation, or both, require immediate relief. The latter may suffer even without the participation to a great extent of the former. Indeed, Trousseau describes a case of fatal collapse due to nothing but disordered circulation. Among the symptoms urging the operation are intense dyspnœa, cyanosis, diminution of renal secretion, anasarca and ascites, and a considerable dislocation of heart or liver. In many cases the intercostal interstices are no longer visible, either on inspiration or expiration; they are even found bulging. Not in every case are the consecutive disorders proportionate to the amount of effusion; indeed, this may be small compared with its effects when the pleurisy is complicated or secondary to a disease of either heart or kidneys, or both. Still, the quantity of fluid contained in the pleural cavity is more frequently underestimated than the reverse, no matter whether the healthy lung is pressed upward and is floating on the liquid in a compressed condition, or whether, congested or inflamed, it is swimming in the midst of the fluid. Thus, it is impossible to exactly gauge the indications of the operation according to the amount of exudation. Potain's claim, that when the latter reaches the level of the clavicle the operation should be performed, is justified by the fact that the consecutive symptoms in most such cases must be very urgent. In such persons as do not subjectively complain, their indifference is mostly

due to lack of cerebral perception,—in conditions of unconsciousness during meningitis, typhoid fever, or idiocy. When the dulness extends high up both anteriorly and posteriorly, and no absorption takes place within a few weeks, the operation is required. The longer the compression of the lung has lasted the smaller will be the chances of its reinflation. It is true, however, that now and then it will re-expand after compression has lasted from two to three months. Another serious danger accompanying the pressure produced by the liquid is the inactivity of the blood- and lymph-vessels of the walls of the cavity; for in such case total compression means absence of function, which is absorption. Thus, even a partial removal of the fluid, with partial relief to the vessels, is quite often the first stimulus to absorption and the commencement of recovery.

In order to either make or confirm the diagnosis of exudative pleurisy, an explorative puncture is often resorted to. For, in spite of a number of rational symptoms, the positive diagnosis of a pleural effusion or exudation is sometimes impossible without its ocular confirmation. The puncture is made near the upper edge of a rib to avoid the course of the intercostal artery, while the hand of the diseased side is carried to the opposite shoulder to widen the intercostal spaces. The pain of the little operation is diminished by the quickness of its performance; besides, a slow introduction of the needle—particularly when of larger size—may peel off the pleura from the chest wall. In many cases of copious exudation the place selected, within certain limits, is a matter of indifference. The puncture is mostly made where there is bulging, or a high degree of dulness, or more or less complete absence of respiratory murmur, frequently in the sixth intercostal space posteriorly to the axillary line. When these spaces are narrow, or when the patient is restless, it is not always easy to penetrate them; these are the cases in which, now and then, the inter-

costal artery has been wounded, or pain resulted from hitting periosteum and bone. When the point of the needle is not carried far enough, it may land in the chest wall or in the thickened pleura; when too far, it reaches the lung; when in a wrong direction, it may be fastened in the liver or in the spleen. In such cases the needle is liable to participate in the excursions produced by inspiration and expiration, and, when withdrawn, will carry blood instead of the contents of the pleural cavity. In rare cases it is possible, however, to exhibit the latter and still wound the lung. It has happened to me to extract pus from a pyothorax. On the very spot of the puncture the incision was made and a rib resected; when the incision through the pleura was made, there was bleeding from the lung. The wound was closed with iodoform gauze, a new puncture was made at a different locality, pus was found, the rib exsected, and again there was, on incision, pulmonary hemorrhage, which also was stopped by compression with iodoform gauze. A third puncture and a third excision at last led directly into the empyema; the failures having been due to extensive pleural adhesions, and the deceptive results of the exploring punctures to the fact that the needle did not reach pus until it had perforated the adhering and twisted lung.

While an absolute diagnosis cannot always be made without a puncture, the results of the latter are not always conclusive. Though there be plenty of liquid (serum, pus, blood) in the cavity, it may not always follow the sucking piston. The point of the needle may first land in the lung after passing through liquid; this will enter the instrument only while the needle is being slowly withdrawn, provided again that it has not been closed by a blood-clot. Therefore, when the puncture is futile, the needle ought to be carefully examined as to its perviousness. Or the needle is too thin for the contents; pus is quite often present where serum was expected; or the needle

is caught in thick fibrin deposits. That may happen time and again, and lead to serious miscalculations and mistakes. Or the pleurisy may be localized, with the result of giving rise to an encysted empyema, instead of a general pyothorax. Such localized empyemata are more frequently met with posteriorly, and upward, than low down, where they are usually expected, from the fact that it is there that free pleural fluids are found. They are quite small sometimes, and not infrequently multiple, and therefore hard to find. Puncture upon puncture must be made in such cases as yield all the rational symptoms of pyæmia, and when no pus can be readily detected. When finally found, it is not always certain to come from a pleural abscess after all. It may be derived from a small pulmonary abscess, or from a pyopneumothorax. In the latter instance, however, and sometimes in the former also, there is often air (or gas) found mingled with the pus.

There are other possibilities of mistake. The needle may have withdrawn serum only, and yet pus or blood may be present; for in patients who have been in a recumbent or semi-erect position, as usual with pleuritics, the solid constituents of blood and pus will be deposited near the diaphragm. Thus, a microscopical examination ought first to complete the diagnosis of the nature of the pleural contents. When pus has been found, there is an urgent indication not to procrastinate the radical operation, for the puncture channel may become the seat of pus infiltration, and possibly of pyæmia. Particularly is this so when the pus is discolored and malodorous, as it is apt to be in cases of pyopneumothorax, or in those which are complicated with caries. The latter cases are apt to be attended with high temperatures (still, there are exceptions), the fever being either continuous or irregularly intermittent. Such fevers require an exploring puncture at an early date; it is mostly delayed too long. Indeed, every case of *uncompli-*

cated pleurisy in which a high temperature is incessant for four or five days, mainly when complicated with much pain or local œdema, becomes suspicious. Even as early as the fourth day I have met with large amounts of pus, not only in infants and children, who are more apt to develop pleural suppurations, but also in adults. Moderately high temperatures, however, do not necessarily indicate the use of the needle, for through periods of weeks, temperatures of 100½° or 101° may persist without meaning anything but the systemic irritation caused by a perpetual process of absorption and elimination. Thus, after all, there is no positive certainty that can be conveyed to the unthinking; here it is, like everywhere in medicine, that experience comes handy, when guided by brains.

Before the operation of puncturing is performed, the skin must be thoroughly washed (and disinfected); after the needle has been withdrawn, iodoform gauze or bismuth subnitrate powder is applied to the wound and covered with adhesive plaster or a bandage. If there be pain, ice is applied. At all events, the chest ought to be at rest; the patient, if possible, in bed; no exercise or work permitted for a day. As a remedial agent a simple puncture is of no account. When recovery follows an exploring puncture, it is spontaneous, and not induced by it; for spontaneous absorption of the pleural fluids, both of transudations and exudations, is quite frequent. That is mainly so when the liquid is serous only and not too excessive; in the latter case, absorption begins only when, by means of an aspiration, the pressure by which blood- and lymph-vessels are hampered has been in part relieved. Nor is it infrequent for hemorrhagic exudations, or even extravasations, to be absorbed after the solid constituents have been deposited on the surfaces of the pleuræ. Even the results of tubercular pleurisy may disappear, just as ascites caused by tubercular peritonitis is apt to get well, whether or not tubercle-bacilli are found in the fluid. As a rule, in most

of the cases of spontaneous recovery no microbes are present; if they be found, they are mostly the short-lived cocci of Fraenkel. No such favorable event, however, need be looked for when the long-lived streptococcus and staphylococcus are present; still worse is the influence of proteus vulgaris and mirabilis of the putrid empyema. Simple encysted empyema, however, may finally heal without any operative interference, through a process of gradual inspissation and absorption.

Spontaneous perforation of pyothorax, either through the lungs or through the chest wall, may lead to recovery; but it is slow, and takes place at the expense of much time, suffering, tissue, and usually of future health and vigor. It should never be wished or waited for.

Thoracocentesis ought to be performed soon after the exploring puncture. In many cases, when a mere aspiration is made, the operation appears simple enough; but it ought to be considered serious in all cases, as in many it is. The patient must rest quietly and be well supported in the position recommended for a simple puncture, and so that respiration and circulation are not unduly interfered with. The needle must be inserted with the precautions detailed in the remarks I made on puncture; if it be caught by a fibrin clot, the latter may be detected by a probe introduced through the needle, but a second insertion may be required to obtain the end, probably anteriorly and superiorly to the first one. Aspiration alone will not cure empyema, except in small children, whose ribs are flexible and whose chests can be compressed more readily so as to approximate and adjust the walls of the abscess; even in them, however, the same operation must not be repeated after pus has again been formed, but a more extensive and radical operation is to be undertaken. Aspiration is always contraindicated in the empyema of adults, except in a vital indication for temporary relief, or

when the fluid is hemorrhagic in character, or in cases absolutely inoperable.

During the operation the patient, if it be feasible, ought to be kept as much as possible on the diseased side, so as to avoid the dyspnœa due to the compression of the lung of the opposite side and the molestation of the heart. The serum may be permitted to flow so long as the current remains equable during inspiration and expiration; the discharge must be stopped when the current begins to cease during inspiration. The relief given by the removal of a half-pint or a pint is sometimes considerable; but in young children, with their compressible chests and corresponding facility of accommodation to the expanding lung, it is safe and advisable to entirely empty the cavity. If the operation—because of the urgency of indications—be performed while exudation is still progressing, and dyspnœa return, another thoracocentesis may become necessary within a short time. I have had to operate twice within a day.

The operation requires time. It is advisable to interrupt the discharge from time to time; for the too rapid entrance of air into the bronchi causes violent attacks of coughing (erroneously attributed to the needle irritating the pulmonary pleura), or the sudden rush into the expanding lung may give rise to large quantities of serous, strongly albuminous, bronchial secretion, or to copious pulmonary œdema, or to hemorrhages with slight surface lesions, or even to considerable rupture of pulmonary tissue. Fainting spells are also frequent during a rapid escape of serum, sometimes through psychical influences, sometimes from cerebral anæmia. In other cases (fortunately, rare) thrombi formed in the compressed lung, or in the impeded heart, or in the torn surface of the bronchi may be carried off into distant blood-vessels; thus, emboli are known to have been swept into the pulmonary artery or into the artery of a fossa Sylvii.

After the operation the wound must be cared for as I suggested above, when speaking of the treatment of a mere puncture made for the purpose of a diagnosis. In addition, it is advisable to enforce absolute rest and to apply for some time an ice bladder to the part. This is particularly necessary when there is acute pain. Should this be severe, morphia may be used subsequently, but in uncommonly small doses, because its absorption is very rapid and its effect much more marked here than under ordinary circumstances.

The simple operation of aspiration does not suffice in cases of exudative pleurisy in which the pleural contents hold, or consist of, pus, either laudable or putrid. As I mentioned before, pus may be found as early as the fourth day, and then it is often on both sides. When high fever attends such cases, far from contraindicating a radical operation, they require it for immediate relief. If such relief be not obtained after a reasonable time, it is either because of a complication such as pneumonia, pericarditis, or peritonitis, or of some pus concealed in a recess. The latter ought to be looked for and made to discharge; Nelson employed a metal sound for the purpose of breaking up adhesions and facilitating the escape of pus.

The radical operation consists in the making of a large aperture, either by simple incision between two ribs, if possible, in the fifth or sixth intercostal space between the mammillary and axillary lines, or by incision with the exsection of a piece of rib from one-third of an inch to an inch in length, large enough to admit two fair-sized drainage-tubes. The opening is insufficient so long as it gives no exit to the clots of fibrin, which sometimes are as large and perplexing as their presence is unsuspected. It is on their ready and speedy removal that the duration of convalescence or the favorable or fatal termination depends. Thus, there are those who, as the presence or absence of these large masses can-

not be diagnosticated, insist upon exsection in every case of empyema, no matter whether of recent date or of long standing. At all events, whenever there has been a continued or a pyæmic fever, a great deal of pain, an intercostal œdema, or a complication with infectious embolism, pyopneumothorax, tuberculosis, or superficial pulmonary or hepatic abscess, the exsection of a large piece of rib is indispensable. When fistulæ remain behind, or the abscess cannot close because of the lung being kept from expanding by pleuritic thickening over it, larger pieces of one or more ribs must be removed to enable the chest wall to sink in and thereby facilitate the approximation of the walls of the cavity. In these, as in many simpler cases, it is necessary to keep the opening patent for a long time; this is readily accomplished through the slowness of the growth of callus in that region.

After the operation has been completed, the cavity must be thoroughly washed with quarts of warm solution of corrosive sublimate or of Thiersch's mixture (boracic and salicylic acid) until the irrigated fluids return clear, and a thick aseptic dressing should then be applied. The frequency of the removal of this dressing and the number of injections depend on the nature and quantity of the pleural secretion. In the majority of cases it is safe to wait until the dressing becomes moist. When the lungs expand readily, many days may elapse before the first dressing is removed and another one substituted. When, however, the pus is putrid, and in cases of complications such as are mentioned above, a daily change of dressing and daily irrigations, with occasional short interruptions, must be resorted to.

Hydrothorax (fluid with a low specific gravity, less than 1015, and from one to five per cent. of albumen) depends on or is complicated with malaria, nephritis, cardiac disease, anæmia, or cachexia. The cases resulting from scarlatina are among the most favorable. Besides the indications afforded

by its cause, and good nutrition, hydrothorax demands diuretics, such as digitalis, sparteine sulphate, caffeine, diuretin, bitartrate of potassium. The less such patients drink the more readily will the fluid be absorbed. Plenty of sodium chloride in food and drink will increase renal action. If no reduction of the fluid take place, paracentesis is demanded.

Pneumothorax is a complication or a result of the perforation of a cavity, of pulmonary gangrene, of pleural infarctus, or of perforating empyema, and in many cases of this kind pyopneumothorax will be observed. Foreign bodies are more apt to produce pneumothorax than hooping-cough, which is liable to tear the mediastinum rather than the pleura. Ice will relieve local inflammation and pain, so will opium, which, moreover, modifies the perturbed respiratory movements. Cases of pyopneumothorax which do not readily discharge their pus through the lungs demand a counter-opening of the chest wall.

IX.

DISEASES OF THE ORGANS OF CIRCULATION.

BOTH in *acute* and in *chronic diseases of the heart* the amount as well as the quality of food require some modification. In many cases the loss or diminution of appetite will regulate the former. As a rule, however, the amount taken ought to be much less than the same person would take when in health. Not only ought the total quantity to be less, but also that consumed at each meal should be comparatively small. It is best, therefore, to divide the meals into halves and even thirds, so as to cause the patient to eat every two or three hours. Digestibility must be improved by slow eating. The diaphragm should not be annoyed by large quantities of food or by the evolution of gases. Therefore but few carbohydrates and but little fat are to be given, and the digestion of nitrogenous foods, such as meats (eggs) and milk, with or without cereals, ought to be aided by pepsin and dilute hydrochloric acid. The latter is an excellent adjuvant to the digestion of milk prepared according to J. Rudisch's formula (p. 23). Or it may be modified or mixed according to the rules given by me in my treatise on the intestinal diseases of infancy and childhood. At all events, milk is the main food to be given in cardiac ailments. Its digestion will have a further advantage in this, that it does not result in the physiological congestion of the stomach, liver, and spleen, which becomes irksome after large and heavy meals by disturbing the circulation and thereby adding to the labor of the heart, and that it does not contain the large mass of fat-forming elements present in the mixed food of healthy advanced childhood or adult age. In milk the proportion is: fat, 1; albuminoids, 1.44; sugar, 1.63; in mixed food, however, 1; 1.58; 6.04 carbon hy-

drates. Altogether, it is best to slightly underfeed the patient. Thereby the labor of the heart is facilitated, an object which must never be lost sight of. For the same reason fast drinking, even of water, must be avoided, for its sudden absorption fills the blood-vessels too suddenly for comfort. Its speedy elimination does not diminish the momentary overwork. This warning is of particular importance as regards iced liquids, which act both by their bulk and by reflex. This advice is by no means superfluous, either for medical men or for the sick. It was strongly urged by Williams fifty years ago. Stokes prohibited the use of large quantities of soups or milk. And it has been again introduced by Oertel with such impressive emphasis that thirsting has become almost fashionable and a craze among the fanatics.

That stimulants, such as coffee, tea, and alcoholic beverages, must not form part of the regular diet in cardiac disease is self-understood. They may be required as medicinal agents, however, upon positive indications.

In every form of cardiac disease absolute rest of both body and mind is among the very first indications. The latter is just as important—perhaps more so—here as in diseases of the nerves and nerve centres. Fretting, worrying, crying, are detrimental, and must be avoided. Thus, it may become necessary to take a child out of bed, temporarily, to gratify and quiet it; or to change its position, for the recumbent position of an hypertrophied heart may cause dragging of the phrenic nerve or of the sympathetic plexus; or to raise the trunk and head to relieve the intra-cranial hyperæmia and the consecutive irritation of the pneumogastric nerve; or to give a mild opiate or a dose of bromide of potassium to insure quietude or sleep. The child must be permitted to select his own position; he knows best where he is most comfortable; but rest he must. The diseased heart is in its most favorable condition when working least; the number of heart-beats is reduced by ten or

twenty-five in the recumbent position. Rest is not only a curative, but a preventive agent. Many a life-long cardiac affection could be warded off if care were taken in time. We are beginning to become more and more aware of the frequency of affections of the heart muscle. Myocarditis in a chronic, subacute, and acute form is of very frequent occurrence. In or after every case of typhoid fever, scarlatina, diphtheria, or small-pox we must be prepared to be overtaken by some cardiac disease, either interstitial myocarditis or parenchymatous degeneration. Rest in bed or on the lounge (the former is better) will act as a preventive. It ought to be continued for weeks in almost every case. Like the paralysis consequent upon infectious diseases, which develops after weeks, heart-disease may occur from the same cause, partly as a consequence of actual primary alterations, partly of nerve exhaustion. So long as the pulse becomes more rapid on exertion, or on getting out of bed, absolute rest is the best remedy and safeguard. In these cases it is not always possible to distinguish between functional debility and actual disease. Autopsies too frequently tell us of our mistakes. Trifling changes in size cannot be measured by percussion, feeble murmurs cannot always be estimated according to their exact value. Functional murmurs are not so frequent in the child as in the adolescent or the adult. On the other hand, organic cardiac diseases have a better chance to be cured—really cured—in the young than later. So much the greater is the responsibility of the medical man in cases of preventable or remediable cardiac disorder. Even patients suffering from the very worst forms are apt to feel better within a very few (hours or) days after being confined to bed, with strict diet and loose and comfortable clothing. These cases teach us the lesson of what can be accomplished through the same *régime* in milder or incipient forms, by reducing the labor of the heart and at the same time of the voluntary muscles,

and by diminishing the overactivity as well of the general innervation as of the cardiac nerves, both exciting and inhibiting.

It is difficult to decide to what extent exercise should take the place of rest in individual chronic cases. The hearts of patients are as little alike as are their noses and finger-tips, and their treatment ought to be as individual as the size and shape of their gloves. Neither fit everybody. Nor is the rule adopted to-day that which will accomplish the best end in a month or a year for the same patient. The heart is neither in health nor in disease a uniform body. Its innervation may change from minute to minute, its nutrition is dependent on sudden or gradual alterations. A heart muscle is influenced in its arterial supply, venous discharge, and lymph circulation not only by its own health or disease, but by the ever-changing conditions of the other organs. Thus, many of the rules given one day may not remain valid another. Still, after a fair time has elapsed since the occurrence of an acute myocarditis or endocarditis, exercise should be recommended. The child may get up and have his quiet play sitting at the table, may begin to walk on the level floor, and may indulge in mild gymnastic exercise. More must not be permitted until the mucous membranes become a little more tinged, the arteries fuller, the heart quite regular. The systematic rules recommended by Stokes and by Oertel refer more to adults, with their incipient fatty degeneration and chronic myocarditis, than to children. In these, while they bear the imprint of cardiac changes, no iron-clad rules hold good. Gentle exercise and long rest should alternate.

The skin requires judicious attention. Exposure to cold, with its consecutive contraction of the cutaneous blood-vessels, overloads the viscera, retards circulation, and increases the labor of the heart muscle. A cold general bath, therefore, is dangerous (as also in the atheromatous degeneration of the old)

in acute carditis (where *local* application of cold acts quite favorably) or in extreme muscular weakness of the heart. On the other hand, a brief cold sponge-bath or wash, with thorough friction, is an intense stimulant and may be used to advantage for a weak heart, unless the extremities be cold and the mucous membranes cyanotic. In these latter conditions, hot washes and frictions, with or without alcohol, should take its place. In the average condition of the diseased heart general hot bathing must be avoided. It overstimulates and paralyzes, and proves an actual danger in both acute and chronic cases. Newspaper readers will remember the reports of people who go to the hot or "Turkish" bath with their heads erect and full of their own therapeutical wisdom, and leave it with their feet forward. A warm bath, the temperature of which ought not to be over 90° or 92° F., is often relished. Both the talking child and the silent, in fact, will soon tell you the exact temperature best adapted to their wants. In these cases requirement and comfort are identical. The baths, particularly the first, must be limited to a few minutes; at all events, they should never be continued after the slightest change in the pulse is noted. The debilitating or fatiguing effect of the bath must be avoided.

The mineral springs which have obtained a reputation in the treatment of chronic heart-disease, like the German Nauheim and Oeynhausen, owe their effect to the stimulating action of the salts and carbonic acid contained in them.

Like hot water, hot air is contraindicated in heart-disease. The wilted forms of the little ones soon show the effects of summer heat. A temperature of from 65° to 70° F. and fairly dry air are best for them. High altitudes do not agree with cardiac disease, particularly when no compensation has facilitated the heart's action. Compensation is not complete until the hypertrophied left ventricle, having become so by mitral

incompetency, transmits as much blood into the aorta as the pulmonary artery does into the lungs. Until that stage has been reached, the lungs are comparatively hyperæmic and subject to catarrh, œdema, or bleeding. In this condition, therefore, the influence of the rarefied air of the high altitudes must be avoided; as a rule, I recommend an altitude of not more than one thousand to fifteen hundred feet to children affected with chronic endocarditis.

The drugs and remedies of the Pharmacopœia applicable to the treatment of the several diseases of the vascular system being the same, a few general remarks on those I mostly employ will save repetition. At the head of the list is digitalis. It increases the action of the heart muscle and thereby increases cardiac pressure. It is indicated in all conditions of weakness of the heart muscle so long as the latter is not decomposed. This condition hardly ever occurs primarily in childhood, for uncomplicated fatty degeneration in which digitalis is contraindicated is almost unknown at an early age. Secondary parenchymatous degeneration is a frequent occurrence in and after infectious diseases such as typhoid fever, dysentery, rheumatism, scarlatina, diphtheria, and others. Digitalis is useless and sometimes worse than useless in nervous affections such as the palpitations of Graves's disease, of neurasthenia, or of fever. In all probability the effect of digitalis is mostly felt at first in the left ventricle, which is more muscular, but in the right ventricle almost as soon. By acting on the left ventricle it regulates the general circulation and facilitates aspiration of the venous blood and the circulation in the lungs and in the right heart. During its administration the contractions of the heart become more vigorous and less frequent, the arterial pulse slower and fuller, the urine increases in quantity, cyanosis and dyspnœa diminish, and dropsical symptoms gradually disappear. When large doses have been given for some time, cumula-

tion of the effect takes place. The pulse becomes quite slow and irregular, and vomiting sets in. If possible, this effect must be avoided.

For how long a time may digitalis be administered when given in moderate doses? This question has often been asked and as often answered. Unfortunately, the preparations sold in the markets are of different strengths and vary too often; so it is best to rely on preparations which are not liable to spoil on one's hands. With that proviso, I can say, from an experience of several dozens of years, that I cannot agree with those who stop the administration of digitalis after a few days, to begin again after an intermission. Moderate doses may be given day after day for months without any ill effect and with great benefit. Nor is it necessary to alternate between cardiac stimulants so long as no uncomfortable digitalis effect makes its appearance.

In practice we are often disappointed. The preparations are as various as are the firms of wholesale, or sometimes retail, manufacturers or tradesmen. The United States Pharmacopœia is, after all, the best stand-by of the practitioner, and its list of drugs and that of the National Formulary of the Pharmaceutical Association are sufficiently large to supply any taste. The infusion of digitalis, when reliable, may be given to a six-year-old child in doses of a teaspoonful two or four or five times a day, the fluid extract (I have often expressed my predilection for "Squibb's") two or three minims daily, the solid extract from one-half to one grain daily. Indeed, children bear digitalis, and cardiac stimulants generally, better than adults, and in comparatively larger doses. Digitalin I have used a great deal. Unfortunately, the wares sold by that name are very unequal: they are resinoids, not alkaloids. In order to have—no matter whether resinoid or alkaloid—an article of probable uniformity, I prefer to prescribe Merck's. A child of six years may take one-hundredth of a

grain from three to ten times a day. I have often been obliged to give much larger doses to obtain an effect; for, while in chronic cases we may safely spend some time on developing an effect, in urgent and acute cases one or more large doses should—nay, must—be given to accomplish the desired end immediately. In urgent cases a six-year-old child must take from one to five minims of the fluid extract at once. That dose may be repeated after a few hours, and perhaps again, until the effect is perceptible. Then it is time to slacken off or stop altogether. It is particularly in those cases in which the pulmonary circulation is obstructed, either by local inflammatory processes or by cardiac incompetency, that this mode of proceeding is advisable.

The effect of digitalis is not limited to the heart; the arteries are also affected by it. On this account digitalis is often contraindicated in senile affections of the whole vascular system. As they (atheromatous conditions) are not found (except in a few stray cases of literature) in infancy and childhood, this contraindication is rare in early age. There is a single exception, however, to this rule—viz., in abnormal congenital smallness of the arteries, which is not so excessively rare as may be presumed, and is a frequent cause of life-long migraine, neurasthenia, hysteria, and chlorosis. In these conditions, thus caused, digitalis is not well tolerated.

In those cases in which the effect of digitalis appears to be retarded, or the practitioner has "reason to doubt the qualities of his drug," another one may be substituted for it or combined with it. The tincture of strophanthus may be taken by the same child to the daily amount of from six to twenty-five minims; the fluid extract of convallaria majalis in the same or somewhat larger doses. Again I suggest that in most cases it is best to ascertain the moderate dose to be administered a long time in succession by giving a good dose

from the very beginning and watching its effect. Of the sulphate of sparteine (better than other preparations of scoparius) eight or ten doses are required daily, altogether amounting to from one-half to one and a half grains. Caffeine from two to ten grains, or the salicylate (or benzoate) of sodio-caffeine from four to fifteen grains a day, are fair doses, the effect of which will be pleasant in most cases. In a former chapter of this book (p. 81) I have alluded to the subcutaneous use of the latter, as it dissolves readily in twice its weight of water and is not a local irritant; therefore it is easily employed. The effect of these injections is often marked. More than a dozen years ago I published a case of cardiac pulmonary œdema, among others, in which recovery was the undoubted result of their use. There is, however, a positive contra-indication to the use of caffeine (and coffee),—viz., cerebral hyperæmia, either active or passive. The salicylate of sodio-theobromine has been introduced (as "diuretin") by G. Sée. It is a diuretic rather than a cardiac stimulant, and, like the former, it is often found wanting. Calomel in small doses is certainly a cardiac sedative, and as it is surely a diuretic, it is entitled to the many praises bestowed on it rather by the older than by modern physicians. Salines owe their effect upon the heart mainly to their action on the digestive and the urinary organs, with the exception of the bromides and iodides, the former of which act as sedatives and thus save labor and soothe irritation. The iodide of potassium has a more direct effect. It dilates arteries, diminishes arterial tension, and aids elimination through the bronchial mucous membranes and the kidneys. Obstructions of the pulmonary circulation depending on the heart are its happy indication. Sclerosis of the coronary arteries is not found in the young; therefore this is an indication exclusively belonging to advanced age. A child of six years may readily take from five to twenty grains a day, in three or four doses, in plenty of

water, after meals. It need not often be interrupted because of the gastric symptoms produced.

There are occasional cases in which the secondary compensation required by mitral incompetency is not fully established, and serious disturbances of the circulation arise therefrom. The dangerous symptoms may be cyanosis and pulmonary (or) and cerebral œdema. There are stupor or convulsions, dyspnœa, cyanosis, dilated veins, cold extremities, and a small and intermitting pulse. It is in these cases that a few of the above-mentioned large doses of digitalis may do good; here it is that wavering and indecision become criminal. Whenever digitalis does not have any effect, a venesection may. Our ancestors were less pusillanimous. Maybe they overdid bleeding, but in an urgent case they did not fail to do it. I know that I have several times saved the lives of children (and adults) by opening a vein quickly. Once it was the jugular.

Chronic (and sometimes the final termination of acute) cardiac diseases may lead to heart-failure. In such cases stimulants are indicated. Alcohol must not be given by itself and in large doses in cerebral hyperæmia of any kind. A child of six years may take from three to twenty grains of camphor internally; subcutaneously, a solution of one part in five of sweet almond oil should be used, and from five to fifteen drops injected repeatedly. Ether may be given, in doses of from three to ten drops, in alcohol and water, and ammonium carbonate, in frequently repeated doses of from one-half to two grains, in anise-seed water or in milk. Siberian musk internally, strychnia subcutaneously, are required. The more urgent the case appears to be the greater is the indication for combining several of these remedies.

Myocarditis.—Though myocarditis, both acute and chronic, is by no means so frequent in the child as in the adult, it is nevertheless not infrequent; it is, indeed, remarkable to ob-

serve how often it is not diagnosticated, or how little its occurrence is appreciated. The disease is met with either in connection with endocarditis, pericarditis, rheumatism, etc., or is spontaneous and uncomplicated.

In its treatment muscle stimulants must not be given. Digitalis is contraindicated. The recommendation of Heffen, to administer ergot, I cannot approve of, for by its action on the muscular fibres it increases vascular pressure, and thereby secondarily the labor of the inflamed heart muscle. Whatever relieves this temporarily is welcome. Therefore, iodide of potassium combined with a bromide will act favorably. This is also the place for morphia, either in large doses at long intervals or in small doses more frequently repeated, together with ice to the chest. During attacks of collapse, or during weakness or prostration, ether, camphor, and alcohol should be given, either internally or in an urgent case subcutaneously. A dose of calomel to relieve the bowels. Enemata for the same purpose daily, for regular evacuations are the best regulators of intra-abdominal circulation. In chronic cases iron may safely be given with the iodide; not in acute ones, which are injured by it through the increase of vascular irritation. Absolute rest, both physical and mental, is essential. The extremities must be kept warm.

Endocarditis.—The treatment of this disease is more promising in the child than in the adult, for entire recovery is more frequent in early life than later; but it is important that the diagnosis should be made early. In order not to be taken unawares, we ought to remember that endocarditis may be present without exhibiting a murmur, at least for some time; there are, indeed, cases which run their full course without a murmur. This is eminently so in ulcerous endocarditis. On the other hand, it is also necessary to remember that functional murmurs are not so common in the child as they are in the adult. Thus, every murmur—though there be no hypertrophy developed as

yet—must be suspected of being dependent on organic disease. This may also be suspected in most cases of acute chorea, which sometimes precedes and ushers in, instead of following, endocarditis; and in every case of articular rheumatism, the symptoms of which have been described by me in a former chapter of this book as sometimes so slight as to be easily overlooked (p. 205). Acute endocarditis is also common as a sequela of the chronic form, and as part of septico-pyæmia. It is not uncommon as the result of acute and chronic nephritis, and of infectious diseases, such as scarlatina, measles, typhoid fever, variola, tuberculosis, and carcinosis, and is frequently complicated—mostly through the intercession of pericarditis—with pneumonia and pleurisy. Frequent and careful examination, therefore, during the existence of such ailments, while it facilitates an exact and complete diagnosis, suggests the best method of prophylaxis. Most of the cases of endocarditis we meet with in children being due to acute rheumatism, every case of the latter, though ever so slight, must be watched, put to bed, and treated with salicylate of sodium. Almost every form of "growing pain" ought to be so treated, and in no case of infectious disease must the patient be permitted to leave the bed before much of the previous strength has been restored.

The special treatment of acute endocarditis requires absolute rest in bed, a dose of calomel sufficient to open the bowels, and regular discharges through the course of the disease rather by means of enemata than of purgatives. Frequent but small meals, and articles of food as suggested before. If thirst be great, drinking should be permitted often rather than much at a time. No alcohol in the beginning. Depletion by leeches is rarely indicated, and then only when there is a serious complication with painful pleurisy. In rheumatic endocarditis depletion is not tolerated at all. For severe pain which depends on pleural complication the subcutaneous injec-

tion of a few drops of Magendie's solution of morphia is preferable. Dry and wet cupping will sometimes relieve in such cases; other derivants, such as sinapisms, will often suffice. Vesicatories I do not advise in an acute case, the patient having enough to suffer from nature's infliction. Ice applied in a bag, which must not be too heavy, or ice-water cloths well wrung out, are beneficial in most cases, rheumatic or other. The head and trunk must be raised so as to make the patient as comfortable as possible. Blue ointment has been recommended over the heart and other places. I cannot say that I have reason to advise it. Strong diuretics, such as act by increasing blood-pressure, must not be given; mild salines will answer best; a small dose of calomel may be given from time to time. According to the indications noted above, iodide of potassium, with or without an opiate, will answer best, in doses of from fifteen to twenty-five grains daily, for a child of six years. An opiate at night secures rest; bromide of potassium may be given through the day. If the case be rheumatic, as it mostly is, salicylate of sodium, from fifteen to thirty grains daily, will be tolerated and found serviceable. Phenacetin may take its place sometimes, in daily doses, all told, of from eight to twenty grains. It acts as a febrifuge, an antirheumatic, and a sedative at the same time, better than quinine, a dose of which may, however, answer well now and then, particularly during remission. No antipyrin, no acetanilid ("antifebrin" of the trade). Serious attacks of dyspnœa are best relieved by morphia, either internally or subcutaneously, or by lead and opium. Drastics will seldom be required and seldom answer the purpose. The nitrites may be tried, though they have not served me so well, or so often, as I formerly thought I had reason to expect; they act best when the pulse is dangerously small. When cachexia and debility are prominent symptoms, tonics and stimulants are indicated early. In septic cases the chloride of iron should be given at an earlier period than

in those of a purely inflammatory or rheumatic character. Among the stimulants, I think highly of camphor and ammonium. Among the direct cardiac stimulants enumerated above, digitalis ought to be given only after the acute changes in the muscular tissue of the heart have been repaired. (There is hardly a case of endocarditis unaccompanied by myocarditis.)

It is here that the experience and tact of the practitioner have to decide an important point. In the further evolution of the case, digitalis with quinine, digitalis with belladonna, digitalis with strychnia, or with a bromide, or with an iodide, together with stimulation of the peripherous circulation by friction, either dry or with alcohol or hot or cold water, find their own indications.

The hygienic treatment of chronic endocarditis has been disposed of in former remarks. The medicinal agents of most importance are digitalis and iron. Constipation and overexertion must be avoided. In connection with the latter, the education and training of the child should be so guided as to prepare him for his future trade, business, or vocation. Endocarditis terminating so often in valvular disorders with consecutive hypertrophy, his future life ought not to be exposed, if avoidable, to great excitements or hard physical labor. A child so affected must not take coffee, tea, or alcohol in any shape as an article of diet. He must not be trained to become a military man, a pugilist, a mason, or a medical practitioner, unless he make up what he would call his mind to turn to a fashionable specialty at the age of twenty-one, compile a text-book, and earn greatness and millions with ease and comfort while sitting in his office.

The management of valvular changes resulting from endocarditis is more successful in childhood than in the adult. Compensation is brought about by consecutive hypertrophy; thus it is facilitated, about puberty, by the rapid increase of the heart at that period of life, and particularly by the in-

crease in size of the aorta and also of the arteries in general, thereby easing the circulation. Besides, vascular disease, which is so common in the adult, is a rare exception in the child. Moderate exercise contributes its share in increasing the growth of muscular tissue of all kinds, and should be recommended, according to Beneke.*

Pericarditis.—The pericardium is more accessible to the influence of cold applications in this than in any other form of acute heart-disease. They generally act well; but we must be prepared to meet with doubtful or no success in many cases, for pericarditis is but rarely a primary disease. Myocardial changes (fatty degeneration mostly in the adult), chronic interstitial myocarditis, or tubercle, or syphilitic gumma, or complications with purulent mediastinitis or pleuritis, are not uncommon. In pneumonia, pleurisy, rheumatism, and scarlatina pericarditis is not unusual. The internal treatment of pericarditis is, therefore, in part guided by the complications. Digitalis is indicated mainly in cases which are rather complicated; strophanthus, convallaria, and iodide of potassium may take its place or be combined with it. Morphia is demanded in most cases, if only to give rest for the night. The fever may require phenacetin or (during a remission) quinia. After the fever has disappeared, or while

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* From birth to the seventh year the volume of the heart increases from twenty-three to one hundred cubic centimetres, by no means in proportion to the weight of the body. Still, this increase is very much greater than that of the lumen of the arteries when compared with the length of the body. The pulmonary artery is wider than the aorta until puberty; afterwards they are equal or the aorta becomes larger. The subclavian arteries and the common carotids are very wide compared with the length of the body (thereby causing physiological and pathological congestions of the cranium and its contents). Between seven and fifteen years the volume of the heart is from one hundred and thirty to one hundred and forty cubic centimetres; at that time the large arteries increase in absolute width, in accordance with the rules given before.

it is waning, absorption of the effusion may be promoted by caffeine, sparteine, diuretin, iodides, and a vesicatory over the heart. Effusion into the pericardium is not often so copious as to produce suffocation, but I am afraid that puncture of the pericardium to relieve the fatal pressure is not made so often as it ought to be. Fortunately, errors in the diagnosis are not very easily made; still, they do occur, for I have been called to perform paracentesis where there was some pericarditis, more hypertrophy, and much pleurisy. The operation is not difficult, the liquid being so copious as to give the heart ample space to recede in a semi-recumbent position. The aspiration can be made in the mammillary line, in the sixth intercostal space. In the same neighborhood, at the upper margin of the fifth or sixth rib, the incision can be made to remove pus, and injections made afterwards. Drainage has also been established in such cases. The heart has been punctured during the aspiration without evil result; but I am not prepared to say, even with Biedert, that "the puncturing of the heart is not connected with any danger."

Hydropericardium, no matter from what cause originating, must be treated on the same principles as those which are valid for hydrothorax.

Syphilis of the pericardium and of the heart, if diagnosticated, require their own specific treatment.

Congenital anomalies of the heart are apt to claim attention from the moment of birth. The newly-born candidate for cyanosis is liable to suffer from asphyxia, the rules for the treatment of which need no repetition here. As the troubles are incurable, being the result of embryonic arrests of development or of fœtal inflammations, almost the only thing to be done for the little sufferers is to protect them as much as possible. If they be so unfortunate as to grow up, exercise should be avoided,—indeed, is avoided. Alcohol is indicated in conditions of collapse only; no blood must ever be taken; laxa-

tives should be but sparely given. The temperature in which the little waifs are to live ought to be equable, moderately warm, their wearing apparel warm and comfortable. Congestive disorders which would require the use of cold in otherwise healthy children must mostly do without it, as they seldom bear it. Mild vegetable acids are coveted by most. Only those who appear to develop hypertrophy of the heart should take digitalis. Small doses of an opiate will often relieve their discomfort and dyspnœa. The combination of digitalis with iodides, administered for months in succession, gave relief in a number of cases where the patients lived four years and more.

Congenital undersize of the heart does not appear to be so frequent as that of the arteries. Indeed, in many cases of undersized arteries it was found of normal size, or somewhat larger. In the latter case the heart was not always hypertrophic; on the contrary, in most instances there was fatty degeneration. Like every small organ, the small heart, whenever found, may be built up by moderate and persistent exercise. A certain amount of hypertrophy will probably result from it, but the labor of the heart must be done either by an organ of sufficient size or one of unusual strength.

Blood-vessels.—The structure of the blood-vessels may be very defective, the walls being thin, fragile, and pervious. In such cases hemorrhage, small or copious, is a frequent symptom. The frequency of hemorrhages in the newly-born, leading to asphyxia, convulsions, idiocy, or early death, is caused by the thinness of the vessel walls, whose tissue has not yet evolved from its embryonal condition. This, or a similar condition, may continue for life. This hypoplastic state, however, is not, of necessity, general: it may be local. The early nose-bleedings of some, though they have no heart-disease, and the congenital tendency to aneurisms in places where the elastic tissue is either scanty or absent (mostly at the origin

of branches), prove the occasional occurrence of these circumscribed and local defects. A uniform thinness of the arteries, however, is most likely to be complicated by their narrowness, which has been studied by Virchow, Sée, and others in its relation to incurable chlorosis, palpitation, and cardiac asthma. That thinness which predisposes to fatty degeneration of the intima and media, to sclerosis of the adventitia, to atheromatous endarteritis, and to the formation of aneurism at an early age has not been made the subject of active treatment, so far as I know, except by myself. The number of such cases is naturally small compared with the total number of a large practice or clinic ; but I feel convinced that the administration of phosphorus,—not phosphates of any kind,—with its stimulant effect on the growth of connective tissue in general, has rendered me good service in habitual tendency to cutaneous, mucous, and internal hemorrhages. Hæmophilia of moderate degrees appeared to me to improve under its use, and the children to be safer and better developed. The dose for a child of three years should be from one-fiftieth to one-thirtieth of a grain daily ; that means from two to three minims of the oleum phosphoratum, or from one to one and a half teaspoonfuls daily of the elixir phosphori (United States Pharmacopœia of 1890).

Thrombosis of veins in general, and of the sinus of the dura mater in particular, is the result of retardation of the (general or) local circulation and of coagulation of blood by marasmus from whatever cause: rapid elimination of water (cholera infantum), debility of the heart, pressure on veins, or inflammation in the neighborhood (for instance, caries of the petrous bone). In the cranium the right transverse sinus is most frequently affected, but quite often also the inferior petrous, cavernous, and longitudinal sinuses. These thromboses cause hyperæmia, œdema, or extravasations; these are the symptoms by which the diagnosis is made. The treat-

ment must be preventive in order to be successful. Early attention to the ear and mastoid process, treatment of diarrhœa before inspissation of the blood and heart-failure take place, timely stimulating and roborant treatment, and not *pro re nata*,—that is, when it is just a little too late,—are the best preventives. The subcutaneous injection of large quantities of warm sterilized water, with chloride of sodium (1000 : 7), is capable of preventing the inspissation of the blood which results from acute and copious diarrhœa, and often proves life-saving.

Congenital local dilatations of blood-vessels, capillaries, smallest veins, and smallest arteries, together with an increase of their number, and mostly with incompetent structure, are known by the names *nævus*, *telangiectasia*, *angioma*. Their color depends on the nature of the blood-vessels composing the anomaly, also on their distance from the surface, their size on the extension of the morbid process, and their size and consistency on the admixture of connective tissue. They are found in all sorts of tissues and organs, mostly on the surface of the body; in the subcutaneous tissue, when mixed with much connective tissue, they are liable, after having remained unchanged for many years, to undergo sarcomatous degeneration. Therefore, and because of their tendency to rapid growth in every direction, with increasing deformity and possible danger from hemorrhage, the early removal of all those which do not exhibit from the beginning a tendency to fade and finally disappear is indicated. The methods followed to obtain that end are very numerous. Vaccination over a nævus will generally destroy it, but may do so but partially, and will leave a bad scar. The plaster of tartar emetic and Vienna paste cannot be controlled to such an extent as to destroy the growth only. Injections of the perchloride or of the subsulphate of iron are known to have given rise to extensive thrombosis, gangrene, and death; injections of alcohol have been

tried, but have not, I think, reached further than the ear of the medical public. Corrosive sublimate in collodion (1 : 8) is an excellent caustic where the nævus is not extensive, particularly on the head; it rarely requires more than a single application. Fuming nitric acid is perhaps the best of all local applications; the pain is but temporary, and the effect circumscribed and fairly thorough. But it ought to be used for superficial nævi only, and even then must be repeated in a number of instances. Excision is a good method if the operation can be performed in a short time and all the morbid parts can be safely removed without loss of too much blood. The ligation of angiomatous tumors is indicated where they can be entirely grasped either without or with the aid of needles run through their base; but time is required for them to finally fall off, and the wound demands careful and persistent antiseptic treatment until the danger from local infection has passed and a smooth scar has been secured. Electrolysis has been praised very highly, particularly in the treatment of the extensive wine-marks. Still, personally, I never saw a satisfactory result in these cases. There always remained speckled, whitish scars of small size alternating with the original discoloration, a result which I should not claim as an improvement upon the original condition. The actual cautery is the most satisfactory of all our remedies; very few will at present use it in any other shape than that of the galvanic or the thermo-cautery. The heat must not be excessive; white heat destroys blood-vessels too rapidly to permit of simultaneous coagulation of the blood, and produces hemorrhages. Dull-red heat will accomplish a cure. A momentary application suffices for a superficial nævus; its action can always be controlled and strictly localized, and the formation of the scurf secures against surface infection. Nor are large angiomata inaccessible to it. When these are to be destroyed, it is best not to attempt too much at first. It is unnecessary to

destroy everything; long after the direct effect has passed away, coagulation in the blood-vessels and slowly progressing cicatrization result in the gradual lessening of the swelling. When the reduction of the nævus ceases, the operation is repeated, sometimes after many weeks or even months. The cautery is then introduced into the very spot where the previous application was made. In this way the surface cicatrix remains localized. As a general rule, a cicatrix following the application of the actual cautery is smooth and becomes more so and less perceptible from year to year.

X.

DISEASES OF THE NERVOUS SYSTEM.

THE great indication in the treatment of all *diseases of the nervous system* attended by symptoms of irritation is absolute protection against external disturbances. This is attained by equable climate, uniform temperature of the room, rest in bed, exclusion of light and noise, by comfortably warm clothing, warm bathing, warm applications and fomentations, and by the removal of any- and everything annoying and jarring. Therefore, children sick with nervous diseases must not be excited by unnecessary constraint or coercion, their medicines ought to be given in a palatable form, and vesicatories and other distressing applications avoided, if possible. Symptomatic treatment is perhaps more indicated than in the same class of ailments among adults. Pain and sleeplessness lead to speedy exhaustion. Nothing is more common and more dangerous than the prejudiced refusal to relieve pain by opiates and sleeplessness by properly selected narcotics. It is particularly in those cases which are mostly, or entirely, of a reflex nature that a symptomatic treatment ought to accompany that of the causal indications. It is ludicrous as well as criminal to withhold chloroform when an eclamptic attack results from an intestinal irritation, or an antispasmodic when a cough is caused by stomach, ear, or nose.

In conditions of depression, debility, and paralysis the treatment should be stimulant, exciting, and roborant. In such cases the electric current is frequently employed, and is, to a certain extent, useful. Massage has a beneficial effect not only on the periphery, but by its general action on innervation and circulation, by its effect on the muscles, and also by its direct influence in increasing the relative circulation

of the red blood-cells (John K. Mitchell). Strychnia stimulates (while curare depresses) the reflex and vaso-motor centres. Nitrate of silver appears to exert a favorable influence in spinal paralyses; muscarin, physostigmine, and nicotine in paralytic conditions of the unstriped muscular fibres.

The interrupted electrical (faradic) current is an excitant—stimulant—of the nervous system, both locally and generally. For the latter effect general faradization has been practised, both through large electrodes and in the bath, to great advantage, according to many who have a right to claim a large experience. The generally stimulant effect does not, however, disprove the fact that, like the galvanic, the faradic bath is capable, particularly when the fine wire coil is used, of reducing undue sensitiveness. The action of the galvanic current is claimed to show itself in different ways. It is stimulant and excitant, and (directly, or when interrupted by reversing), mainly when the brush is employed, produces pain, contraction, and consecutive dilatation of blood-vessels. It is electro-tonic, and thereby produces changes in the irritability of the tissues; it is chemical, and thereby decomposes fluids; and it is cataphoric, and thereby transfers solutions through badly conducting tissues. To the two poles different properties are attributed. It is the positive pole (anode) which is credited with a tranquillizing effect in inflammations and neuralgias (less in tic and hemicrania than in supra-orbital, occipital, intercostal, lumbar, and sciatic neuralgias); the negative (cathode) is claimed to influence old inflammatory processes, cicatrices, and indurations. Still, there is no doubt in my mind as to the exaggerated character of the expectations once cherished in regard to the effects to be obtained by both electricity and galvanism. The difficulty of reaching a coveted spot through tissues of different conducting powers is always great; the accumulation of fat is a powerful obstacle to the transmission of the current, and its amount cannot be calculated. This is so true

that even for purposes of diagnosis the subcutaneous fat of babies and many women offers a serious impediment. Besides, different morbid conditions and different periods of life interfere with the estimation of the effect of the current. In what has been called the reaction of degeneration both the faradic and the galvanic irritability of the nerves are diminished, and while the galvanic excitability of the muscles is preserved, the excitability by the faradic current is lowered. In the very young,—the baby under two months,—as general reflex irritability is lowered, comparatively strong electrical influences are required to obtain effects. At all events, therefore, the action of the different currents is, to some extent, not measurable, controllable, or certain. The time during which both the faradic and the galvanic current were considered far-reaching and omnipotent remedies has long gone by. Indeed, there are those, particularly among neurological specialists, who, while maintaining that the currents are great aids for diagnostic purposes, yet reject their claims as curative agents. But lately Meltzer—in a paper read before the Association of American Physicians—has proved the total absence of efficacy on the part of the electrical current when applied to the mucous membrane of the stomach and the intestines. It is to be hoped that the exertions of the American Electro-Therapeutic Society will clear up many doubts and obtain results commensurate with the enthusiasm which gave rise to its foundation.

Franklinism, once the only recognized electrical remedy, has rapidly regained a standing, much of which is due to Dr. W. J. Morton, of New York. But neither the common disruptive discharges which he uses in locomotor ataxy nor his "static induced currents," obtained by adding condensers to the static machine, will find many applications among children affected with diseases of the nervous system.

The effect of the electrical and the galvanic current is perhaps best exhibited in cases of peripherous nervous affections.

Paralysis of the facial nerve and of the *brachial plexus*, both not infrequent after difficult or clumsy deliveries, are among those in which the current is frequently used; its effect is mostly very slow, sometimes not very satisfactory. Particularly in cases of facial paralysis, where the reaction of degeneration has already been established, it leaves much to be desired. The same must be said of *polyneuritis*,—such as follows infectious diseases, with its pain and increasing paralysis and degeneration, together with intact bladder and pupils,—in which rest, salicylate of sodium, and, later, strychnia yield better results than does the current. Nor is it more effective in *hemicrania*, no matter whether it be the result of congenital disposition, or complicated with hysteria and epilepsy, or dependent on anæmia, hypermetropia, dyspepsia, overwork, or confined air. In all these conditions the correction of the causes, a convex glass, country air, shortening of school hours, cold-water treatment, arsenic, iron, and aconitia, with an occasional dose of a bromide, will yield better results.

To complete what I have to say on the subject of the remedial influence of electricity and galvanism, I may as well speak here of their employment in the peculiar changes of the muscles which are known under the heads of *muscular atrophy*, *progressive juvenile muscular dystrophy*, and *pseudo-hypertrophy*. All of these names are applied to abnormal conditions whose coarse anatomical changes are better understood than their causes. In a certain percentage (exactly as in Thomsen's *congenital myotony*) the alteration is in the beginning strictly local; in others there can hardly be a doubt as to the cerebral origin of the muscular anomaly. In all of them electricity and galvanism have been extensively used, together with massage, bathing, etc., but in no case have their effects been noteworthy. As in many other cases where the original cause (or change?) is inflammatory, and exhibits itself in proliferation of cellular interstitial tissue (no matter what its final result is

destined to be), mercury, mostly the bichloride,—administered patiently and watched carefully,—appears to have given me better results. At least, the duration seemed to be longer and intermissions of the morbid process more distinct and prolonged.

Operations on the skull and brain are among the prides of modern operative surgery. Escapes from death on the table are more numerous than formerly, and recoveries from diseases formerly fatal, because permitted to die without an operation, are not infrequent. Craniotomy has been performed for injuries, intra- and extra-dural hemorrhages, hydrocephalus, softening, tumors and cysts, Jacksonian epilepsy, athetosis, chronic contractures, certain mental diseases, otherwise incurable headaches, old cicatrices, and abscesses. Infants and children come in for their share, mainly with abscesses, hemorrhages, hydrocephalus, Jacksonian epilepsy, and premature ossification of the cranial bones and fontanels, with epilepsy and idiocy among its results. So far as craniotomy and craniectomy are concerned in cases of *microcephalus* or *idiocy*, no other surgeon has met with the favorable results alleged to have been obtained by Lannelongue. Guided by thirty-three cases of American surgeons,—fourteen of which died soon, while nineteen recovered, and very few showed any improvement,—I have treated of the subject in my address before the Eleventh International Medical Congress at Rome, April, 1894,* and have arrived at the following conclusions: that congenital idiocy is the result of many different forms of arrest of development (of blood-vessels, cortex, island of Reil, hemispheres), of inflammations (meninges, encephalon, with softening, or sclerosis), of thrombosis, and of hemorrhages; that it is a frequent result of microcephalus, which, as a rule, is not dependent on premature ossification of the bones and fontanels, but in the large majority of cases on arrest of de-

* "Non nocere," New York Medical Record, May 19, 1894.

velopment of some parts of the brain, mostly connected with long-continued patency of the fontanels; that, therefore, operations undertaken to widen the cranial cavity are of no use, for a brain which did not grow before the cranium closed will not grow afterwards, and absent or defective parts will not develop; that even cases with a clear history of premature ossification are not, or very doubtfully, benefited; that, finally, the operation undertaken for the purpose of enlarging the cranial cavity has the opposite effect, as is proved by the experience of Van der Veer and Hun, also by a case reported and drawn by Bourneville, and, finally, by the skull, belonging to B. Sachs, of a child operated upon twice in the course of sixty-seven days by A. Gerster. It exhibits a mass of hard tissue proliferating into the cranial cavity along the whole wound made in the first operation. I trust, therefore, that the days of uncalled-for craniotomy and craniectomy are numbered.

Starr observed, in 1889, a total of 270 *brain tumors* in children. Of these, 152 were tubercles, 37 gliomata, 34 sarcomata, 5 gliosarcomata, 30 echinococci, cysticerci, and cysts, 10 carcinomata, and 2 gummata. The carcinomata were mostly secondary, the gliomata and sarcomata primary. Forty of the two hundred and seventy were superficial, and in sixteen of the forty their localities could be distinctly diagnosticated. Therefore, trephining and operations on the substance of the brain for tumors will never be numerous. Their diagnosis is not always easily made, and that of the locality affected is beset with still more difficulty. Gliomata are but rarely near the surface; solitary tubercles are sometimes found in the gray substance of the brain, but more frequently in the corpora striata or thalami optici. In many more instances an operation will be required because of tumors originating in the cranium or its periosteum and encroaching upon the brain; they are mostly sarcomata, fibro-sarcomata,

or osteomata. One of the last mentioned I have removed. A cyst of the dura mater, resulting from hemorrhage, was successfully removed in the service of Dr. Henry Hun, at Albany, followed by marked improvement of the child's idiocy and convulsibility.

The simplest form of *cerebral meningitis* is that which results from insolation and mental emotions and exertions. Frights (especially protracted fears) and overstudy are frequent causes. So is trauma, which, however, is liable to produce the purulent form. In pneumonia, particularly of the upper lobes, it is not uncommon; less frequent in typhoid fever, more so in the septic diseases of the newly-born, where, however, it is liable to form part of the general pyæmic condition. An antiphlogistic course of treatment is here indicated, if anywhere. The hair should be cropped short; the head must rest on a cool pillow and be placed high. Calomel at first in purgative, later in smaller doses. As the mercurial treatment is to be continued, a solution of potassic chlorate ought to be applied frequently to the gums and mouth. The heat of the head and the local inflammation must be fought by cautious cold applications, according to the directions formerly given (p. 88), and by leeches applied to the nasal septum or to the mastoid processes, also by cupping to the neck and shoulders; coma by cold affusions to the head and hot bathing of the rest of the body. Great restlessness, sleeplessness, and general excitation demand warm bathing, bromides in generous doses, from one to ten grammes (fifteen to one hundred and fifty grains) a day, chloral, and codeine. After the first invasion and the period of high fever have been successfully dealt with by calomel and a few large, afterwards moderate, doses of digitalis, the time for iodide of potassium (one to five grammes daily) has arrived, also for vesicatories to the neck and behind the ears. In regard to the latter, however, it is always well to be care-

ful, for cantharides are the sworn enemies of the kidneys. The iodides must be continued a long time. Of the roborants to be given during convalescence, iron ought to be the last one selected.

It is not always easy to diagnosticate between a fully-developed meningitis and a *hyperæmia* resulting from similar causes,—viz., overexertion, emotion, insolation, and the continued effect of overheating and stimulating diet. The continuation of the treatment depends on the persistence of the symptoms. Quite frequently a warm or hot mustard bath, with temporary applications of ice to the head, repeated hot foot-baths, sinapisms to the neck, an erect posture in bed, a calomel purgative (with or without local depletion), and occasional counter-irritation by derivant enemata (vinegar 1, water 5–6) will suffice. The *passive hyperæmia*, however, complicated with and depending on general and local *cerebral anæmia* (occasionally even *thrombosis* of small vessels) and that which is caused by the rapid inanition produced by the different forms of acute and exhausting intestinal discharges require an altogether different treatment. In place of the antiphlogistic treatment, stimulation is indicated. Still, caffeine and alcohol are to be avoided during the worst stage; camphor, ammonium carbonate, and musk will answer better. Food and medicines are to be regulated by the requirements of the follicular or other enteritis, and water must be supplied in ample quantities. When there is vomiting and diarrhœa is persistent, neither the stomach nor the rectum will accept it. In these cases the only salvation may be in copious (pint or quart) subcutaneous infusions of warm and sterilized salt-water solution (water 1000, table salt 6–7, sodium carbonate 10–12).

Thromboses from other causes are treated on the same principles. Debility and paralysis require such stimulants and irritants as the brain will tolerate. *Embolisms*, with their sec-

ondary conditions of irritation and inflammation, should be treated according to the rules detailed above, and will require ice, purgatives, warm bathing, and iodides, with or without bromides. The resultant paralysis demands massage, electricity, strychnia, and mineral baths such as St. Catharines or Kreuznach. Chronic remnants of an inflammatory disorder, no matter from what cause, may be benefited, even after a long time, by a protracted course of treatment with iodide of potassium, or with mercurials, or both together, or alternating.

Ergot is useless in these cases of intra-cranial hyperæmia; it does not have the favorable effect often following its use in similar changes in the spinal canal.

Tubercular meningitis is not always fatal, though the diagnosis permit of no doubt. The latter, however, is mostly made at a time when the prognosis is very ominous. Biedert had an opportunity to make an autopsy on a patient treated for tubercular meningitis, death resulting from another disease. He found old meningeal tubercles. Still, many of the recoveries reported—mainly for the purpose of proving the efficacy of specific treatments (tartar emetic and iodoform ointments, etc.)—are of doubtful character. I have also seen recoveries from what I diagnosticated as tubercular meningitis. One died afterwards of necrosis of the cranial bones, occasioned by my tartar emetic ointment. Another case, that recovered thirty years ago, is still alive in an insane asylum; he has never been normal, mentally, since I discharged him "cured." From what little I have said it is evident that a preventive treatment only may be expected to do good, if anything will. Infants and children of scrofulous or tuberculous families must be brought up with unusual care. Congestion of the brain, caused by feather pillows, exposure to the sun, hot rooms, coffee, tea, and alcohol, physical and mental overexertion, must be guarded against. Constipation

must be overcome. Eczema and other eruptions of the surface should be slowly healed, but they must be healed. Their presence is a constant source of danger, both by reason of the opportunities afforded for a direct invasion of microbes, and of the irritation and swelling of lymph bodies. These, when found, must be removed by internal treatment, massage, ointments (green soap, iodide-lanolin mixtures), or enucleation. Nasal catarrh should be immediately relieved; its persistence is a cause of "scrofulous glands" and, possibly, of secondary tuberculosis; also of direct invasion of germs through the patent orifices of the lymph-vessels at the base of the cranium and the extra-dural tissue. The best general preventive treatment of infants and children with a predisposition to tubercular meningitis, rendered probable by hereditary taint and by suspicious symptoms, consists, in my opinion, in the regulation of the diet and hygiene: animal food mostly, daily cool or cold bathing with vigorous friction, open windows, exercise, cod-liver oil during the cool and cold months, arsenic in regular small doses, and pure guaiacol (or the carbonate of guaiacol) for many months in succession through a course of years.

When the disease is fully recognized, constipation must be overcome; the first drug to be used for that purpose must be, or contain, calomel. It may be repeated from time to time, provided the regular use of iodide of potassium does not contraindicate it. The latter ought to be given in large doses through (nearly) the whole duration of the illness. Tubercular meningitis both permits and demands large doses,—from one to three drachms (five to twelve grammes) daily. Mercury is indicated. Calomel and iodide of potassium being incompatible, the bichloride should be given, or mercurial ointments used instead. Cardiac stimulants may be employed to advantage from the beginning, the circulation being defective on account of the undue irritation of the pneumogastric nerve.

Strophanthus and strychnia in very small doses will probably act better than digitalis. Caffeine and alcohol must be carefully avoided. Chloral will act well when headache is severe and a tendency to convulsions exhibits itself. To combat the latter the inhalation of chloroform cannot be avoided; nor can morphia altogether, when the pain is excessive. Antipyretics are not indicated in the beginning, when the temperature is low; during the last few days, when it rises previous to death, they are useless. With tartar emetic ointments applied on the closely shaved head I have had ample experience, and shall not employ them again. My experience with iodoform ointments (1 : 5–10) is but small, and my confidence in their efficacy less. Vesicatories may do harm by annoying and irritating the patients; I expect more derivative action from keeping the bowels open and the body sufficiently covered with clothing. Leeches are seldom useful, except when conjunctival injection and local heat of the head become apparent at an early date. Otherwise, symptomatic treatment is all that can be advised. Unusually severe vomiting in the beginning may require ice pills and mild doses of an opiate, or cocaine, perhaps tincture of iodine in one-quarter- to one-half-drop doses, or arsenous acid, $\frac{1}{300}$ to $\frac{1}{500}$ grain ($\frac{1}{5}$–$\frac{1}{8}$ milligramme), from four to ten times a day. Ice applications are useless, for the temperature is low, the local hyperæmia mostly passive, and the tolerance of ice in small children easily exhausted.

To what extent the operative treatment by trephining and draining will prove successful remains to be seen. There are but few cases of tubercular meningitis not complicated with general miliary tuberculosis; thus the prognosis of operative interference is not at all promising. Besides, the cranial cannot be compared with the peritoneal cavity, which is known to be favorably influenced by the performance of a laparotomy. Peritoneal tuberculosis is very apt to be isolated and uncomplicated, its secreting surface of a different char-

acter, and drainage easier. Quincke, Fürbringer, Caillé, and others have tapped the spinal canal between the third and fourth lumbar vertebræ. The operation has resulted in facilitating a diagnosis (by proving the presence of bacilli in the cerebro-spinal liquor), in temporarily relieving symptoms, but never in a cure.

The prognosis in, and the results of treatment of, *chronic hydrocephalus* depend on its nature. When it is congenital, no matter whether internal or external, whether the result of a fœtal inflammation or of an arrest of development, the morbid processes leading to it are so serious as to render the outcome of treatment—though it do not prove fatal—very problematic. Substantial changes of the original brain-substance cannot be remedied by the removal of fluid. Nor is it probable, or rather possible, that the cerebral atrophy produced by permanent intra-cerebral pressure can be overcome by attempts at relieving hydrocephalus. The chances are better when chronic hydrocephalus is the result of a post-natal meningitis. But even in these cases, while the recoveries—I mean anatomical recoveries—from the secondary effusion are more numerous, the inflammatory alterations both in meninges and brain are such as either to predispose to future meningitis, or to so alter both the physical and mental functions of the cranial contents as to render the result either very doubtful or far from desirable. Our prisons and lunatic and idiot asylums tell the tales. The chances of hydrocephalic patients are best when the disease is the result of chronic hyperæmia,—for instance, in craniotabes. Children with a slight amount of hydrocephalic effusion are always apt to get entirely well under proper antirhachitical treatment (fresh air, animal food, phosphorus, iron, etc.), and even large amounts of fluids are absorbable, with restitution of the brain and its functions, in a certain percentage of cases.

After all, it is evident that iodides, mercurials, vesicatories,

diaphoretics, diuretics, and purgatives are useless in congenital hydrocephalus. In the other forms the diagnostic and therapeutical skill of the practitioner will make the required selection, as far as indicated. Should the head grow rapidly, the prognosis is bad. In these cases even compression will do but little, inasmuch as compression of the increasing fluid will also compress the brain. In less progressive cases the application of rubber bandages or caps, also adhesive straps, may do some good. They should not be omitted in all cases where puncture is resorted to, provided the cranium is still compressible. Indeed, in almost all the cases on which it was performed the children were quite young and no ossification of the sutures had taken place. Therefore the case successfully operated upon by Rehn, of Frankfort, Germany (with repeated punctures),—that of a girl of twelve years, who was presented (alive) before the German Congress for Internal Medicine of 1886,—may be considered very exceptional.

Punctures of the hydrocephalic cranium were made in antiquity, but, like many other experiences of Hippocrates, were forgotten. It was not until this century that observations of recoveries were made after the intra-cranial fluids had found a spontaneous or traumatic outlet. Höfling published a case (1828) of recovery after a complicated fracture of the frontal bones and a discharge extending over days; Greatgood (1828) one after an injury produced by a nail; Haase (1818) one of spontaneous perforation. Huguenin collected six cases of recovery after a discharge through the nose (or ear) had been established. Punctures have been made in great numbers; many more, certainly, than have reached the eyes of the medical public. It can, however, be easily understood that very probably not a single case of recovery has taken place but has been published. Indeed, the publications are mostly made very soon after the operation or operations are performed. Thus, when Beely collected twenty-seven cases of recovery

after puncture (two of which were combined with tincture of iodine injections), he expressly stated that only eight of them had been under observation a year or more. Altogether, it may be more human than, unfortunately, scientific to pride oneself on one's results, particularly when these results prove of benefit to mankind. Thus, Conquest reports "ten cures" out of nineteen cases operated upon by himself. West, than whom there is no critic more learned, wise, and incorruptible, collected sixty-five cases with (alleged) "sixteen recoveries," which he, however, reduced to from three to perhaps five. Battersby came to the conclusion that probably there was one recovery in fourteen cases on which the operation was performed. But from my previous remarks, referring to the severity of the original lesion and to the results of the fluid present either outside or inside the brain, it is easily understood that I cannot look upon the result of the operation as anything like as favorable as is claimed. Still, there are many cases in which it must not be omitted, together with general treatment. Among the remedies I value most highly here or wherever tissue-building is a main object is phosphorus. It may be alternated or combined with iodides, digitalis, iron, or arsenic, according to circumstances.

The puncture must be made over the large fontanel, about one centimetre or more (half an inch) from the median line; vertical when the lateral ventricle is to be reached, diagonal when the hydrocephalus is external. It is best not to remove much fluid the first time; from fifty to sixty cubic centimetres (℥ii) will suffice. As a rule, there is but little reaction, and the operation may be repeated within a few days or a week. During the operation and after it compression must be made to prevent hyperæmia, hemorrhage, and rapid re-effusion. In cases of external hydrocephalus a mild injection of iodine, or of iodide of potassium and water ("Lugol"), may be given to suppress secretion. It will take very numerous observations,

however, during the next fifty years to determine to what extent all these attempts at suppressing secretion and at facilitating meningeal adhesions are valuable in the interest of families or of mankind in general.

A number of chronic degenerations of the brain, both general and local, are the result of inflammatory processes. If they be prenatal, the prognosis is very bad; if acquired after birth, the nearer the beginning of treatment to their origin the better the possible result. Such conditions are *disseminated sclerosis*, also the *infantile spastic hemiplegia* depending on encephalitis, and *bulbar paralysis*. The general indications for treatment are the same. In acute exacerbations, depletion, ice, and laxatives will be required; bulbar paralysis may often demand a local application of ice. The chronic condition requires the different forms of electrical and galvanic treatment, iodides, mercurials, and warm bathing. In all such cases the indications are pronounced enough, but the results mostly negative.

Meningocele and *encephalocele* (hernia of the brain) are but rarely amenable to a successful treatment. When they are small, the protruding contents may be retained by a properly fitting appliance of lead or leather or rubber, until the abnormal aperture has had time to close. This process may be accelerated by the administration of phosphorus (ol. phosphoratum or elixir phosphori), of which the newly-born may take at the rate of one-third of a milligrame daily (gr. $\frac{1}{180}$). When larger and irreducible, the tumefaction has been caught in a clamp and punctured, or removed altogether. In some cases the clamp was allowed to remain, in others it was removed; in the latter the wound was sutured. Similar treatment has been resorted to in a few cases of *meningocele spuria*, which results from fissures of the cranium induced by forceps operation, by fall or other trauma, by caries, or by syphilis.

Epidemic cerebro-spinal meningitis requires absolute rest of

both mind and body from the very beginning. Though the prognosis be much better than in the different forms of cerebral meningitis, the long duration of the disease endangers the result. Noise and glaring light must be excluded, no muscular exertion permitted, the neck supported; in bad cases of hyperæsthesia the bedclothing should not be permitted to touch the body. The urinary bladder requires watching. Leeches applied to the painful spine will do some good in the very early stages; an ice bladder, on which the neck must be made to rest comfortably, and another one to the occiput, and a purgative dose of calomel ought to usher in the remedial treatment. Unless contraindicated by great sensitiveness, mercurial ointment externally and iodide of potassium internally are expected to do good. The latter is generally given in too small doses, and thus misses its effect; from three to five grammes (grs. 45 to 80) daily, and more, are easily tolerated, and are required by a child of five years. Bromides will quiet excessive restlessness (doses of 1–4 grammes a day); there are, however, very few cases but will be greatly benefited by sufficient doses of opiates, or chloral, to insure comfort and sleep. Sinapisms should be applied for a few minutes at a time, and frequently repeated; in the later stages a vesicatory over the cervical part of the spine is indicated. I am not pleased with the effects of tincture of iodine or iodoform ointments. Salicylic acid and salicylates have been praised; but I am afraid that the cases in which their good effects were observed were those of mistaken diagnoses, for, indeed, rheumatism of both the muscles and the meninges has been taken for different forms—even the very gravest—of meningitis. The after-effects of the disease, particularly paralysis and contractures, are difficult to handle; their treatment does not call for any special measures dictated by the original disease. Deafness is liable to prove permanent, in spite of hydrotherapy, diaphoresis, and electro-therapy. The actual cautery has been

used extensively. In the acute stage of the disease it is useless or harmful; in the chronic it has been known to do good, and may be applied regularly.

The modern progress of our acquaintance with the etiology of infectious diseases adds to our preventive powers. H. Jaeger (*Zeitsch. f. Hyg. u. Infect.*, xix. p. 351) asserts that sixty per cent. of all cases of cerebro-spinal meningitis are connected with or dependent on the pneumococcus (and diplococcus intra-cellularis?). This explains the frequent complication with pneumonia. Thus, the nasal secretion in which the diplococcus is of frequent occurrence requires particular attention. Indeed, as early as 1888 the Prussian government ordered the disinfection of linen—mainly handkerchiefs—from this point of view. For the same reason the violent aspiration of the naso-pharyngeal secretion, for the purpose of expectoration, may prove unfortunate for the individual and, secondarily, for the community.

The general rules for the treatment of diseases of the organs contained in the *spinal canal* are almost identical with those detailed in reference to the brain and meninges. With the exception of rare cases of pseudoplasm, the changes occurring in the spinal cord and its meninges depend on anomalies of circulation, or on some form of inflammatory process, either in an acute or a chronic state. To the latter class belong the final and persistent lesions of *spinal*, *pachy-*, and *lepto-meningitis*, *transverse myelitis*, *poliomyelitis*, *lateral* and *amyotrophic lateral sclerosis*, *paramyoclonus*, and *tabes*. Before entering upon a course of treatment, it is of the greatest importance to study the etiology of an individual case; a disease of the bone, or tuberculosis, or syphilis must be known before it can be effectually treated. Nor is it superfluous to omit the exact diagnosis of those ailments which are more and more supposed to be of an infectious nature and bacteric origin, such as *Landry's paralysis* and *poliomyelitis;* for the time

may come, even during our lives, when an extensive anti-infectious, antibacteric, antitoxic treatment or preventive immunization will be among the accomplishments of modern therapeutics.

In every case of acute disease of the spinal cord or its meninges absolute rest is required. But the patient, to avoid overheating and hypostasis, must not be kept on his back constantly, or most of the time, and not on feather beds or pillows. Quilts covered with linen or cotton sheets, air mattresses, or water beds are often absolute necessities. When the acute disease can be localized, as mostly it can, cold water, ice-water, the ice bag, with now and then an ether spray, or local depletion by cups or leeches, are indicated. Vesicatories or tincture of iodine ought to be avoided in this stage, because of their irritating and annoying effects. Purgatives are required on general principles,—calomel (and) or salines. Now and then a mustard bath, quite hot, will act well as a derivant. The indications for digitalis (or other heart regulators and invigorators) are frequent; direct antipyretics are seldom required. Quinine acts better here than in diseases of the brain, where it appears to give rise to occasional congestions. To influence the spinal circulation in acute and subacute diseases, ergot (useless in cerebral diseases) holds a high rank; the fluid extract may be given in doses amounting for the day to from one to eight or ten grammes in the beginning, later less, according to age. Its indication does not cease until the stage of chronicity, with anæmia, contraction, and incipient atrophy of blood-vessels. Iodide of potassium is indicated early on account of its influence on circulation, and later for its absorbent effect. The difficulty in handling very old cases is due to the permanency of the local lesions which result from the solidification and cicatrization of the new cell proliferations. Nor are the difficulties in this respect any less, with the exception of some syphilitic cases, in regard to mercury. The

sooner and the more persistently, either internally or externally, these remedies are employed, either simultaneously or alternatively, the better will be their gradual effect. The bugbear of salivation is no longer feared, since it has become more widely known that the younger the patient the better will he bear mercury. Galvanism and the electro-magnetic current are used on general principles, as mentioned before. Neither should be employed at an early stage. The former requires large electrodes, well salted, to reach the cord; the direction of the current does not appear to make much, if any, difference. Sessions of from six to ten minutes, the current being inverted once or twice during that time, once or twice daily, are all that are demanded. The interrupted current is employed later to stimulate the muscular action, and should be used locally with small or more generally with large electrodes, or in the bath. Anæsthesia may require the application of the metal brush. Warm bathing is often attended by very good effects, due to its influence on circulation and the surface temperature. A bath may last minutes or hours; the latter mainly in secondary contractures, which may also require tenotomies. In these cases hot sand baths have been used extensively in Europe, particularly where the fear of water has not yet begun to wane from the minds of the masses. Their usefulness consists mainly in the invariability of the temperature, which requires less attention and watching than a warm water bath. In chronic cases ointments have been extensively used. Still, very few substances can be rubbed through the epidermis and cutis; indeed, hardly any except iodide of potassium (in glycerin, better still in lanolin) and mercury (ointment and oleate). Application to the spinal column is of no advantage; it is better to select the usual places where the skin is thin and the lymphatics are near and numerous,—viz., the inner aspect of the extremities. Here also the actual cautery has been found beneficial, together with the mineral

springs containing salts and iodine (St. Catherine, Kreuznach, Oeynhausen, Nauheim).

In many of both the acute and the chronic cases a symptomatic treatment cannot be avoided. Pain must be lulled. Now and then the anode (positive pole) of a mild galvanic current will have some effect; sometimes the local application of chloroform ointments or chloroform vapor in cotton, an ether spray, a menthol stick, or menthol in a ten-per-cent. alcoholic solution will do good. If not, hyoscine, chloral hydrate, croton chloral hydrate, opiates (internally or subcutaneously), or hot fomentations are required; for there is no greater enemy of the sick than pain, and no greater bliss and gain than rest. Other symptomatic treatment may be required for the motory and trophic paralyses resulting from a number of spinal-cord diseases, such as paralysis of the bladder, of the intestines, of the sphincters, and bed-sores. The latter are very ominous, and the ointments of bismuth, or tannin, or balsam of Peru, though they be indicated and locally useful, will not defer very long the final termination. Paralysis of the bladder is said to be benefited by local internal electrization; it is benefited by ice-cold injections; its secondary cystitis is certainly improved by plain or medicated warm irrigation. Paralytic constipation requires physostigma and regular enemata. All of these forms of paralysis will be more benefited by the subcutaneous than by the internal administration of the sulphate of strychnia.

Suspension has been practised for several years in some of the chronic diseases of the spinal cord, mainly in *tabes*, which, fortunately, is rare among children. It may again become fashionable in another generation. Operative extension of nerves is occasionally useful in *contractures* depending on cicatrization.

Acute poliomyelitis (spinal paralysis, essential paralysis, "dental" (!) paralysis, infantile paralysis), as the initial stage

may differ both in its onset and in its symptoms, may require different measures at first. Some cases exhibit a high fever, great excitement and prostration, even cerebral symptoms. The majority, however, come on suddenly, without fever and without premonitory symptoms. The former class requires antipyretics and the necessary attention to cerebral and other urgent symptoms; much more can hardly be done, because in most cases of this class the diagnosis will probably not be made at first, with the exception of those in which it is assured by local pain and the observation of the paralysis. These latter are the cases in which local applications of ice may prove beneficial.

Every case, whether feverish or afebrile, requires absolute rest. The few which are suspected of originating from rheumatism, or those which are complicated with peripheral neuritis, should be treated by salicylates, and locally by warm applications or fomentations. All the rest will do better with cold applications—ice water, ice-bladder, cold water—continued for some time, but with interruptions. Depletion by means of leeches, or by cupping, is often indicated, particularly in such cases as exhibit local pain. I feel certain that a purgative in the beginning (calomel, salines) will do good; so will ergot; the equivalent of from one to three grammes or more may be given daily, either as extractum ergotæ or as extractum ergotæ fluidum. It may be accompanied by a few drops of the tincture of belladonna. As early as possible—that is, as soon as the necessity of absolute rest will permit of inunctions being made—mercurial ointment (on the first day or days the oleate) may be used, and the internal administration of iodide of potassium commenced at once. Both may be continued—particularly the latter—for several weeks; the dose should be smaller than in cerebral meningitis, half a gramme to one gramme daily being sufficient. Tincture of iodine modified by the addition of alcohol,

or sinapisms frequently applied for a few minutes at a time may be used with advantage.

The rapid improvement during the first week after the onset of the disease, and the slow convalescence of the few months before the residual (mostly local) paralysis becomes final, having been established, the indications for treatment will change. Congestion and dilatation of blood-vessels give way to anæmia and contraction, and in place of belladonna and ergot, strychnia must be given; at first, perhaps, internally. It may be beneficial when so administered, but hypodermically it will act better. I cannot agree with Gowers, who claims that it is probably "never either necessary or desirable to give it by hypodermic injection in this disease." Several times a day, for weeks in succession, the cold shower-bath applied one or two minutes to the back, followed by lively friction, will contribute to the stimulation of the spinal circulation.

The rapid waste of the paralyzed muscles requires local stimulation. Frictions with oil, vaseline, alcohol and water, tepid water, or hot water must be made several times a day. Where the surface circulation is still fair, cold water may be preferable. Passive movement must take the place of active exercise when the latter is impossible. The faradic current will stimulate and may improve whatever there is left of contractility. Should it become totally inactive, the reversed galvanic current may take its place for the purpose of exercising the muscles. Otherwise the galvanic continuous current is eminently the nerve and blood-vessel stimulant, and must be constantly used to keep up the circulation and thereby the nutrition of the degenerating tissues. It is best applied through large electrodes, and should be made to ascend and descend alternatively. Sessions of from six to ten minutes, one or two every day, are sufficient, but they must be continued a long time. I know that limbs which had remained unchanged in their atrophy and uselessness for years im-

proved under patient galvanic handling, when persisted in for a long time.

Mechanical appliances will prove useful. The arm must be so supported as to render the paralytic slipping out of the socket of the paralyzed humerus an impossibility. The rare cases of dorsal paralysis require a jacket or a properly fitting corset. The paralyzed (mostly extensor) muscles of the lower extremities demand elastic bands, so as to counteract the contraction of the antagonistic flexors and thus facilitate walking. Meanwhile the remedial agents mentioned before must be continued. Strychnia will always do good, and phosphorus will act both as a nerve stimulant and as a tissue builder. It may be given to a child a year old in doses of from half a milligramme (half a teaspoonful of the elixir of phosphorus of the United States Pharmacopœia) to three-fourths of a milligramme daily. To expect an improvement of nutrition by ligating the paralyzed limb is a grave mistake. That procedure will tumefy, but not nourish, the constricted part.

Consecutive club-foot requires the employment of proper orthopædic apparatuses at as early a time as is judicious, to prevent an unnecessary degree of anæmia, atrophy, and loss of length. To avoid the necessity of such mechanical aids, an operation has been performed—arthrodesis—for the purpose of anchylosing the upper ankle-joint, in some cases also the talo-calcaneal joint. The after-treatment consists in the use of a plaster-of-Paris bandage, which should be carried three months by children under ten years, six weeks by adults. The highest degree of tendon contraction may require extirpation of the talus, but is usually overcome by tenotomies. After recovery a snug shoe must be worn.

Circumcision has been performed on children affected with poliomyelitis, without any justification either in theory or practice.

The forms of *hydrorrhachis* (*spina bifida*) are various, and

extensive arrests of development or by secondary changes in the treatment differs accordingly. Cases accompanied by other the lower extremities do not respond favorably to treatment. Those rare ones which are complicated with superjacent tumors (mostly lipomata) or with hypertrichosis (very rare) must be carefully watched, for careless operations on what were considered uncomplicated pseudoplasms have proved fatal. Such as are of central origin, the substance of the posterior horns with the nerve-roots spreading over the sac, are of grave prognosis. Spontaneous bursting of the sac must be guarded against, for much loss of cerebro-spinal liquor is apt to terminate fatally in a very short time. Puncture may be resorted to and repeated, a fine needle being used. After each puncture pressure ought to be applied to prevent rapid filling up. A few cases—small ones of simple meningocele—have been known to get well in this way. Or, after the puncture, iodine may be injected. Morton's formula—iodine 1 part, potassic iodide 3 parts, and glycerin 48 parts—has been very successful in his hands and in those of others. Favorable cases have been successfully treated by the clamp, suturing, and gentle compression, and bad cases by extirpation of the sac and utilization of the periosteum of the patient. Robson transplanted that of a rabbit in 1883.

Nicolaier's discovery of the bacillus of tetanus in 1885, and its pure culture by Kitasato in 1889, together with the progress made in immunization and antitoxic treatment generally, add to our hopes of the curability of *tetanus*. Immunization against tetanus has been proved in mice, and recovery has taken place when serum was injected five hours after the introduction of the culture. But it is true that a hundred times the amount of serum was required in an animal infected only a quarter of an hour before, as compared with the amount required before infection was accomplished; it is also true that no absolutely certain and indubitable success has thus far been

proved, but there can be no reasonable doubt as to the results of antitoxic methods of treatment shortly to be developed. Still, the experiments on mice do not prove the efficacy of the serum in the tetanus of the human animal, and no case of tetanus in the latter is on record as having been cured by its antitoxin. The effect of heavy doses of the bromides, of chloral, of curare, and of opium is undoubted. Most of the cases of tetanus in the newly-born and in the adult that I have seen get well did so under chloral and occasional doses of opium. Carefully, but early, must the doses of chloral hydrate be increased. In some instances they were incredibly large.

It is probable that those cases of tetanus which are undoubtedly of bacillary origin are least amenable to treatment. Such as are of rheumatic or traumatic origin, and even such as result from throat inflammations, are perhaps most easily influenced by remedies.

The treatment of *eclampsia* depends on its causes. Repeated attacks may be the results of identical causes,—for instance, feverishness, intestinal disturbances, and emotions,—but they suggest the existence of epilepsy. Indeed, a single eclamptic attack cannot be distinguished from an isolated epileptic seizure. According to the various causes to which eclamptic convulsions may be due, the best preventives are regulation of the diet, of the bowels, and the removal of worms; the withholding of alcohol, coffee, tea, and improper foods; the watching of every kind of fever, from a simple catarrh to an inflammatory or infectious disease. In households where there are babies known to be subject to eclampsia the clinical thermometer is indispensable. Catarrhal fever, intermittent fever, pneumonia, otitis, meningitis, and acute eruptive diseases are often ushered in by a convulsion. Tight bandaging, renal calculus, and splinters in the skin are to be suspected when no other cause is readily found. A normal dentition never produces a convulsion, and "difficult dentition" as a cause of

convulsion is among the affections which are as rare as they are too readily diagnosticated.* The frequency of the habit of lancing the gums, to which many practitioners are still addicted, proves the frequent absence of diagnoses and the readiness with which tribute is paid to the prejudices of past centuries and to those of the female population. Cranial and encephalic rhachitis, with or without laryngismus stridulus, is often attended by convulsions, and requires antirhachitical treatment.

The habit of regularly administering bromides to infants who have convulsions is a bad one. As a regular medication they ought to be reserved for epilepsy. The attack demands the removal of the cause. Irrigation of the stomach, or an emetic; irrigation of the bowels with water, soap and water, oil, turpentine, assafœtida, and a purgative (calomel with or without an antifermentative, such as resorcin or salol, followed or not by castor oil); the proper use of a warm bath; a cold pack frequently repeated, with ice to the head and heat to the feet; the timely administration—in an urgent case antipyrin under the skin—of an antipyretic; chloral hydrate internally or by the rectum; inhalations of chloroform to shorten the attack,—all suggest themselves as most promising. The latter ought not to be deferred, for any moment of a violent convulsion may occasion a cerebral hemorrhage with its dire results to life, or body, or mind. Sinapisms to the neck and to the extremities have often been recommended, but besides the possible after-effect of annoying and irritating the infant suffering from a vulnerable nervous system, they cannot be expected to have much, or sufficient, derivative action. To

* Kassowitz comes to the same conclusion, as, indeed, did many before him. He quotes the literature copiously, also the book of Fleischmann, who quotes me. But, probably because my results in 1862 were so very identical with those of Kassowitz in 1893, it was not thought necessary to take notice of my "Dentition and its Derangements," New York, 1862.

quiet the irritability persisting after an attack, chloral hydrate with or without a bromide, or repeated small doses of codeine or extract of opium, or the camphorated tincture of opium may be administered.

The causes of *chorea minor*—St. Vitus's dance—are either anatomical changes (some of them improvable, some incurable) or functional disturbances. Therefore the treatment should vary according to the etiology, but hardly a case will act well without attention to the functional treatment. Indeed, some forms of the latter are almost of a specific character. Prevention is indicated when the patient is of a neurotic constitution; the descendant of a neurotic family; when suffering from digestive or genito-urinary disorders (masturbation), perhaps supplied with alcohol in more than medicinal doses, or if he has rheumatism or heart-disease. Capillary embolisms, cysts, tubercles, apoplexies, and exudative changes in the nerve-centres, particularly the brain, are not subject to preventive measures. Demme observed a case depending on a fissure of the anus; it admitted of direct treatment; Soltmann a chorea of the left side after traumatic depression of the right parietal bone; others report cases depending on shrinking cicatrices and on neuritis. I have observed a marked case of acute chorea which depended on spinal meningitis of the cervical portion. In this case ice, local depletion, purgatives, and ergot were the successful remedies. (Seguin's "Clinical Lectures," vol. i., 1872, second lecture.) In the *American Journal of the Medical Sciences*, April, 1886, and in the "Festschrift zum 70sten Geburtstag von Professor Henoch," Berlin, 1890, I published observations of partly local, partly general chorea depending on nasal reflexes due to catarrhal and inflammatory changes and to polypi. In all these cases the treatment and cure of diseases of the nose and naso-pharyngeal cavity are demanded as preliminary to the successful treatment of St. Vitus's dance.

When heart-disease or a tendency to acute articular rheumatism is the cause, preventives share largely in the success of the treatment. The hygiene must be strict and medicinal attention to the cardiac ailment close. The rheumatic child must be anxiously watched; pain, be it ever so slight, requires rest in bed for one or two days at least and tentative doses of salicylate of sodium. Helminthes must be expelled.

Neurotic children should not be overworked, the school sessions must be short. Cool or cold washes, with friction, and systematic, but simple and brief, gymnastics in the open air, not in a close school-room, will fortify them. The period of convalescence from any incidental disease must be passed in bed, which should be placed, if possible, near an open window. Anæmia must be carefully watched and treated. The patient should not be allowed intercourse with neurotic, or choreic, or epileptic, or even merely violent children; for some of the worst cases of chorea are those produced by fright. Headaches of a simply neuralgic or ocular origin must be attended to, the latter mostly by glasses, sometimes by the protracted use of strychnia, but not by misdirected and unauthorized operations when there is no disturbance of muscular accommodation.

A patient sick with chorea minor must be kept quiet in body and mind. Bad cases will not get well, unless confined to bed in a quiet room, with no visitors or excitements, with but a single person present to entertain or read to them, with a warm, protracted bath daily, and with ample sleep. Very bad cases must be kept sleeping eighteen out of twenty-four hours by means of mild opiates or chloral hydrate with or without bromides. Sometimes large doses are necessary, but the effect *must* be obtained. I have met with cases in which an occasional inhalation of chloroform was also required. Meanwhile, the symptomatic measures adapted to the average case must also be attended to.

The best symptomatic remedy is arsenic, in the form of liquor arsenitis potassii or sodii. Three doses are to be given daily, much diluted, after meals. When the eyes or the intestines begin to give trouble, or when a serious cutaneous eruption makes its appearance, or should the urine show albumen and casts, it is time to intermit. The doses must be increased slowly but persistently, according to the rule detailed on page 96. The original dose can be doubled or quadrupled; indeed, can be increased almost indefinitely. The cause of failure on the part of arsenic is generally its insufficient dose.

Of other remedies, nitrate of silver may be mentioned; it is of less service here than in some other ailments of the nervous system. Oxide of zinc or valerianate of zinc may be tried, if arsenic happen to be omitted. The galvanic current, warmly recommended by Benedict, has not satisfied me. Sulphur bathing, either natural or artificial, is adapted to cases consequent on rheumatism; it is indicated as after-treatment, as are also rational gymnastics and general roboration.

Tetany has been observed in general disturbances of the general health, after gastro-intestinal disorders and during the presence of worms, in convalescence from acute and chronic (particularly infectious) diseases, after sudden exposures to changing temperatures, in chronic malaria, after injuries to the head, as the result of irritation, or as a consequence of the abuse of alcohol. The fact of the occurrence of tetany after total extirpation of the thyroid gland may lead in future to a correct diagnosis of tetany in children and to an accurate examination of the thyroid gland. It is sometimes absent, or hypertrophied, or in an abnormal condition. The several causes enumerated above prove the occasional difficulty of a satisfactory etiological diagnosis, but suggest the preventive and curative treatment. Pilocarpine has been mentioned as the successful remedy in a case which was probably caused by

exposure. Gastro-intestinal disturbances demand proper medicinal and hygienic treatment. Tetany after infectious diseases and during convalescence generally requires rest in bed, good air, copious (perhaps forcible) alimentation, and roborants. A *very mild* galvanic current, prolonged warm (not hot) bathing, bromides, chloral at night, and small doses of codeine in older children will be required according to the severity of the cases; they will get well after weeks or months. A roborant treatment with cod liver oil, iron, strychnia in small doses, phosphorus, and systematic exercise will restore the general health. The treatment with thyroid gland has not proved a great success in the average case.

Exophthalmic goitre is not a frequent disease in childhood. Of twelve cases reported in literature until 1879, four were mine (*New York Medical Record*, July 5, 1879); they occurred in children of from nine to thirteen years. Nor are the symptoms so grave as they are liable to be in the adult; in many, not all of the three alterations (exophthalmos, goitre, and tachycardia) are found at the same time. In the treatment proper regard must be paid to diet and hygiene. No excitement, fear, work, stimulants. Prolonged or but partial rest in bed at home or in a hospital. Baths of moderate temperature. Ice to the heart and (or) goitre for days, or hours, in succession. Application once or twice daily of a mild galvanic current (negative pole, from one to three milliampères) from five to ten minutes over the sympathetic nerve, between the horn of the hyoid bone and the sterno-cleido-mastoid muscle. Digitalis acts badly, and is apt to increase the tachycardia; strophanthus and iodide of potassium act more favorably. Gowers recommends belladonna in rising doses. My most successful medicinal treatment has been with arsenous acid from two to six milligrammes, atropia from one-third of a milligramme to one milligramme, and extract of ergot a gramme daily. I have had no child's case under

treatment since the partial extirpation of the thyroid body has been practised on adults. The internal administration of thyroid has proved a failure.

Catalepsy is quite rare in children. I have seen but two well-marked cases, one of whom, a boy of thirteen, landed finally in a lunatic asylum. It is intimately related to hysteria and epilepsy, and often attended by psychical disorders. Both its prognosis and its treatment are dependent on the causes, among which fright, masturbation, chlorosis, malaria, helminthiasis, epilepsy, and melancholia have been enumerated. Thus, depletion, diaphoretics, emetics, nervines, anthelmintics, and electricity have been recommended. In most cases medicines are less effective than is attention to general hygiene, both physical and mental. In this respect it shares the fate and prognosis of hysteria, of which it may be considered one of the manifestations the existence of which among children has been more extensively observed and studied since its presence, particularly in connection with masturbation, was discussed by me in 1875 (*American Journal of Obstetrics and Diseases of Women and Children*). Hirschel and Fleisch observed catalepsy after intermittent fever, and Glas noted the case of a boy of five years, who had an attack of catalepsy (instead of a chill), followed by perspiration. In these cases quinia and arsenic take the place of other treatment, with better success.

Another, though rare, symptom of hysteria is *chorea magna*, which differs from chorea minor in the occasional appearance of paroxysms of co-ordinate spasms with psychopathic prodromi and (frequently) termination. Altogether, hysteria occurs with all the symptoms met with in adults. It is not confined to the female sex in children any more than it is in adults, and exhibits the same debility and irritability of the nervous system in general and of emotions, reflexes, imaginations, and will in particular. It is found in psychopathic families as

the result of mental strain, undue ambition, irritation, masturbation, diseases of the ovary, and emotions. Hysteria in a child means, unfortunately, in most cases, hysteria for life. Still, training and education are capable of accomplishing a great deal in strengthening will and character and independence of thought. Such children are better off among strangers than at home. School sessions ought to be regular but short; work in the open air, housework, gymnastics, and hydrotherapy, with general roborants, are indicated and prove successful.

Athetosis, that peculiar form of localized (ends of upper extremities mostly) spasm, can hardly be improved when congenital. Now and then it accompanies cerebral poliomyelitis or tumors. Improvement is claimed to have followed the use of arsenic, bromides, and galvanism.

Most cases of *epilepsy* are observed in, or date from, infancy and childhood. In no disease is the hereditary influence more marked; the state of the future will have to see to it that epileptic persons are not placed in a position to raise progeny equally cursed. Epileptic mothers must not nurse their babies. The child known to be epileptic must be trained very carefully, both physically and mentally. Alcohol and other stimulants, physical and mental exertions, and sudden emotions must be avoided. The hygiene of the skin and of the bowels requires particular care; the use of cold water is imperative; constipation must not be permitted. Feeding with gruesome nursery stories, tight dressing, and early schooling, also horseback exercise and swimming, are forbidden. In the interest both of patient and of schoolmates a public school should not be attended. The child ought to be instructed and trained with a view of preparing him for his future calling, which must not overstrain body or mind, must not be sedentary, nor should it confine him, if avoidable, to the limits and influences of city life and air.

No case of epilepsy should remain without treatment. It is true that there are spontaneous recoveries; even hereditary cases may get better or well; remissions are frequent; intervening acute diseases and many operations have frequently a favorable effect. On the other hand, Gerhardt saw a relapse after an intermission of twenty years. But the knowledge of these facts must not tempt us to procrastinate medicinal and hygienic interference, or to hold out a hope of recovery at the period of "second dentition," of "puberty," or of "marriage."

The best methods of treatment are always either specific or local. Symptomatic treatment may prove very successful with the aid of all-healing nature, but it is always a makeshift. The ideal indications for the cure of epilepsy ought to be—nay, must be—causal; its proximate seat is in the cerebral cortex, but its actual origin in anatomical lesions, mostly, of different localities. Thus, epilepsy may be cerebral, it may be the result of persistently abnormal circulation, or it may be of a reflex nature. All sorts of cerebral tumors, solid or cystic, the results of previous encephalitis and meningitis from insolation, otitis, or otherwise; arrests of cerebral development; premature ossification of one, more, or all of the cranial sutures and fontanels; cerebral exhaustion from masturbation or premature venery; diseases of the heart with secondary venous obstruction; congestion from other causes (in a case of Gerhardt's, enlargement of the thyroid); the influence of prolonged use of alcohol or ergot; the sluggish brain circulation attending constipation and the general toxæmia of intestinal autoinfection; external irritations such as tumors, cicatrices, foreign bodies, and the reflex excitement produced by carious teeth, Schneiderian hypertrophy, and nasal and naso-pharyngeal growths; vesical and renal calculi; helminthes, from tænia to oxyuris; in older children deferred menstruation, are so many different causes of epilepsy. It

is, therefore, only the most painstaking examination of all the organs and the whole surface of the body which gives promise of finding the cause of the disease as well as the indications for rational causal treatment.

Arrests of cerebral development are not amenable to treatment; the method of dealing with the chronic results of cerebral and meningeal inflammations, also the possible value of operations on prematurely ossified skulls, have been previously discussed. Most of the operations on the cranium undertaken for the purpose of healing epilepsy have not been successful, and the most enthusiastic promoters of such operations have rescinded their favorable opinions. Thus, the American Neurological Association, in a discussion which was mainly carried on by Sachs, Mills, Putnam, and P. C. Knapp, expressed itself very reservedly on this topic. But there is no doubt as to an occasional success, nor can there be any as to the feasibility of removing tumors from the surface and the cortex, or of opening and removing cysts and the results of new and old hæmatomata. The human body not being a machine manufactured wholesale, and medicine not being mathematics, the indications both for medical and surgical interference are neither geometrically exact nor are they gospel. For these reasons mistakes are always liable to occur, and recoveries may not be obtained, though no error be committed; for, indeed, habitual convulsions may be so firmly established that even the removal of their original source is no longer an efficient cure. But the insufficiency of medicinal treatment may be such as to sometimes necessitate surgical interference as a last resort.

It is particularly in cases produced by reflex from cicatrices and nasal irritation that local treatment, excision, cauterization, and the removal of polypi and adenoid growths have their signal, though rare, triumphs. The eyes have been accused—"eye-strain"—of producing epilepsy, and hence

have been submitted to operations. My remarks on that subject, as connected with chorea, I can but repeat here. As regards local treatment, we have also to consider the effect on the genital organs when they are the cause of epilepsy. There is no doubt as to the occasional efficacy of digitalis, lupulin, or camphor in such cases. In others a chemical effect is aimed at; thus, in epilepsy from chronic lead-poisoning, sulphur baths, sulphur, and iodide of potassium internally have exhibited good results.

If the approach of an attack be perceived, the patient ought to lie down on a low couch; the inhalation of amyl nitrite, if in time, has warded off many seizures; its effect must not go beyond the first deep flush. If an aura rises from an extremity, a stout ligature around the limb may also act as a preventive. When the seizure cannot be prevented, it must not be interfered with; no hands must be forcibly opened, no convulsive jerking meddled with; but the patient must be protected against biting his tongue or otherwise hurting himself. Among the drugs recommended for epilepsy every narcotic and antispasmodic has had its day. Valerian, pæonia, and artemisia were once highly thought of; so was belladonna, and later atropia, with its paralyzing influence on blood-vessels. Curare was praised for its effect on the muscles. Sulphate of copper has been recommended. Nitrate of silver, in doses of not more than one or two centigrammes daily (gr. $\frac{1}{6}$–$\frac{1}{3}$), best in pills, may be continued, with intermissions, for a long time, and is credited with cures It ought not, however, to be administered more than a month in succession, lest the skin show its effect. Twice in my life have I thus succeeded in producing argyria. Zinc has proved serviceable: the oxide, the valerianate (25 to 50 centigrammes daily), and the sulphate. The latter I have made much use of, beginning with three centigrammes (gr. $\frac{1}{2}$) three times daily for an adult (a child in proportion), in increasing doses. Four

grammes (3i) are dissolved in one pint of water, the first dose being a teaspoonful for an adult, ten or twenty drops for a child, the second the same dose plus one drop, the third the same dose plus two drops, and so on until after twenty days the double dose, after forty days the treble dose is reached. It takes a long time for tolerance to become exhausted; should this happen, a small reduction of the dose is all that is required.

To reduce the irritability of the cortex and the general convulsibility, and thus in the course of time to cure epilepsy, the main reliance is on the bromides. I have not been able to convince myself of the injuriousness of the potassium salt. A belief in its harmful action has been the cause of the substitution of the sodium, or a mixture of the potassium, sodium, and ammonium salts. Whichever plan is followed, there are certain rules which are paramount. The remedy must be given for years; it must not be interrupted unless there have been no seizures for years, except for very good reasons (excessive acne, paresis, sopor, headache, and perhaps the intervention of acute diseases). The doses must be sufficient; a child of two years may take three or four grammes (grs. 45–60) daily. It is best to give a large dose at bedtime, perhaps half of the daily amount; in this way the cerebral symptoms of overdosing are most readily avoided. When they appear the dose may be reduced, but, except in rare instances, the remedy should not be stopped altogether. Perhaps the strontium or lithium salt may take its place for a time, but I cannot say that either have impressed me with the superiority which has been claimed for them. The addition of moderate doses of digitalis has often appeared to me to reduce the drowsiness brought on by protracted large doses. Arsenic in small but regular doses will lessen the tendency to acne.

I cannot say that bromides are badly tolerated in the evening; still, it is claimed that they have a disagreeable

effect. In that case a sufficient dose of amylene hydrate to produce sleep should take their place. Weber, of Dahldorf, precedes his bromide treatment by a regular course of amylene hydrate; on the other hand, there are those who condemn its use altogether because of injurious effects which they claim to have observed (Jastrowitz, Jolly).

Flechsig combines the bromide of sodium treatment with that of opium. His two or three daily doses of the latter, for adults, are from five to ten to twenty-five to thirty-five centigrammes each (gr. $\frac{5}{6}$–6). After six weeks it is suddenly discontinued and replaced by 7.5 grammes daily (ʒii) of the bromide. After this treatment has been continued two months the daily dose is reduced to two grammes. Flechsig claims no direct effect, but only a preparatory action on the disease. Indeed, during the opium treatment there was no relief; but in combination with bromide of sodium, cases which had lasted decades were improved. Radcliffe, however (according to Gowers, *Lancet*, 1880, p. 552), found opium effective in some cases. Gowers saw but rarely any good effects from bromides and opium combined, but believes in the usefulness of small subcutaneous doses of morphia when attacks reappear often and violently. The latest journal reports on the Flechsig treatment are very contradictory.

Pasteur observed that in a patient under treatment for hydrophobia the epileptic attacks ceased (as they do cease after operations of any kind, strong emotions, or acute diseases). For this reason Charcot suggested systematic injections of rabic virus for the purpose of relieving or curing epilepsy. Gibier has imitated the process and claims good results. Pierre Marie goes so far—a good deal too far—as to believe that "idiopathic epilepsy," which he claims to be frequent, is of infectious origin in almost every case, is therefore preventable, and ought to be treated and cured with microbic toxin (*Semaine Médicale*, 1892, p. 283).

The number of epileptics is so large, and the influence of the disease upon the intellectual, moral, and physical condition of the individual, as well as upon the state and mankind, so wide-spread, as to be alarming. The subject has finally roused the anxiety of philanthropists to a great extent. Country settlements of epileptics have been established in Europe, with beneficial results. As a result of combined efforts the following resolution was passed at a meeting of the American Neurological Association :

"That it is the unanimous sense of the American Neurological Association that the proper care of the epileptic class, so long delayed, be urged upon the public, upon State authorities, and especially upon all interested in the care of the sick and defective poor, whereby they may be retired from asylums and almshouses, and may receive the required care in such separate establishments as their deplorable situations demand."

One of the results of this resolution was an act of the Legislature of the State of New York, by which a tract of land in the interior of the State was set aside for the purpose of establishing colonies for epileptics. The world *is* moving.

Salaam spasm (*spasmus nutans*), a peculiar affection of the accessory nerve, must receive the treatment proper for its causes, which are either central (rhachitical) or reflex (from intestinal disorders). Many of the patients are thoroughly anæmic. The indications are bromide of potassium, the positive pole of the galvanic current upon the convulsive muscle (sterno-cleido-mastoid (or) and trapezius), also massage and antirhachitical treatment.

Psychical diseases have been considered rare in infants and children. The statistics published by lunatic asylums and by specialists are meant to prove that. These statistics are correct, but the conclusions drawn from them are not. Every practitioner knows better. *Dementia* and *mania* are by no means rare, *melancholia* and similar conditions of depression

are not frequent. The public institutions do not contain such patients. A demented or even a maniacal child can be managed and prevented from doing harm to itself or to others, at home and by the family, better than an adult, and it is there that numerous such patients can be observed. The same forms of mental disease occurring in the adult are also seen in the young. Besides those which have been mentioned, we meet with *moral insanity*, *monomania*, *epileptic* and *circular dementia*, even "*paresis*" and *delirium tremens*. More frequent than either or all of them are *idiocy* and *cretinism*, the former of which is a not rare final termination of mental anomaly in the adult, while in the young it is the first appearance of aberration, though, indeed, but the result of ever so many different anatomical changes. Their varieties I have discussed above, also the possibilities of treating them medicinally or by surgical procedures (p. 380). Cretinism has some well-understood anatomical peculiarities or causes; prominent among them are the shortening of the cranial base by premature ossification of the occipito-sphenoidal synchondrosis and, it appears (principally), the absence or degeneration of the thyroid gland. Thus, the cretinism of the fœtus and infant and the myxœdema of the adult are among the results of the same anomaly.

In the therapeutics of cretinism in all its forms the thyroid gland, in its various preparations, has worked a beneficial revolution, as it also has in that of myxœdema in general. This addition to our facilities for overcoming a formerly incurable ailment, at least to a certain extent (for no perfect recovery is known as yet), is, as Meltzer has so well shown (*New York Med. Monatsschrift*, May, 1895), eminently due to biological experiment and to it only. There are but few cases that resist its efficacy. The doses, however, must be small, particularly in the beginning; from one-third of a grain to one grain of Parke, Davis & Co.'s powdered thyroid three

times a day, the small doses first, the larger one afterwards, are all that ought to be given an infant or child, according to age. The treatment must be continued a long time. It cannot be expected to act so well as in the myxœdema of the adult, because the cretinism or semi-cretinism of the child is the result of an arrest of development at a very early period of intra-uterine life. It follows that the treatment ought to begin as early as the diagnosis can be made. Besides the powder of Parke, Davis & Co., I know only that of Armour and the tablets of Burroughs and Wellcome. They are not of equal strength, and in every case ought to be commenced with in small doses; for sometimes even apparently small doses produce general and cardiac irritation, palpitations, tremor, debility, and diarrhœa. Other effects of the thyroid medication are obtainable in the child as in the adult. Myxœdema, the near relative of cretinism, shows its main symptoms in the subcutaneous tissue, in the skin, and in the nervous system. I have seen good results of the thyroid treatment in cases of excessive adiposity,—one boy of eleven years, weighing one hundred and fifty pounds, was reduced to one hundred and twenty in four months under the use of small doses,—in scleroderma, and in a case of psoriasis. Fortunately, all such cases are rare.

My object in enumerating most of the possible causes of mental disorders in the young is principally to show that preventive treatment must be considered more reliable than curative. Heredity plays an important *rôle*, so does inebriety and all other forms of psychical aberration or serious nervous disorders,—epilepsy, diabetes. To what extent matrimony between relatives contributes to mental disease in the offspring is by no means proved. I cannot, from theoretical reasoning and from practical experience, admit that two healthy persons, be they ever so nearly related, will for that reason have a diseased child. But to what extent the state of the future will interfere with the marriages of insane and epileptic peo-

ple, as also with those of carcinomatous or tuberculous patients, provided our therapeutics continues as unsatisfactory as hitherto, remains to be seen. It is but natural that the rapid favorable changes of the last few years in our therapeutics, both internal and external, should increase our hopes in regard to great results.

Diseases of the fœtus, mostly of inflammatory character, —meningitis, encephalitis,—predispose to mental symptoms. During birth, a prolonged labor or undue pressure by pelvis or forceps invites hemorrhage with its results. Spontaneous hemorrhages are the more common and the more dangerous the younger the infant. Congestions and inflammation of the meninges or of the brain are frequent in the infant and child. Their causes are rhachitis of the cranium, insolation, hot stoves and bed-pillows, tumors, stimulants, such as coffee, tea, and alcohol, falls and blows, and diseases of the heart. Disorders of the ears are frequent, and affections of the nose not unheard of causes of intra-cranial disease. Infectious diseases, such as typhoid, scarlatina, erysipelas, rheumatism, influenza, are known to be direct causes of mental disturbance in the young. The removal of intestinal worms has ended a psychical disorder. I have known overexertion at school to result in mental aberration, which terminated either in recovery or in death from exhaustion or meningitis. The period of puberty, with its sudden changes, creates a predisposition, and excessive masturbation may cause derangement. Bad habits, bad training, and congenital migraine add oil to the fire.

This cursory enumeration of causes gives plenty of food for thought. The conscientious family physician with a number of infants and children under his charge has a great responsibility. His cares ought to begin with conception. Many a case of infant meningitis (hydrocephalus) can be prevented by timely attention to the mother. Labor must not be permitted to last too long, asphyxia in the newly-born must be

immediately attended to, and strict care should be taken of the diet and hygiene of the baby. Errors in this respect are not punished immediately; and while some babies thrive, or appear to thrive, while these are being constantly committed, in others the foundations are being slowly laid for ill health and serious disease, both physical and mental. That heart and ears ought to be attended to in time, and persistently, is self-understood; but procrastination—waiting for better times and "second dentition" and "puberty"—is too common an occurrence. Perhaps the greatest negligence on the part of medical men is exhibited in regard to mental overwork. Our schools have become hot-houses in which scoliosis, near-sightedness, anæmia, neurasthenia, chlorosis, and cerebral exhaustion and disease are being bred in incredible numbers. Even the apparent offset to this mental overwork—gymnastic or "calisthenic" exercise in the same building, as part of the curriculum—adds to the general exhaustion. It is time that the medical profession looked into the increasing degeneration of the people resulting from this overstraining of the young brain, ninety per cent. of the growth of which is not attained until the seventh year, and the full growth not reached before the fourteenth or seventeenth. Physicians will do well to be no longer afraid of the charge of going into politics. If they do not wish to be "politicians," let them be something better, and turn statesmen.

The general remarks made on the first pages of this chapter will suffice for both the general and causal treatment. Serious and unmanageable cases belong to an institution. Conditions of excitement, besides proper hygienic and dietetic treatment, require rest in bed, warm bathing (not hot), and plenty of sleep, which latter may be procured by opiates (extractum opii, codeia), or hyoscin, or chloral.

Mild forms of temporary mental aberration are the night terrors (*pavor nocturnus*). They are mostly (not always) met

with in delicate, pale, scrofulous, or rhachitical children, with neuropathic tendencies somewhere in the family. Like attacks of genuine dementia or mania, they are not remembered by the patients. But few of them are attended by fever; many result from or are connected with digestive disorders. Heavy meals, particularly in the evening, must be avoided, also emotions, frights, ghost-stories, exciting games; the bowels should be kept relaxed. A dose of quinia bromide or potassium bromide at bedtime and a room not absolutely dark are good preventives.

Stammering is pre-eminently a disease of the nervous system, and is probably caused by a diseased condition or insufficient tone of the cerebral cortex, with lack of equilibrium, exhibited in some by choleric temperament, in others by cowardice, together with disturbance of will power and an absence of co-ordination of respiration and the muscles of the larynx and mouth. In some it is the result of nervous talkativeness, fidgetiness, and flightiness on the part of parents or attendants; in some of imitation not checked at the proper time. Strengthening of mind and body is the main indication. Training, cold water, and exercise will fortify the character; bromides may for a time relieve irritability. Co-ordination of innervation and muscle may be achieved by loud and slow speaking and by reading, reciting, and singing. Self-confidence must be encouraged in every way. Among strangers and in institutions established for the purpose such patients are most benefited, not infrequently in a short time. Local affections of the respiratory tract must be attended to, adenoid vegetations of the naso-pharynx removed, and other anomalies of the nares corrected, provided they interfere with respiration.

XI.

DISEASES OF THE SKIN.

Burns.—Burns of the first degree rarely require more than cooling applications and rest, both general and local, water, lead wash of different strengths, oil, and cotton. Persistent cold applications are not tolerated. When large blisters have been formed, the epidermis should be removed and an application made of equal parts of lime-water and oleum lini, to which a twentieth of a per cent. of thymol may be added. The burn should then be thickly covered with aseptic gauze. After this application is removed, a fine powder of bismuth nitrate should be spread over the wound and the whole covered with gauze again, or an ointment containing bismuth, or bismuth and boracic acid, or bismuth and zinc may be employed. To thoroughly guard against infection, the washing of the wound with a three-per-cent. solution of carbolic acid, or of salicylic acid, or of boracic acid (not so painful as the other two) must precede the application of a gauze thoroughly covered with bismuth nitrate finely powdered, or with a mixture of bismuth and starch, or the same with the addition of from one to two per cent. of salicylic acid. Such an application may remain undisturbed for weeks. Extensive burns do well in the permanent warm bath. Should large defects result, transplantation may be practised afterwards; if contractures, extension must be employed in time and apparatuses used for a sufficient period.

The younger the patients the more liable are they to suffer from burns, though apparently mild. Much reaction may set in after a day, with high fever and convulsions. Therefore the thermometer ought to be consulted soon after the accident and the symptoms prevented or treated. Diarrhœa is not un-

common, even after moderate burns, and requires opium and the regulation of diet; collapse demands stimulants, either internal or subcutaneous; and sleeplessness appropriate narcotics.

Burns are more frequent than are the effects of cold. Common *frost-bites* are frequent, it is true, and annoying, but rarely of great importance. The rubbing of red, itching, and swollen parts with snow (or with petroleum) is quite effective in mild cases. The itching is often relieved by a mild tincture of iodine or by the application of a (from three to ten per cent.) solution of nitrate of silver or of chloride of calcium in water (1–2 : 100). The popular remedies of tallow and whiskey or, better still, the application of carpenter's glue to frost-bites yield relief. This may also be obtained by surrounding the inflamed swelling by a protecting (corn) plaster. Vesicles on the toes and heels, filled with blood and resulting in ulcerations, require the latter treatment, together with subnitrate of bismuth, or naphtalin, or cauterization with nitrate of silver until granulations spring up, or an ointment of balsam of Peru with or without zinc oxide, or bismuth. Gangrene of the skin or of whole extremities is, fortunately, rare. When it occurs it demands rational surgical treatment.

Erythema is met with at every age of infancy and childhood, and depends on a number of causes. The treatment is, therefore, partly symptomatic, partly causal. In the newly-born, from the establishment of an unprecedented cutaneous circulation and the discontinuation of the intra-uterine amniotic pressure, the skin becomes red, changes into yellow (alterations of hæmatin), is subject to extensive peeling, and obtains its normal pink color under ordinary circumstances. The erythema, however, is not always uniform; now and then it bears a resemblance to measles, and is attended by fever, but not by catarrh. As a rule, it demands no treatment, except preventive. The bath must not be hot, the temperature of the room not abnormally high, the bedding not hot and

oppressive. Vaseline, cold cream, or lanolin is useful where the redness and the tendency to peeling are very marked.

In the following months erythema is a common symptom when the babies are exposed to pressure or friction by clothing, to heat of summer, stoves, bedding, or bathing, to irritation by urine, or to the septicæmic after-effects of infectious fevers, such as measles, angina, diphtheria, typhoid, or influenza. In some of these cases desquamation is observed ; it is the more readily a cause of mistaken diagnosis the longer it lasts and the greater its extent proves to be. Children of three or four years, when afflicted with diarrhœa and consecutive cachexia, are subject to a papular erythema which is mostly confined to the gluteal regions and the extremities. Finally, thin and feeble children frequently exhibit a general redness, sometimes mottled, which lasts as long as does the sluggish circulation depending on their general condition.

The indications for treatment in all of these varieties are furnished by the causes. Irritation of the surface must be avoided ; the patient must not be exposed to abnormal temperatures, either of air or water, or to errors in diet ; diarrhœa and emaciation must be arrested, and vaseline and fats used according to necessities. In many cases a full supply of drinking-water, which is too frequently withheld from the very young, corrects the evil by stimulating cutaneous circulation and the tendency to perspiration, which is almost absent during the first month and very scanty in the second and third.

Constipated and dyspeptic children are very apt to suffer from erythema as the result of intestinal autoinfection, sometimes to such an extent that the diagnosis between it and scarlatina may become doubtful. The difficulty grows in those cases in which the intestinal erythema is attended by the corresponding intestinal fever, an occurrence not at all uncommon. Constipation may be congenital or acquired, and may lead to

the same result. The diagnosis is not always easy for other reasons,—viz., the apparent normality of the stomach, the absence of diarrhœa, and the actual or alleged absence of flatulency. This erythema is not uncommon; it may last hours or many days, or may alternate with acute attacks of urticaria. The latter is, therefore, not always gastric or neurotic, either in its acute or chronic form, and it thus shares the etiology of many cases of acne and some of senile pruritus. When occurring in the face exclusively, I have seen it mistaken for erysipelas.

This variety of erythema is sometimes seen mostly on the hands and feet, is symmetrical, and now and then, like urticaria, has vesicles or bullæ (similarly to herpes iris). When of *intestinal autoinfection*, it is usually accompanied by indican and the ether-sulphuric acids in the urine, which is liable to be very scanty and of high specific gravity. Skatol and indol are found in the fæces. In most cases a purgative (preferably calomel) will bring speedy relief, but actual and lasting aid will only come from prolonged disinfection of the intestinal tract by naphtalin, salol, resorcin, oil of peppermint, small doses of calomel or bichloride of hydrargyrum, by large enemata containing a twentieth of one per cent. of thymol, or such as consist of aromatic infusions (mint, catnip, chamomile) exclusively, occasional purgatives, and by the regulation of the diet, which must be such as not to cause fermentation and putrefaction. In the employment of the sulphites (of sodium and magnesia) I have been rather disappointed. The use of menthol is not to be recommended; it can be swallowed in capsules only, and to atone for its local irritation it has no eminent virtues.

Erythema nodosum may be discussed in connection with this subject. It consists of large nodes, whose redness turns yellow in the course of the normal alterations of hæmatin; it is mostly seen on the legs, but also along a number of tendons

from the occiput downward. It requires rest. When it is the result of rheumatism, salicylate of sodium is indicated; when it depends on malaria (Moncorvo), quinine. A six-per-cent. solution of nitrate of silver has been recommended for external application. I have used with benefit, I believe, inunctions of oleum gaultheriæ, of iodide of potassium in glycerin (1 : 2–4), and of iodide of potassium and lanolin ointments.

Erythema complicated with loss of epidermis, either spontaneously or through irritation by urine or fæces, or by friction of the adjoining surfaces of the nates, thighs, axillæ, and the folds of the neck, together with secretion, and even crusts, is called *intertrigo*. It is mainly noticed in fat, flabby, and rhachitical babies, is painful and annoying, and may prove dangerous by becoming gangrenous or by inviting the invasion of erysipelas or diphtheria. Therefore, its treatment and cure are imperative. The diapers must be soft, not pinned during sleep, and frequently changed; the babies must be kept scrupulously clean and bathed at least once a day. A seven-per-mille solution of table-salt is more pleasant than water alone. Diarrhœa must be relieved by dieting, internal medication, and rectal injections. Astringent solutions (sulphate of zinc, tannin) would be beneficial but for the difficulty of making regular applications; ointments containing zinc oxide, bismuth, tannin, or lead are preferable. Fine powders of bismuth subnitrate, of talcum, of amylum, or mixtures of two of them, with or without the addition of one or two per cent. of salicylic acid, will act satisfactorily. The popular lycopodium powder is not to be recommended. By reason of its gluing together it forms foreign bodies which prove irritant.

In addition to what has been said on the treatment of *erysipelas* (pp. 177, 178), I ought to mention ointments of ichthyol, which have been recommended; but I cannot say that my results have been encouraging. The compound tincture of benzoes may be used all over the inflamed surface once every

hour or two hours. Absolute alcohol (99°), applied constantly, appears to render good service in limiting the area of infection. That is what is aimed at and accomplished (where the locality permits) by the hedging in of the morbid process. Rail-fence-like scarifications into the rete Malpighii, double, crossing each other, are made to enclose the erysipelas, and corrosive sublimate (1 : 500) is rubbed into the wounds under anæsthesia, in most cases with almost instantaneous, at all events rapid, success. To modify this procedure, as is done in one of the large children's hospitals in Germany, by incising the surface of the erysipelas and squeezing it so as to empty the œdema, then scarifying deeply round it and rubbing in ichthyol, and repeating the process until scurfs are formed, appears to come dangerously near the permits and privileges of criminal law.

Among the circumscribed inflammations of the skin met with in children, mostly of advanced age, are *acne*, *lichen*, and *prurigo*. Acne is dependent on an interrupted action of the sebaceous follicles. They begin their rapid development about the middle of intra-uterine life, and are large and numerous at birth, particularly over the nose, ear, eyebrows, and around the mouth. When obstructed, they exhibit in the infant no black-heads like the comedones of the adolescent or adult, but are white. Normally, they secrete much tallow, which gives the foreheads of many babies their shining, glossy appearance. When this tallow accumulates and gets dry, and mixes with the scabs of the epidermis and foreign material, such as dust, etc., it forms *seborrhœa* of any shade of color between whitish and black, which is more difficult to remove because of the conservative superstition of the mother than because of its own obstinacy. Its importance and its dangers are quite local; it interferes with the growth of hair and predisposes to local irritation of the scalp; it ought to be removed by oil, fat, soap, hot water, and brush, and the subjacent hyperæmia relieved by an astringent ointment.

When acne has formed (in older children) the comedones ought to be squeezed out. For this purpose an old-fashioned watch-key with broad edges will prove as serviceable as the mechanical devices of instrument-makers. Frequent hot washing with green soap, or spirits of soap, followed by ice-cold washing, I have found very successful; besides, the skin should be washed four times a day with a solution of corrosive sublimate in water, or in alcohol and water (1 : 20–2000 or 1 : 20–1000).

Washing with vinegar dissolves the epidermis cells and thus aids in disintegrating and loosening the obnoxious material. Hebra recommends his paste. Various mixtures of emplastrum and unguentum plumbi may be employed. After a thorough cleansing with soap, equal parts of lac sulphuris, glycerin, and alcohol (to be preserved in a well-stoppered jar) are applied in the evening and washed off in the morning; or beta-naphtol 10 parts, precipitated sulphur 50 parts, lanolin or vaseline 25 parts, and green soap 25 parts are applied, and removed by washing after fifteen or twenty minutes, after which the skin is covered with talcum or starch. Only in the very worst forms of acne (fortunately, rare in children) must scarifications be resorted to.

Lichen is mostly found in its mildest form: *strophulus* of pin-head size, slightly excavated on top, round a hair. It is not particularly resistant, but is liable to return. *Lichen scrofulosorum*, however, is apt to be obstinate. It is mostly met with in older children, is of a yellowish or red color, and forms a circle round a hair. It does not itch very much, but by reason of its duration and looks is quite annoying. Locally, warm bathing and frequent ablutions with vinegar and water (1 : 3–6) will act well. Antipyrin in a nightly dose will relieve itching whenever troublesome, and by its sudorific effect will contribute to the disintegration of epidermic accumulations. The general treatment of scrofula is required for

its causal indication. *Lichen acuminatus* and *planus* consist of circular nodules congregated round a pigmented spot, the first in rows, the second flat. Both are rare in children.

Prurigo is found, of pin-head size and pink color, on the extensor side of extremities and in the gluteal region and abdomen. In its neighborhood the lymph bodies swell, and chronic pigmentations are frequent. The itching is terrible, intolerable, exhausting, and may prove fatal. Twice I saw it complicated with or depending on diabetes; in both cases it terminated with the fatal cause. Inunctions of glycerin or fat and protracted warm bathing in water or alkaline water should be resorted to. The baths ought to be continued for hours, and may be allowed to last half a day. Vinegar will dissolve the epidermis. Pilocarpine will do well in subcutaneous injections large enough to produce perspiration. As much and as long as permissible it may be combined with antipyrin; and if subcutaneous injections be found impossible, it ought to be administered internally. Tar, sulphur, and green soap have been found very useful, when continued for from four to six weeks in alternation with warm baths. Wilkinson's ointment contains all of them (flor. sulphuris, ol. rusci, āā 10 parts; sapon. virid., vaselin., āā 20 parts). Kaposi recommends naphtol ointment (5 : 100). But it must not be forgotten that the prognosis becomes more serious with every month or year of the duration of prurigo, and that general and preventive treatment demand urgent consideration. Most patients are stricken in their second year; thus a hereditary influence is to be suspected in many. Often the parents are tubercular.

Furunculosis in the very young does not often exhibit the same character as in adults. Both the sebaceous follicles and the perspiratory glands being rather patent, there are rarely such large and hard indurations. It is often complicated with acne, or follows eczema, and may complicate scabies. It is frequently found in cachectic infants and children and

after protracted diarrhœa, generally in the form of multiple and cold abscesses; sometimes in connection with tuberculosis. These abscesses are liable to lead to extensive suppurations of the connective tissue. The skin must be kept disinfected either by blue ointment or by corrosive sublimate in water (1 : 2000–5000). Abscesses—no matter how many—must be incised and disinfected with sublimate solution, or iodoform, or treated with the sharp spoon, or filled with antiseptic gauze, according to circumstances. Now and then these abscesses are found near the matrix of the nails, not multiple as in syphilis, but localized, and are liable to destroy the matrix unless incised and disinfected in time. Secondary lymphatic swellings round the neck will, when benign, disappear after a while. If not, they are probably tubercular, and if persistent, without a tendency to get smaller, ought to be enucleated. A preventive measure is the covering up of incipient furuncles with some indifferent plaster (saponis, belladonna; no turpentine) to avoid the friction of the clothing. Arsenic in small doses, but persistently given, has a favorable effect.

One of the most common forms of dermatitis in the young is *eczema* in its different forms, from the small vesicular and *papular*, with but slight desquamation or the formation of thin scabs, to the purulent variety (*impetigo*), with moderate crusts, and the rapidly growing and pointed *ecthyma* and *rupia*. For, indeed, all of them are but varieties of the same process. It may be microbic in isolated cases, but certainly is not a microbic disease generally. It may be complicated, however, with a parasitic ailment such as scabies. A disposition is generated by the tendency to congestive, catarrhal, or inflammatory disease such as is understood by "scrofula," not by tuberculosis; also by rhachitis, chronic indigestion, and anæmia; also by incidental fevers,—for instance, that of vaccinia; indeed, it is not uncommon to date the first appearance of

eczema back to the effect of vaccination. These occasional or constitutional partial causes of eczema must be considered as regards general and constitutional treatment. These are the cases apt to be benefited first by appropriate diet, then by the protracted use of arsenic, the hypophosphites, cod-liver oil, and iron. Still, it is important never to be tempted to begin such a treatment in an acute attack of eczema, which is more apt to be benefited by a few moderate doses of quinine and purgatives.

Acute eczema is liable to run its course with a great deal of swelling and irritation, in these respects resembling erysipelas. It bears absolutely no water, and no ointments in the beginning. Powders of amylum, or subnitrate of bismuth, or oxide of zinc, pure or in different proportions, with or without the addition of one or three per cent. of salicylic acid, prove more efficient. After a while the same constituents may be used as ointments.

Most of the cases presented for treatment are chronic, either in the moist, or crusty, or squamous form. Many of them are itching, and are apt to lead to persistent infiltration of the skin, even amounting to elephantiasis. In many of them the original local causes are still persistent and can and must be relieved or removed. All sorts of local irritation are found. Seborrhœa, uncleanliness, secretions of nose, ear, and eye which are permitted to remain and irritate the neighborhood, the oral secretion of dentition excoriating the cheeks and chin, the septic piercing of the ear, the presence of vermin on the skin, are all frequent causes of eczema, the predisposition to which is established on certain parts of the body where eczema is most common (head and face) through the large size of the carotids and the physiological congestion and rapid development of the head and all its organs. By mistaking this connection, even the protrusion of the teeth has been charged with producing eczema. Indeed, everything causing

sluggish circulation and congestion to the surface—the constipation, for instance, of fat babies, hot bathing, the influence of solar and stove heat—may have the same result.

The effect of protracted eczema on the head is liable to be grave by its interfering with the growth of the hair; by causing and extending catarrh of the ear and nose, or blepharitis, conjunctivitis, or keratitis; by producing open sores and thus facilitating the invasion of erysipelas and (probably more frequently) tubercle germs; by irritating and tumefying the numerous lymph bodies of the neighborhood with the complication of hyperplasia or tuberculosis. Thus, the indications for treatment are urgent in every case of eczema; the sooner it is suppressed the less is the number of complicating dangers which are direct outgrowths of what appears to be, in most cases, a merely local affection.

The necessity for local as well as general hygienic and constitutional—mostly preventive—treatment is pre-eminent. The body of the infant must be kept clean, but the local eczema should not be touched by water more than is absolutely necessary; the reaction after a bath is liable to bring out a new crop. If the eruption be on the head, the hair must be cropped close. The nails must be kept short so as to a certain degree to prevent scratching. Remove thin or thick scabs by warm water, soap and water, warm fomentations (not on the head), oil, fat, liquor potassii in oil or cod-liver oil (1 : 8–12). Use the comb when the scabs are beginning to loosen. Below them the surface is hyperæmic or oozing; therefore the secretion must be dipped up and stopped as soon as possible. Solutions of astringents are neither so convenient nor so effective as ointments. The official zinc ointment will suffice in many cases. Vaseline by itself is irritating. Bismuth subnitrate 5 parts, with ungt. zinci and vaselin., āā 20 parts, is a good combination. Such applications may be made from two to five times a day. Hebra's ointment is thickly spread on linen

and the surface covered with it; layers of it may be worn for days or weeks. There is no harm in the extensive use of lead; I never saw or heard of a case of direct cutaneous absorption which stood criticism, but I have seen lead-poisoning in a child who scraped the lead ointment from his cheeks and ate it for many weeks in succession. The formulæ now and then published in the journals are very numerous; every thoughtful practitioner will make or combine his own from bismuth, zinc, lead, and tannin. In addition to these, I mention for inveterate cases and the scaly form tar (tar, alcohol, and green soap in equal quantities, or ol. cadinum 1 part, ol. oliv. 1 part, lanolin. 10 parts) and hydrargyrum ammoniatum (either the official ointment or a modified formula, such as zinc oxide 1 part, hydrate of ammonia 1 part, ol. amygdal. dulc. 1 part, fat 10 parts), and, finally, nitrate of silver. It is mainly in chronic cases of eczema—the crustaceous or squamous variety—that a large surface will heal under the influence of a solution of from three to ten per cent.

Tar has but one grave inconvenience. On skins which absorb rapidly it may prove dangerous to the kidneys. Nausea, vomiting, diarrhœa, headaches, vertigo, and a smoky or even black urine, occasionally with more than mere albuminuria, may be observed. The same, to a greater degree, must be said of carbolic acid, which may be added to ointments (2–3 : 100) to relieve itching. It requires watching. Where it cannot be used, cocaine (2–5 : 100), ointment of lead, zinc, or bismuth may take its place. Where the surface healing is slow, the proliferation of tissue can be accelerated by balsam of Peru (1 : 10) ointment.

Pemphigus is more frequently observed in the newly-born and very young than in older children, mostly on the face and trunk, with a pale or hyperæmic basis, running its course, inclusive of the drying of scabs, in from six to twelve days, seldom chronic, and mostly so mild that no scabs remain,

except when it is complicated with diphtheria or general cachexia. The serum (albuminous and mostly neutral or alkaline) contained in the bullæ becomes turbid after some days, but seldom sanguineous. There is rarely any fever. New crops may start up. Strelitz and Almquist gave themselves pemphigus through cocci. Riehl found in a single case a fungus resembling very much the trichophyton tonsurans. It is mostly found in institutions, and will spread to nurses or to members of the same family; it seems, therefore, to be contagious, and is disseminated through careless midwives. Isolated cases are the result of hot bathing and bedding. The treatment is suggested by the causes thus far enumerated. Beware of heat and of contagion. Cleanliness and disinfection are required as preventive and curative measures. Astringent ointments or bismuth powders are demanded locally, particularly where the epidermis has been torn off; general roborant treatment is required for puny and cachectic children, and antipyretics if (in exceptional cases) the temperature rises to an unbearable degree; for even delirium has been observed. In most cases powders of bismuth, talcum, amylum, zinc oxide, etc., render good service.

Pemphigus foliaceus, where no scabs form, but relapses take place contiguous to the first starting-point, is serious and apt to terminate fatally. *Pemphigus exfoliativus*, which, according to Ritter, begins at the mouth and extends all over the body, with an angry redness, gangrene, and phlegmons, and is fatal in one-half of the cases, requires careful and roborant nutrition, astringent ointments and baths, and stimulation.

Neuropathic affections of the skin are apt to be congenital; while not always connected with cerebral defects resulting in paralysis or epilepsy, like the *papillomata* described by Neumann (fissured warts following the course of a nerve and covering the whole side of a body), still, they are serious enough, and sometimes not amenable to treatment. The congenital

disposition to the formation of vesicles is in later life often combined with other neuropathic symptoms. The *pemphigus neuroticus chronicus* described by me ("Transactions of the Association of American Physicians," 1894) is of that nature. To this class also belongs *urticaria pigmentosa*, which yields ever-returning crops, many of them with consecutive and persistent pigmentation. Even common *warts* are probably, in many instances, trophic disorders of a neurotic character; their sudden appearance in great numbers and their sometimes unexpected disappearance seem to prove it. While fuming nitric acid is a fair local application, the internal use of arsenic is often of much advantage. This is certainly the case in what has been noticed first by Hebra as "verrucæ planæ juveniles," and carefully described by Thin. These warts are met with in children and adolescents on the face and back of the hands and fingers; they are yellowish or reddish brown, of the size of a pea or less, flat with a central depression, and may have frequently been mistaken for lichen ruber planus.

A neuropathic *œdema* has been described by Widowitz; it makes itself known, after exposure to cold, by extensive tumefaction with livid edges, and without any complication on the part of heart or kidneys. A neurotic *cyanosis* has been reported by Tordeus, and by him connected with dentition.

Symmetrical cutaneous hemorrhage connected with cerebral disorder has been reported by Epstein; *erythromelalgia* in a child, by Baginsky; *symmetrical cutaneous gangrene* (Raymond) of feet, nose, and ears, with hæmoglobinuria, in a boy of three years, by Abercrombie; in children of seven, eleven, and thirteen years, belonging to the same family, by Braman.

Scabies is apt to become chronic in children because it is often mistaken for or complicated with the various forms of eczema and "prickly heat." A mistake is also facilitated because it is not pre-eminently the fingers which are affected,

but also the face, the gluteal region, the abdomen, and the joints. These constitute a difference from prurigo, in which the extensor sides of the extremities are principally affected. The skin must be thoroughly cleansed with soap every morning, after balsam of Peru, or balsam of Peru 15 parts, alcohol 10 parts, or balsam of Peru and vaseline, in equal parts, have been copiously applied the evening before. A few such applications will suffice, but they stain the linen. The unguentum sulphuris of the Pharmacopœia is too irritating to the skin of children, but may be mitigated by the addition of fat, styrax liquidus, and olive oil, in equal parts; creolin (5–10 parts in 100 parts of olive oil) or naphtol with fat (5–15 : 100) will also render good service. The clothing must be thoroughly washed in hot soap and water or disinfected with sulphur. Both naphtol and styrax may irritate the kidneys, so that both are contraindicated in children with renal affections. In them, Williamson's ointment (ol. rusci, flor. sulph., āā 20 parts; sapon. virid., vaselin., āā 40 parts; cret. alb., 10 parts) is advisable.

Impetigo contagiosa has thinner vesicles than pemphigus and no fever or inflammatory basis. It is found on the uncovered parts of the body, face, hands, and feet; the vesicles are small or large and spread rapidly, and relapses take place. Serious results have not been noticed; still, a case of nephritis is reported as a sequela in a girl of twelve years. It is met with in schools and after wholesale vaccinations, through infection by vaccine lymph. Lassar found the staphylococcus aureus. As many as a thousand cases have been observed in a single epidemic. The treatment must be preventive, if opportunity be given; a school in which the disease is found ought to be closed temporarily and disinfected. The local (and general) treatment is that of a mild eczema.

Favus is, through its achorion Schoenleini, eminently contagious from child to child and from animal (rabbit, cat,

dog) to child, is communicated through beds, caps, and finger-nails, and is not confined to the head. A mild treatment may first be tried. Green soap and warm fomentations will succeed in removing the hard masses, and solutions of corrosive sublimate (1 : 100–300) and ointments of naphtol (5 per cent.) or pyrogallic acid (10 per cent.) may prove beneficial. Or a ten- (or less) per-cent. ointment of chrysarobin may be tried (according to Wolff) daily for six weeks, alternating it with a corrosive sublimate ointment (1 : 100). After that time, if the treatment have been tolerated, the application should be made every other day, and later once a week. The unguentum hydrargyri ammoniati will do the rest. I rarely saw a case improved without epilation, after a thorough removal of the yellow crusts by means of green soap and fomentations. Epilation can be done by pincers or by the old method of the pitch-cap, which is applied after the hair has been cut to one-third or one-half inch in length. Biedert modifies the old plan by melting two hundred and fifty parts of white pitch and four of tallow. The mixture is then spread over a cloth from six to eight square inches in size, which is fastened on the hair stumps with a hot iron and allowed to remain an hour before it is pulled off. This procedure is repeated every six or eight days until the cranium is entirely bald and smooth. The pain can be overcome and the cruelty of the necessary process moderated by the use of an anæsthetic. Very obstinate places must be scraped out.

Herpes tonsurans (from trichophyton tonsurans, a parasite very similar to achorion, common among domestic animals: circular vesicles, enlarging) requires a treatment similar to that of favus, including epilation. Before resorting to it, ointments of sulphur, ichthyol, salicylic acid, or chrysarobin may be tried. Corrosive sublimate (1 : 100) in solution and naphtol ointment are very efficacious.

Molluscum contagiosum (light nodes from which lobulated

whitish masses containing brilliant oval bodies, perhaps protozoa, can be squeezed out, mostly on the uncovered parts of the body) is very contagious and is met with epidemically. Communication from child to child or from baby to nurse must be guarded against, the morbid growths removed with the sharp spoon, and the wounds treated antiseptically (best with carbolic acid); and, finally, if required, with balsam of Peru or ointments containing it.

Lupus is in some of its forms (exfoliativus, tuberosus, exulcerans, serpiginosus) accessible to anything but external treatment. Still, the treatment of the patient who, as a rule, shows more symptoms of scrofula than of tuberculosis is not excluded. Zinc chloride has been mixed with two or three parts of starch and made into a paste with water. Its application is very painful and its effect slow. So is Lannelongue's repeated injections of a ten-per-cent. solution of zinc chloride in water; still more so Milton's indefinite and persistent use of carbolic acid and a twelve-per-cent. solution of hypermanganate of potassium (joined to the internal administration of arsenic, iodide of potassium, and mercury). Another method consists in the repeated application of saturated solutions of lactic acid; still another is the use of the sharp spoon, and then for three or five days in succession that of a ten-per-cent. mixture of pyrogallic acid. Wherever the affected part is not too large, and in a convenient locality, excision ought to be made and the wound ligated; should it be too large for that, transplantation may be performed afterwards. At all events, the destruction of the morbid part, wherever aimed at, is most easily accomplished by the actual thermo- or galvanocautery. Tuberculin has failed here as in other cases of tubercular disease. A paste composed of arsenous acid 1 part, hydrarg. sulph. rubr. 3 parts, vaselin. 15 parts (or another menstruum), applied daily for several days in succession, has a deserved reputation for destroying the morbid masses.

Tuberculosis of the skin (both verrucosa and ulcerosa) may be treated with the actual cautery and with mercurial plaster; *scrofuloderma* (nodes in and under the skin of the face, neck, and extremities, with central softening and a cheesy pus), by arsenic internally and the sharp spoon, and subsequently iodoform and balsam of Peru.

Psoriasis, when acute, is a very distressing disease because of its intense itching. It requires many and protracted baths and plenty of soap to remove the scales; unguentum hydrargyri ammoniati is used for the same purpose. Ichthyol ointment (five to ten per cent.) has rendered me good service in the only case I have seen for years. Neisser recommends chrysarobin or arthrarobin ointments (five to ten to twenty per cent.). They are positively dangerous in such doses, when used on children, because of the extensive erythema and conjunctivitis following them. On the head, therefore, he substitutes pyrogallic acid, but it dyes the hair black and is not so efficient. For chronic cases the principle of treatment is the same. The eruptions must be attended to locally; ichthyol ointments will also do some good. Chrysarobin ointments (one to two per cent.), or chrysarobin in traumaticin in the same proportion, should be applied once every day or every few days. Green soap, or liquor potassii, will dissolve the scales and facilitate the effect of the other applications. Internally, iodides will prove effective in syphilitic cases. Thyroid in small doses (one to two grains daily) has had some successes among many failures. The best internal remedy is arsenic in long-continued moderate doses.

A number of *congenital diseases* of the skin and subcutaneous tissue are amenable to treatment; to them belong the *neoplasms*. *Lipoma* is found in two varieties: first, the circumscribed and capsulated; second, the diffuse. While the former is as easily removed as in the adult, the latter is sometimes inoperable, inasmuch as it extends over large areas, and resembles

in some instances, or in some parts of the anomalous growths, a moderate or formidable surplus of normal fat only. *Fibromata*, *cysts*, and *dermoid cysts* are met with; many of them, though congenital, attract attention only after months or years. *Atheromata* (when small and superficial, embedded in skin only, —milia) are not infrequent about the head (eyebrows, etc.). They can be readily enucleated, and ought to be removed before they adhere to the skin and undergo suppuration. When they are suppurating, and removal very difficult or impossible, tartar emetic in water (1 : 30) may be injected, or hydrate of potassium introduced. Either of these will disintegrate the cyst wall to such an extent as to render their removal by pincers possible after a day or two.

Congenital *ichthyosis* is not subject to treatment. It terminates fatally in a few days. Partial, follicular ichthyosis, in which bony spinæ grow out of hair- and tallow-follicles without affecting the general health, demands frequent bathing, green soap, plenty of fat inunctions, and a ten-per-cent. sulphur ointment. Congenital idiopathic *atrophy of the skin* (head, face, hands, feet) is not amenable to treatment.

Congenital *neoplasms* on the *neck* are: *hygromata* (lymphangiomata with albuminous contents and endothelia); serous and *dermoid cysts*, sometimes so dense as to render their diagnosis from lymphatic tumors difficult when situated below and alongside the sterno-cleido-mastoid muscle; and *sanguineous cysts*, mostly diverticles of veins, or in a few cases rudimentary developments of the jugular vein. They require either enucleation or an extensive incision with aseptic tamponing.

Nævus pigmentosus and *verrucosus* belong here. Their treatment is similar to that applicable to vascular nævi and tumors (p. 373), the latter differing from the former by a greater prominence of the skin, which is produced by elongation of the papillæ and by hyperplasia of connective tissue; also to the *nævus lipomatodes*, which is a spherical or cylin-

drical fatty excrescence covered with normal skin, sometimes pedunculated, sometimes sessile and with a broad basis. A few of the latter class are liable to grow out of proportion; all the rest in conformity with, or even less than, the rest of the body. In the majority of cases the time for an operative procedure is left to the medical attendant. Besides the methods of removal which have been detailed above, total extirpation is advisable in most cases. Indeed, it is the preferable method. Local anæsthesia can be easily accomplished by a mild solution of cocaine (gr. $\frac{1}{2}$–2 : 100) subcutaneously administered. Excision is readily executed with but little loss of blood, and the sutured wound is covered with collodion. In a very few days, without a change of the collodion, recovery is apt to be complete.

XII.

DISEASES OF THE EAR.

Malformations of the ear, both external and internal, are mostly the results of arrests of development, and are but rarely amenable to improvement by treatment. A faulty position of the auricle may be corrected after birth; when it protrudes unduly, bandages or adhesive plaster, worn for a number of weeks, will keep the organ in a more normal (adjacent) place. Obstruction of the auditory canal by either an epithelial or an organized membrane can be relieved; the former demands a metal probe to perforate it; the latter, a cruciform incision and removal of the flaps.

Foreign bodies are common in all accessible cavities; these prove frequent receptacles of shoe-buttons, pearls, peas, beans, etc.; sometimes their removal is very difficult, particularly in the case of vegetables, which swell and thereby totally obstruct the meatus. The use of probes during examination is sometimes decisive in regard to diagnosis, sometimes very deceptive; the reflector is indispensable. The secretion of secondary catarrh must first be removed by syringing and wiping; pincers will remove a body which is not tightly incarcerated; a Daviel spoon, or the blunt end of a hair-pin bent upon itself, or a sharp spoon is often required for peas and beans. While the attempts at removal are going on, the ear ought to be frequently injected with warm water to expel shreds and blood and to facilitate inspection. Before the operation is begun, a cocaine solution may be instilled into the ear. A spray of ether may be demanded, and in urgent cases anæsthesia by chloroform; for the extraction of a foreign body being paramount, even pieces of bone have to be removed sometimes to render its expulsion possible.

Living bodies, such as insects, will die in water, oil, alcohol, or a two-per-cent. solution of carbolic acid. Dried secretion, or cerumen, is softened by filling the ear with oil or glycerin and syringing forcibly with soap and water. The after-treatment may demand all the requisites of the therapy of inflammation,—rest, cool and disinfectant applications, erect posture, and narcotics.

Otitis externa (inflammation of the external auditory canal) is the result of irritation by foreign bodies or by clean or dirty finger-nails, brushes, and sponges, also of the frequent use of ear-spoons, or of exposure to a high wind or draught; or it may depend on eczema which extends inward from the neighboring surface. Gonococci and tubercle-bacilli have been met with in the external ear, diphtheria not infrequently, and soiled bathing water is probably a more common cause of ear-disease than is generally supposed. Now and then external otitis complicates internal, particularly in infectious diseases such as measles and scarlet and typhoid fevers. The general disposition to scrofula—that means to subacute or chronic inflammation of the tissues with rapid disintegration of the surface epithelium and insufficient tendency to reparation—is a frequent factor in the production of external ear-disorder, and requires constitutional treatment. Preventive local measures are indicated by the causes enumerated above. Foreign bodies must be looked for and, if present, extracted.

The three forms of established external otitis are the erythematous, the catarrhal, and the phlegmonous (including the furuncular). The first exhibits a general redness, and produces scales rather than secretion. An occasional application of lead wash, or lead ointment, or zinc ointment, or bismuth subnitrate, finely powdered, will be all that is required in the average cases. Where the redness is marked and angry, with a good deal of itching, the ointment should contain five per cent. of cocaine; or a watery solution of cocaine hydrochlo-

rate (two to six per cent.) may from time to time be brushed over the sore surface.

The catarrhal form of external otitis is by no means a uniform or always a mild affection. There may be pain, also secretion of a simply catarrhal or of a malodorous (fat acids) or cheesy nature. Erosions, ulcerations, and swelling of the neighboring lymph bodies are quite common. The integument is sometimes greatly swollen and now and then granulating; below and behind polypoid excrescences the bone may be affected; through the defective ossification anteriorly and inferiorly, fistulæ may form in the parotid region and even in the maxillary joint, and pus may find its way through the incisuræ Santorini into the cartilaginous floor of the meatus. The drum membrane is frequently affected. Every form of *myringitis* is met with, from a slight hyperæmia to thickening and turbidity of the membrane, even perforation. Thus there is every reason for early and persistent treatment. In the interest of examination, the speculum must not be used at first, except in older and very docile children; it annoys, pains, and frightens, and is seldom as useful as in advanced age because of the horizontal position of the young drum membrane, only part of which, at best, can be seen. The secretion must be removed by syringing both frequently and forcibly (but the current must not be directed to the drum membrane) while the head is inclined so as to allow the instantaneous egress of the fluid. The injection fluid may be warm water, soap and water, salt and water (6–7 : 1000), or mild astringent solutions of acetate of lead, sulphate of zinc, tannin, or alum (1 or 2 : 200); or the secretion may be removed by tufts of absorbent, or borated, or salicylated cotton, which are held tightly in a pair of pincers and not rubbed hard against the wall of the canal. A saturated solution of boracic acid (four per cent.) is both mild and disinfectant. Boracic acid finely powdered may be thrown in

so as to fill the canal after it has been thoroughly dried. When the renewed secretion has liquefied the powder, after a few or many hours, they are both removed by cotton or by injections, the ear thoroughly dried, and boracic acid introduced again as before. Bichloride of mercury (1 : 5000) injections may be given several times a day, mainly when there are much hyperæmia and infiltration, in any of the varieties of external otitis; fomentations of the same solution should be made persistently. Two daily applications of carbolic acid in glycerin (1 : 10–20) have also been recommended; I believe they frequently irritate and fret the surface. *Polypoid granulations* have been removed by ligature. Chromic acid is liable to deliquesce so much, even when used carefully and in small quantities, as to endanger the drum membrane. The solid stick of nitrate of silver is safer, and requires for neutralization, after application, only a salt water solution. A daily touching with liq. perchlorid. ferri or liq. subsulphat. ferri is very effective and quite safe. Biedert recommends the sozoiodolate of hydrargyum. In external otitis leeches are seldom required, and then only where there is an excess of swelling. To relieve local pain and tension, cocaine solutions act better than do those of morphia. The oleate of morphia irritates the sore surface. Internally, a dose of morphia or some other opiate, or chloral, may become necessary. The patient must be kept in a semi-recumbent or almost erect position, on a cool pillow, in every catarrhal or inflammatory condition of the ear. Cases of external otitis with copious secretion, complicated with or dependent on eczema, are greatly benefited by one or two daily applications of a small quantity (well rubbed in) of bichloride of mercury in lanolin (1 : 300–500). In obstinate cases of eczema a solution of nitrate of silver (1 : 10–50) may be brushed over the parts once every few days.

The phlegmonous form of external otitis is mostly recog-

nized with facility; the pain is intense, the swelling marked, more or less local, circumscribed, and red. Before an incision —which ought to be made in time—appears advisable, applications of solutions of hydrargyrum bichloride (1 : 5000 water) are better than warm fomentations. As stated, incision must be made soon, and will relieve quickly. The furuncular form demands at once either an incision or carbolic acid treatment. Both should be preceded by local cocaine anæsthesia, for the pain may be intense. The incision must be as thorough as in a furuncle of any other region. It may often be substituted by a thorough application of concentrated carbolic acid. If applied early, a single (or repeated) application will prove effective. As its action is quite local, there is no danger. If the furuncle be pointed and the point excessively painful, the acid ought to be introduced into the centre of the swelling by means of a slightly curved probe.

Accompanying *myringitis* is apt to improve after its cause —the otitis externa—has been removed. A vesicatory or tincture of iodine on and about the mastoid process is helpful.

Otitis media, both the catarrhal and the purulent variety, is a very frequent disease of infancy and childhood. Even in the middle ear of the newly-born accumulations are met with which either constitute or dispose to otitis. According to some, the masses frequently encountered consist of detritus developed out of the fœtal epithelial covering; others accuse aspiration during and immediately after birth; some attribute the changes to œdema produced *ex vacuo*, the vacuum being due to the sudden separation of the mucous membranes formerly immediately adjacent to each other. Infants have a large Eustachian tube, with a funnel-shaped pharyngeal aperture; thus infectious material of the common eruptive fevers, strepto- and staphylococci, the bacilli of a diphtheritic rhinitis, and even gonococci find easy access. All the varieties of nasal, pharyngeal, and naso-pharyngeal catarrh, also adenoid

vegetations and hypertrophied tonsils, are known to be the principal causes of middle-ear disease. Vehement spells of hooping-cough, forcible medicinal or other injections into the nares, and violent sneezing are apt to carry foreign material into the Eustachian tube and middle ear, particularly when the uvula is split in half (bifida), and still more so when the hard palate is fissured; for in such a case the levatores palati have no support and the muscles of the tube are insufficient and atrophied.

Preventive treatment has a wide scope. The number of cases of otitis media—according to Schwartze, twenty-two per cent. of all diseases of the organ of hearing are purulent forms of middle-ear disease—is as significant as its causes are manifold. Nasal, post-nasal, and pharyngeal catarrh must be attended to in their incipiency. Regular attention to the nose of infants would prevent much disease and many calamities. Indeed, defective hearing is more common than we suspect. Bezold found (1886) that of nineteen hundred and eighteen school-children, twenty-five per cent. had but one-third and eleven per cent. but one-fifth of normal hearing distance, and his statements have been amply confirmed. Most cases of perforation of the drum membrane, chronic suppuration, abscesses in the mastoid process, permanent paralyses of the facial nerve, and cerebral abscesses can be prevented by treating and curing the origin and fountain-head of the future distress. The hypertrophied mucous membrane of the nose must be reduced, adenoids removed, and enlarged tonsils resected in time. The interior of the nose ought to be washed—irrigated—at least once a day, according to known principles (p. 310). There is better reason, from the point of view of danger to health or life, for washing the inside than the outside.

A child with an acute attack of middle-ear disease ought to be in bed, the head raised. The symptoms are not always urgent or easily recognized. In the very young the large size

of the tube facilitates the exit of the internal secretion into the throat, so that the drum membrane is not annoyed and pain from internal pressure and irritation is insignificant in many instances. Careful examination, however, will leave a doubt as to the actual seat in but few cases. A mild antipyretic, a small dose of a narcotic, or a purgative will ameliorate the symptoms. In the very beginning the Eustachian tube ought to be treated by inflation (Politzer) very carefully, if at all; older children, who can be taught the use of Valsalva's method, must be warned against its excessive and vehement employment. When the acute stage has passed, both are more readily indicated. The severe pain may be relieved by a cocaine solution (2–10 : 100) instilled into the ear, also by one or more leeches to the mastoid process of the affected side, in most cases but one side being diseased. In mild cases tincture of iodine alone will suffice. When the drum membrane is red, a cloth moistened with a solution of hydrargyrum bichloride in water (1 : 5000), applied to the ear and frequently repeated, will, after getting warm, do equally as well as the most favored warm poultices. When secretion of mucus or pus is increasing inside, the posterior half of the drum membrane is pushed out first, afterwards the anterior; between the two the hammer can be distinguished. A spontaneous perforation is apt to form in the anterior portion, but the presence of a white discoloration does not always indicate pus. When the protrusion of the membrane is very marked, an incision may be made, mostly posteriorly and inferiorly. The general opinion of experts, however, is no longer in favor of indiscriminately early operation; still, when it is performed, the incision ought to be sufficiently large. Pus is then expelled by inflating through the nares (Politzer), and wiped out or carefully syringed out with a warm solution of table-salt or of boracic acid (3–4 : 100). The patient should rest on the diseased side. Boracic acid is then used as described in the rules laid

down for its application in external otitis, or the cana. is gently syringed with a mild solution of bichloride of hydrargyrum, or of an astringent,—sulphate of zinc, acetico-tartrate of alumina (2 : 100–300). To what extent, during all this time, narcotics are to be used, or whether anæsthesia, local or general, ought to be employed, depends on the individual case and the judgment of the practitioner; also whether an antiscrofulous or antisyphilitic treatment (the latter but rarely in children) be demanded. Chronic discharges require politzerization frequently, though cautiously, and the use of boracic acid and astringents; secondary polypi, treatment similar to that detailed above.

The secondary affections of the *mastoid process* demand leeches, ice, and tincture of iodine; where there is œdema, warm poultices and a deep incision. Abscesses of the mastoid process and of the brain require timely operation by an expert hand. The general rules laid down by Tröltzsch are still valid. Cerebral affections due to ear-disease are, when originating in the external meatus and the temporal bone, in the transverse sinus and the cerebellum; when in the middle ear, in the cerebrum; when in the vestibulum and cochlea, in the medulla oblongata.

In my opinion, one of the most important additions to modern surgery is our knowledge of the operative accessibility of all the spaces and nooks of the middle ear, as taught by Schwartze, and of the epitympanic part, by Zaufal, in all cases of chronic suppuration of the middle ear accompanied by sensitiveness or suppuration on the surface of the mastoid process, or by fistulæ, with osseous stenosis of the meatus and facial paralysis; of middle-ear disease exhibiting cerebral symptoms, with or without persistent fever, though there be no external inflammation; also in cases of cholesteatoma of large size, with alarming cerebral symptoms during the operation, particularly while injections are being made, or in those

in which sequestra or foreign bodies must be removed, mainly when they give rise to brain symptoms; and, lastly, in cases of profuse ichorous secretion, or of actinomycosis, or of tuberculosis of the middle ear.

Deaf-mutism is rarely an affection of the organ of hearing. It would be better to assign it a place in connection with diseases of the nervous system, for most of both the congenital and the acquired cases result from cerebral affections. It is not often hereditary. If more extensive statistics prove its (doubtful) dependency on consanguineous marriages, a wiser social hygiene can be made to act as a preventive. Alcoholism of the parents is a cause, and society and the state, with its organization of ignorance and disorder, are responsible for so much of deaf-mutism as is not directly pathological. About half of all the cases are acquired, the majority of them through cerebral and cerebro-spinal inflammation. According to Biedert, fifty-five per cent. are of that class, twenty-eight per cent. depend on acute infectious diseases (typhoid and scarlatina, also variola and measles), 3.3 per cent. on traumatic injuries, and 2.5 per cent. on ear affections. Thus many of the congenital cases and most of the acquired are preventable. The treatment must be directed to so much of pathological change in the brain, the acoustic nerve, or the ear as is still accessible to the influence of either remedial or operative interference.

XIII.

DISEASES OF THE EYE.

Malformations of the eye are of different variety and gravity. Some cannot be corrected, such as *cyclopia* and *microphthalmia;* some need no correction, like the common (vertical) form of *coloboma* of the iris, or the congenital *atresia* of the pupil. The latter consists in the persistency of a part of the pupillary membrane originating from the posterior aspect of the lens, and, if still extant after birth, disappears slowly. Others require, and are corrected by, operations. *Epicanthus*—an abnormal accumulation of cutis near the root of the nose—may be removed by an operative procedure, in the event of its not gradually disappearing spontaneously.

Neoplasms of the eye and eyelids are not frequent in infancy and childhood. Congenital *nævi* of every variety, however, are not uncommon. Very superficial ones on the eyelids should be kept under observation. When uniform and rather pale, they are liable to heal spontaneously. When a net-work of enlarged blood-vessels is found on the lids or conjunctiva, there is often a central point the compression of which by means of a silver probe empties all the neighboring branches. This centre ought to be destroyed by a single application of the thermo- or galvano-cautery, or by a trace of fuming nitric acid, or by running a silk ligature underneath and tying it. When they form small or large tumors, in most cases the actual cautery is easier and safer than the knife. The cautery must be used carefully and sparingly,—rather too little than too much, according to rules detailed above,—and always with a view of avoiding a consecutive ectropium.

Dermoid cysts are found on the lids, inside; also on the eyeball; even in the orbit, from which their removal is rather

difficult. They must be enucleated when the diagnosis is undoubted. They have been mistakenly diagnosticated in cases of encephalocele of the interior angle of the eye.

Lipoma is very rare, still more so than cysticercus cellulosæ. A few instances have been reported in which this cystic degeneration of the ovum of the tænia solium was found in the posterior chamber and under the skin of the lid in children.

Chalazion (not always tubercular, as has been asserted) is a mucous cyst in the tarsal cartilage, with a tendency to induration. The eyelid is turned over, the small tumor incised, its contents scraped out, and iodoform applied once. As the wound is covered by the lid, it heals favorably.

Glioma of the retina (Beer's amaurotic cat-eye) develops rapidly. Its vascular, sometimes red and bleeding, surface distinguishes it from suppuration of the vitreous body. It must be enucleated at once, as it is liable to grow rapidly in every direction.

Syphilitic *gummata* have been observed in stray cases of retarded syphilis. They exhibit the symptoms of iritis, and require an antisyphilitic treatment.

Tubercles of the iris are, fortunately, rare. They give rise to an incurable chronic iritis and necessitate enucleation of the eyeball. Tubercles of the choroid are sometimes observed in the incipient, sometimes in an advanced stage of tubercular meningitis. They are not amenable to successful treatment.

Foreign bodies hidden under the eyelids must be removed speedily, for conjunctivitis will immediately follow their presence. They are often washed out by the copious secretion of tears. The lower eyelid may be easily turned out and the corresponding portion of the conjunctiva inspected. The upper requires turning up, which is more difficult because of the resistance of the child, but easier than in an adult, on account of the greater motility of the skin of the young eyelid. To facilitate inspection, the eye may be pressed gently backward

into the orbit. The body, when seen, is removed by pincers, a fine sponge, a piece of gauze, or wiped off in the direction of the nose. In case of necessity, anæsthesia may be procured by a drop of a two-per-cent. solution of cocaine. This is indispensable when the foreign body is in the cornea and demands instrumental removal.

Injuries of the eye by puncturing, cutting, blows, etc., require absolute rest, the removal of foreign bodies, the application of ice, of atropia solution (eserine when the wound is peripheric), and gentle pressure. Bad cases of laceration and destruction are either irremediable or require special, perhaps operative, treatment.

The eyelids suffer from *blepharitis* mostly in scrofulous children, in whom dust, smoke, and infections of all kinds are apt to thoroughly influence the superficial tissues. It often accompanies eczematous eruptions of the head and face, and is frequently carried by the fingers. Therefore, soap and water, a nail-brush, and cutting the nails short are good preventives; so is the successful treatment of the head and face. The blepharitis and conjunctivitis of measles require no special local treatment; the common forms do well with a zinc ointment, or one of the yellow oxide of mercury with vaseline (1 : 50–100). The secretion must not be permitted to get dry. Hard crusts are dissolved by a warm solution of carbonate of sodium (1 : 100–200) or by frequent washing with soap and water. Grave cases demand epilation of the eyelashes, every one of which—so far as required—must be caught singly and drawn out slowly enough to secure removal of the entire hair. Ointments and solutions of lead it is best to avoid, for complications with corneal erosions, grave or slight, are very frequent in affections of the eyelids and conjunctiva, and even the slightest ones will be indelibly stained by lead salts.

Both the integuments and the connective tissue of the eyelids being of loose structure and expansible, œdema is quite

frequent. Insect bites are mostly diagnosticated by their circumscribed and pointed appearance; cardiac and renal diseases have their own indications; so has hydræmia from whatever cause, besides the indications for the administration of iron, quinia, or arsenic.

The *conjunctiva* is very liable to be affected by medicinal and poisonous agents. According to Silberman, aniline, potassic chlorate, and corrosive sublimate produce thrombosis; pungent gases, conjunctival hyperæmia and conjunctivitis; antipyrin, urticaria of the eyelids; arsenite of copper, redness and corrosion; arsenide of hydrogen, a brownish-red or icteric discoloration; bromide of potassium, simple or phlyctenular conjunctivitis, without, however, influencing the blood-vessels of the interior; chrysarobin, a local inflammation; coniin, a burning sensation; ergotin, hemorrhages; iodide of potassium, inflammation; iodoform, when applied locally, an erysipelatous tumefaction; and salicylate of sodium, œdema and a bluish exanthem; in larger doses, tumefaction and vesicular eruption. Still, cases of conjunctival disease depending on these agents are comparatively rare.

The majority of the diseases of the conjunctiva are of an inflammatory character. In a number of cases of *conjunctivitis* the conjunctiva of the bulbus does not extensively participate. Common forms of fevers, also hooping-cough and principally measles, are among the causes of acute conjunctivitis. Sometimes there is but little redness; the lids are thickened and stiff with œdema. In other cases there is plenty of mucus, sometimes purulent, now and then with a tendency to coagulation, but not to such a degree as to render difficult the differential diagnosis from diphtheria of the eyelids. The mucous secretion must be wiped off with absorbent cotton or a moist cloth, boracic acid solution of three per cent. should be applied or instilled, and cold water employed at intervals of from one to ten minutes; chlorine water, if to be had fresh (a tea-

spoonful in a glass of water), should be used for applications; if the surface secretes much, corrosive sublimate (1 : 4000–5000). If the secretion be purulent, nitrate of silver, 1 part in 100 or 500 parts of distilled water (black bottle), must be applied once a day, best with a brush, and washed off with pure water. A high degree of congestion, with phlyctenular eruptions,—sometimes unilateral only, not infrequently combined with blepharitis,—demands persistent application of cold, best by keeping a number of small pieces of cloth on a lump of ice and applying them at short intervals until they begin to get warm. Atropiæ sulphas (1 : 200–500) should be instilled once or twice a day, and the lids kept at rest. To hold them immovable, if the patient be very young, a layer of absorbent cotton should be covered with, or slightly soaked in, collodion and applied after the eye has been wiped dry. Later an ointment of the yellow precipitate of mercury (1 : 50–100), or calomel finely powdered, may be employed once a day.

Chronic conjunctivitis presents in many cases but few symptoms. The superficial hyperæmia does not always correspond with the burning sensation often complained of, and the mucous secretion is but trifling, and collects mostly in the inner angle of the eye. Overexertion of school-children, particularly those who are hypermetropic or astigmatic, diseases of the nose of a catarrhal or ulcerous nature, indigestion and constipation, anæmia, scrofulosis, or trichiasis are just so many causes and require the appropriate causal treatment, both medicinal and hygienic, change of air (country), and cool and cold bathing. These measures often suffice to relieve even secondary disorders of the lymph circulation, which is easily disturbed. Like the orbits which discharge their lymph ducts into the deep facial lymph bodies, those of the lids and conjunctivæ are emptied into the glands of the aural and submaxillary regions. The medicinal treatment is disinfectant and astringent; the remedies must be changed from time to

time. Sulphate of zinc (1 : 250–500) with or without cocaine muriate (1–2 : 100), in more protracted cases ointments of sulphate of zinc or sulphate of copper (1 : 100–150), solutions of boracic acid (3 : 100) or of sodium carbonate (1 : 100–200), in suppurating cases a daily brushing with nitrate of silver (1 : 250–1000), combined with scrupulous cleanliness and avoidance of vascular stimulants, will meet all indications.

The *chemosis* of scleral conjunctivitis does not require any additional applications; mild astringents and rest will suffice. Rubbing, constipation, and coughing result in hemorrhagic discoloration (general blueness or extravasations) which requires rest and cool (or warm) fomentations.

Diphtheritic conjunctivitis cannot readily be mistaken. The infiltration is hard and the pseudo-membrane not removable. There is no secretion; indeed, the eye is dry to such an extent that the pressure of the exudation alone ulcerates the cornea. Absolute caution in every case of—particularly nasal—diphtheria, and covering the healthy eye, when (as usual at first) but one eye is affected, with a cotton and collodion application, aided by more cotton and a bandage, are indispensable. Thorough and speedy mercurialization and antitoxin are indicated. Papayotin (1 : 5–10 of water and glycerin), not to be substituted by "papoid," must be applied every hour. Nitrate of silver deserves no recommendation. Chlorine water, carefully applied while the eyelid is kept away from the eyeball, whenever that is possible, may render good service. Ice must be applied carefully and persistently.

Most cases of *gonorrhœal conjunctivitis* are contracted during birth from the gonococcal discharge of the maternal vagina; others through handkerchiefs, towels, fingers, or bathing water. Its treatment has been discussed (p. 64).

Trachoma, possibly of a microbic, surely of a specific character, consists of granular deposits and proliferation of cells which crowd upon the normal tissue and render it atrophic.

Its duration is long; its treatment must be persistent. The acute attack, or stage, requires daily brushing with nitrate of silver (1 : 100), and washing off with water when the first effect of the caustic becomes visible. The subacute cases demand a daily (or less frequent) application of the sulphate of copper stick. The granulations may also be scarified, scraped out, or squeezed out,—an old operation successfully re-established by modern surgery. Many cases do well with a daily application of one part of bichloride of mercury in one thousand parts of distilled water. The conjunctival duplicature, which is the pet seat of trachoma, has been excised to get rid of a large part of the diseased masses at once. For domestic treatment, an ointment of sulphate of copper and vaseline (1 : 100), with or without cocaine muriate, will prove beneficial. A similar treatment, somewhat modified and diluted, is applicable to what is described as *granular conjunctivitis*, which probably is in no case anything but a mild form of trachoma. *Follicular conjunctivitis* is probably of the same nature in many cases; usually it is described as an inflammation of the (microscopically small) glands of the conjunctiva. The follicles are in rows near the margin of the eyelids. It is complicated with, or depends on, the presence of foreign bodies, of nasal disease, or of other varieties of conjunctivitis, and is not infrequently found in large numbers in families and schools. The treatment is milder than that of the previous forms,—rest, washing, boracic acid solutions, astringents.

Keratitis, beginning with a small vesicle, which is mostly not observed, and rapidly terminating in a superficial ulceration, is frequently met with in "scrofulous" children, who, besides, suffer from affections of the mucous membranes of the nose, lips, and ear, from eczema, glandular tumefactions, etc. Some patients are rickety. To overcome the spasm of the conjunctiva, cocaine is often required to facilitate examination; for that purpose the dipping of the head into cold water,

a popular remedy for photophobia, is probably not convenient. The constitutional disorder must be combated by cleanliness, fresh (country) air, bathing, plain and nutritious diet, quinia in small, iodide of iron in proper doses. Iodide of potassium in small doses (gr. i–ii), three times a day, given for a long time, is very successful in many cases. The room must be kept moderately dark and the eye protected by a shield. Good local applications are chlorine water diluted in from twenty to one hundred parts of water, corrosive sublimate (1 : 5000), boracic acid (3 : 100), atropia solution of one-half per cent., or cocaine solution of two per cent. (the last two occasionally in combination). When the ulceration is near the corneal margin, eserine is recommended in place of atropia; but it is advisable to remember that it produces a congestion of the iris and may predispose the latter to be drawn into the morbid process. Old cases will do well with occasional (one every day or two days) gentle applications of nitrate of silver (1 : 200–500) or (particularly when the conjunctiva is pale) of finely powdered calomel; this latter has always been highly recommended, and is useful, if persistently used through weeks and months, when turbidity of the cornea remains behind. Old cases with defective power of reparation will do well when the lids and eyeball are gently kneaded with an ointment of the yellow precipitate of mercury (1 : 50). In many instances some of these remedies will act better than others; alternation is often required. A simple ulceration, no matter what application is employed, will heal better, or best, by avoiding friction of the eyelids; they ought to be immobilized by cautious bandaging, which may be removed to make the demanded local applications. Under the bandage a cloth wet with a solution of corrosive sublimate (1 : 5000) or boracic acid (3 : 100) will prove quite acceptable and beneficial. Suppurating ulcerations lead to hypopyon and perforation. They require, besides atropia, or eserine when near the margin, occa-

sional applications of corrosive sublimate (1 : 2000) or nitrate of silver (1 : 100). Biedert recommends cocaine and scraping or burning of the abscess. According to him, the main obstacles in the way of speedy recovery are: complications with conjunctivitis, blepharitis, nasal affections, stenosis of the lachrymal duct and blennorrhœa of the lachrymal sac (but rarely its congenital obstruction), and blepharophimosis with photophobia and rhagades.

Parenchymatous or *diffuse keratitis* is a peculiar variety. The turbidity and thickening of the two corneæ (the process being bilateral) are extensive, not always uniform, often disseminated, and complicated with considerable vascular injection on and around the corneæ and with synechia of the iris. Very many cases of this variety—according to some, the vast majority ; ninety-six per cent., according to Parinaud ; thirty per cent., according to Siklossy—are the results of syphilis, either hereditary, or acquired, or retarded hereditary. They require persistent antisyphilitic treatment with iodide of potassium (and mercury). Scrofula, rhachitis, malaria, and arthritis are also charged with producing this form. It is certainly true that iodine and mercurial treatment are not always successful. Some cases are benefited by salicylate of sodium. Atropia is useful in all.

In *neuro-paralytic keratitis* both the conjunctiva and the cornea are deprived of sensibility, the lids do not move, the eye is kept open, the cornea is dry (*xerosis*) and may undergo softening (*kerato-malacia*), with the result of either perforation or incurable turbidity and local thickening. It is met with in severe infectious fevers, particularly during the unconscious state of typhoid, and in the coma of encephalitis. These results are not often met with for a long time in succession, for most of the patients die of the original disease. They have also been noticed during and after frontal and conjunctival herpes zoster. In all these cases the eyeball must

be moistened with salt and water (6–7 : 1000) and the lids closed by a bandage or by cotton with collodion. In most cases the latter will prove as effective as suturing of the two eyelids. Xerosis of the conjunctiva is also noticed, in very young infants, as the result of ill nutrition and consecutive marasmus. Most of the patients are from two to six months old. Proper and sufficient food will sometimes restore both the eye and the general health, but the mortality of these cases is very high. The same condition is found in children of from three to nine years (Thalberg, Förster). Several such cases were complicated with hemeralopia.

Keratoconus—the conical raising of the centre of the cornea—requires a cautious thermo- or galvano-cauterization ; *pannus*, the centre of which is generally absolutely deprived of blood-vessels, demands stimulation. Daily insufflation of finely powdered calomel, continued for weeks or months, has met with some successes. Infection with erysipelas and gonorrhœa has been observed to restore circulation and absorption, and the latter has been utilized, consequently, to accomplish these ends.

Acute iritis is rare in infancy and childhood ; its complication with *glaucoma* still more so. Of its two great causes, syphilis is almost exclusively of the hereditary variety, and rheumatism exhausts its main danger in starting endocarditis.

Chronic iritis is not often seen in early life, except in connection with diffuse keratitis. The treatment of iritis is essentially identical with that of the same affection in adults : hydrargyrum, iodides, and salicylates, according to the causal indication ; instillations of atropiæ sulphas in distilled water (1 : 100–500) from two to ten times a day, or oftener if the danger of adhesion be imminent, with a two-per-cent. solution of muriate of cocaine if the pain be great ; absolute rest in the acute variety ; dry heat ; a dark room ; iridotomy, or rather iridectomy, in most cases to loosen synechiæ and restore a pupil. Subconjunctival injections of corrosive sublimate

(1 : 1000, a few drops at a time) were used by Darier in 1892, and in Deutschmann's clinic. They are made near the margin of the cornea and downward, and are recommended principally for syphilitic affections of any part of the eye, except, perhaps, the optic nerve. Parenchymatous keratitis and iritis are also said to be amenable to the same treatment, though they be not syphilitic. Later reports are not quite so favorable.

Suppurative *cyclitis* and a true *abscess of the vitreous body* are generally found together. Blindness is imminent, and enucleation to save the other eye becomes a necessity in almost every case, except in small children. In them the process has often exhausted itself, and terminates in blindness and contraction without secondary irritation. When the abscess is small, part of it may be absorbed, and a white cloud in the lower part of the vitreous body, and feeble vision, may be the only evident results.

Uncomplicated inflammation of the *choroid* is rare in children. Idiopathic choroido-retinitis is observed in later years in both eyes after it has lasted a long time. It certainly commences at an early age, but takes decades before it ends in contraction of the field of vision, degeneration of the retina and optic nerve, and turbidity of the vitreous body and the posterior capsule of the lens. In all cases, whether syphilitic or not, treatment with mercury and iodides is the only one either reliable or advisable.

Congenital cataract demands an operation if vision be insufficient. If it be partial, atropia and iridectomy will suffice. Total cataract is rare in early years; more frequent is zonular cataract, which exhibits round its nucleus one or more turbid layers, followed by normal clear ones. As at the same time in a number of cases transverse phosphatic deposits are found in the teeth, zonular cataract has been attributed by many to rhachitis; others connect it with convulsive dis-

eases. Some constitutional disorder has been charged with being the cause, but no treatment has been advised, nor is there any apparent indication, except to correct the accompanying myopia.

Diseases of the *retina*, the *optic nerve*, and the *orbit* show no particular symptoms in the young, nor do they require special treatment different from that employed in advanced age. In many cases of acute or chronic leptomeningitis with ample effusion, blindness depending on copious secretion in and around the tissue of the optic nerve is an early symptom. Early diagnosis of this condition, and treatment with mercury, iodides, and derivants (diuretics, purgatives, diaphoretics), may succeed in reducing the œdema and preventing compression and atrophy of the nerve. A number of such cases will get well.

The tissues of the young eye being soft and elastic and expansible from internal pressure, *glaucoma* is but rarely seen at an early age. Its place is taken by *hydrophthalmos* (*buphthalmos*), which requires the operative procedures employed for the glaucoma of advanced age,—either iridectomy or sclerotomy.

Strabismus is common in infants. In them it is the result of an insufficient development of muscular power in general and of accommodation. It requires no treatment. That which makes its appearance during convalescence or in general hydræmia terminates in recovery. Diphtheritic paralysis of the muscles of accommodation recovers spontaneously, or through generous feeding and the administration of iron and strychnia. Muscular paralyses resulting from cerebral diseases depend on these for their treatment.

XIV.

DISEASES OF THE MUSCLES.

ACUTE inflammation of the muscles—*myositis*—is located either in the external or internal perimysium, also in the contractile elements. Cellular infiltration, coagulation, fatty and hyaline degenerations, suppuration, nuclear proliferation, and the formation of new connective tissue are observed as its morphological changes, with either incurable retraction or curable contraction as their results. *Traumatic* myositis (see p. 48) requires absolute rest, the application of cold water or ice, after a while tincture of iodine once a day or every other day, iodide of potassium and lanolin ointment several times a day, or gentle massage without the ointment. Iodide of potassium internally is indicated when thickening remains behind. If, after a long time, the muscle, though without pain, does not become normal, the electrolytic effect of the galvanic and the stimulating action of the interrupted current, in short sessions, will improve the condition. Both traumatic and *rheumatic* myositis have a tendency to relapses. The latter requires a treatment similar to that which has been detailed above, with this exception, that hot (dry) applications generally render better service, and the internal administration of salicylate of sodium is mostly indispensable. Inunctions of oil of wintergreen are often useful, as are also diaphoretics. The *infectious* myositis of eruptive and septic fevers starts an effusion which is either serous or purulent, and requires accordingly, besides the active attention demanded by its origin, either expectant or operative (and antiseptic) treatment. *Syphilis* produces either gummata or hyperplasia, and demands, in addition to internal specific treatment, either the inunction of an oleate of mercury or of the blue ointment, or

subcutaneous injections of the bichloride. *Tubercular* deposits are caseous and purulent; they must be incised, scraped out and irrigated, and the cavity filled with iodoform gauze. Purulent myositis is hardly ever idiopathic, and its cause or complications must be ascertained (syphilis, tuberculosis, sepsis).

The *chronic* forms of myositis met with in children are, as a rule, outgrowths of the acute inflammation. The rare forms of *traumatic ossifying* and that of *petrifying* myositis are hardly ever seen in childhood, with the exception of the occasional appearance of the *multiple progressive ossifying* variety, —a collateral to the cartilaginous exostoses,—which exhibits inflammation and bone-formation in the cellular tissue of the fasciæ, in the aponeuroses, and in the tendons of the back, the chest, the masseter, and the extremities. It is sometimes complicated with defect or anchylosis of the phalanges of the thumb. It is a nutritive disorder always of congenital origin. No available treatment is known.

Ischæmic muscular paralysis is the result of anæmia (mostly local, as from the influence of cold). The pain, loss of elasticity, and resulting contracture require massage, gymnastic exercise, and electricity.

Tropho-neurotic ill nutrition and *paralysis* comprise two varieties. One is the result of inflammation of a joint: from disuse the neighboring muscles become atrophic and more or less paralyzed. The other originates in a change of the spinal centres, as in poliomyelitis, with fatty degeneration and atrophy as inevitable consequences.

The "*pseudo-paralysis*" of rickety children is simply debility. *Muscular atrophy*, *progressive juvenile muscular dystrophy*, and *pseudo-hypertrophy* have been mentioned above (p. 378).

The affection which has been described as *grave pseudo-paralytic myasthenia*, and which consists in a peculiar exhaustion of the muscles on slight exertion, to such an extent

as to render voluntary contraction very difficult and to rapidly diminish electrical excitability, appears to depend either on defective innervation or on chemical changes. In the single case I have seen, massage and strychnia rendered some service. Veratrin, physostigmin, and digitoxin are recommended.

Torticollis (*caput obstipum*) means a contraction of the sterno-cleido-mastoid muscle, mostly its sternal end; the head is turned to the affected, the face to the opposite side, and the diseased side is not infrequently more or less atrophic. The treatment depends to a great extent on the cause of the contraction. Malposition in the uterus is an occasional direct source, as also the hæmatoma originating during birth, or later, which has been mentioned elsewhere (p. 48). Tumors, such as sarcomata, have the same influence on the function of the muscle. This is impaired, in advanced childhood, by sudden strains; for instance, by kite-flying, by loads carried on one shoulder, occasionally also by an abnormal position of the head enforced by paralysis of the ocular muscles, in order to avoid double vision (Landolt). Rheumatism of the muscle, isolated or more general, and of one or more vertebral articulations, has the same effect. Salicylate of sodium internally, oleum gaultheriæ, and ammoniacal or camphor inunctions will do good. The same may be said in regard to *muscular rheumatism* in general. Torticollis is also one of the symptoms of the acute rheumatism of the neck which, because of its serious symptoms (fever, vomiting, delirium, with no irregularity, however, of the pulse), has been mistaken for meningitis. Sometimes it depends on a neurosis (neuritis?) of the accessory nerve. In that case the scalenus and trapezius muscles are also affected. Reflex torticollis has been mentioned in connection with intestinal worms and with carious teeth, and an intermittent form is known to exist (Forchheimer) depending on malaria. In these cases quinia and arsenic are indispensable. Worms must be removed, teeth corrected. In those cases in which heavy

loads carried on one side cause contraction of the other, a systematic use of the diseased side will restore the equilibrium. Exaggerated and forcible swinging of the arms will secure cooperation and exercise of the muscles of the neck. Massage both of the muscles and of the articular processes of the cervical vertebræ from the third to the fifth is required. The galvanic current in mild doses relieves spasm. Gentle rubbing with lanolin (in inflammatory cases with iodide of potassium or mercury) is beneficial. Cold temperatures must be avoided. Otherwise unconquerable cases require tenotomy, to be performed from inside outward.

XV.

DISEASES OF THE BONES AND JOINTS.

Of the congenital *malformations* of the extremities (bones and soft parts), many are not accessible to treatment. To this class belong arrests of development and spontaneous amputations. *Curvatures* of the limbs (congenital, through fracture of the tibia) may require osteotomy or osteoclasy; but their domain is not very extensive, for in the large majority of acquired *rhachitical curvatures* of the legs recovery takes place spontaneously. Observations in the surgical clinic of Tübingen, extending over a number of years, prove that seventy-five per cent. of all such curvatures will straighten out in from two to four years. When the patients were first presented, plaster-of-Paris casts of the deformity were made, and another examination took place after an average of four and one-half years. Improvement was noticed in 15.3 per cent. additional. In 9.7 per cent. only no spontaneous recovery or improvement took place. It is in these that operations are demanded. *Supernumerary fingers* and *toes* are either removed from their cutaneous attachments or extirpated from their sockets. *Congenital enlargements* of toes, consisting in hypertrophy of both bone and fat, are removed by amputation. If their relationship to acromegaly could be established, thyroid treatment might find one of its successful fields of action. *Synechia* of (*webbed*) fingers and toes must be separated; the operation being difficult, it is best to delay it for some time, but not long enough to endanger the growth of the organ.

Congenital luxation of the hip-joint, with the exception of rare cases depending on injuries contracted during birth, is the result of an arrest of development of the acetabulum, which is

sometimes hereditary and now and then complicated with other malformations. The head of the femur finds no accommodation, and the trochanter is found above its normal place. This is particularly so on the steep os ilium of the female. When the luxation is unilateral the gait is limping; when bilateral, waddling. Extension lengthens the extremity and conceals the deformity. Treatment is either mechanical or operative. E. N. Bradford (*Annals of Surgery*, August, 1894) claims that no cure is effected by any methods of treatment by traction or by mechanical means, even with tenotomy, that correction by forcible reduction is not reliable, and that operative reduction is more promising, but risky. In the same number, T. Halsted Myers promulgates more favorable opinions. He favors, first, mechanical reduction; then, for the purpose of inducing the new formation of connective tissue and cicatrization, subcutaneous injections of chloride of zinc. If they be insufficient, an operation, according to Hoffa (whose operations up to that time showed a mortality of 3.3 per cent.) and Lorenz, is advisable. Until a few years ago the mechanical treatment was the only one generally recommended. Volkmann relied on permanent extension, particularly in unilateral cases. Schede uses splints, with pelvic support, to extend and to abduct the extremity, for from two to four years in succession. He finds the indication for this treatment in bilateral cases up to the fourth year, in unilateral cases up to the eighth or ninth, for the rudiment of the acetabulum whose size can be improved upon frequently persists up to that period of life. Pavi lost a girl of seven years (of dysentery) four months after reduction and extension of her bilateral dislocation. At the autopsy he found two new joints which appeared to promise stability of the femoral head in the new position, if the child had lived. Within a short time the results of operations have become very favorable. In the German Congress of Surgeons of 1894, Lorenz—in that of

1895, Hoffa—presented very satisfactory statistics and patients. Neither of them cuts the muscles, but both reduce the dislocated limb by powerful extension. The incision is longitudinal, like that made for resection; the capsule and soft parts are loosened from the trochanter by subperiosteal operation, the acetabulum is enlarged and the head fitted into it. The superfluous capsular tissues are then extirpated, the wound is filled with iodoform gauze, and an extension apparatus applied. The extremity begins to grow, shortening becomes less, and head and acetabulum gradually increase in size. Hoffa's operations were performed between the second and eighth years. He presented the statistics of one hundred and twelve operations performed on eighty-two patients without cutting muscles. The last forty-seven terminated without a death.

Lately, A. Lorenz* has published his objections to the protracted employment of extension, which keeps the patient in a recumbent position, possibly for years, and interferes with the nutrition and function of the limb or limbs. Instead, he extends forcibly, under anæsthesia, and reduces the head of the femur, the reposition being kept up by strong abduction. The head of the femur is then retained in the small acetabulum by apparatuses and the abduction is gradually diminished. After a while standing and walking are permitted. At first, while abduction is continued, these movements are clumsy and difficult, but when the weight of the body and the constant friction have deepened the acetabulum, they become easier by degrees. The oldest child in whose case this procedure was successful, the luxation being bilateral, was six years and three months. In one case of unilateral luxation, standing and walking were interrupted three days only, in others several weeks. Even when the luxation was bilateral they were

* Centralblatt f. Chir., 1895, No. 33.

not long delayed. Two patients were able to stand after six weeks.

A number of cases described as *chronic articular rheumatism* are undoubtedly those of arthritis deformans. Their merely antirheumatic treatment is, therefore, inefficient. The differential diagnosis is perhaps best made by noting the early changes which take place in the skin and the rest of the epidermoid tissues and in the muscles. The accompanying changes in the muscles,—a slowly progressive atrophy with corresponding paralysis, without reaction of degeneration, and with only so much alteration of electrical and galvanic excitability as is explained by the atrophy of the muscular tissue,—trophic changes of the nails of fingers and toes (thickening, fragility, and exfoliation), and those of the skin (vitiligo and chloasma and slight indications of scleroderma, even ichthyosis in a few instances*) appear to prove their great difference from rheumatism and their intimate connection with the nervous system (p. 379).

Multiple infantile *exostoses* are congenital, sometimes hereditary; develop early, now and then only after puberty; grow near the periepiphyseal cartilage, between epiphysis and diaphysis, sometimes from the very cartilage of the epiphysis; are now and then found on scapula, pelvis, and cranium; grow in rare instances even after the completion of the growth of the body; remain cartilaginous or become osseous, and then may interfere with the growth of the bones. They do not often disturb the functions of the long bones and joints, but the ulna has been known to become crippled by them, the skin may ulcerate over them, and the synovial capsule may be raised by one growing too near the joint. These complications sometimes require special treatment and attention. Exostoses, so long as they are but few and not cumbersome, are best left alone.

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* Curschmann in Schmidt's Jahrb., 1895, No. 8, p. 220.

However, in the next case of early age seen by me I shall give phosphorus (p. 102) systematically, for the purpose of enforcing speedy ossification, both local and general. Extirpation is indicated when there are but few, and when these are large; but the neighborhood is replete with blood-vessels, and the operation and after-treatment demand unusual care to avoid ostitis. Iodide of potassium has been administered extensively.

Fractures heal the more readily the younger the patient. Callus is speedily formed, and, the muscles being feeble, dislocation of the ends of the bones does not take place to any considerable extent. The fracture of the humerus occasioned during birth requires a light splint with but little wadding. A piece of pasteboard and a few strips of adhesive plaster or a bandage, and the support of the limb either by a sling or by fastening it to the body, are sufficient. Clavicles heal readily when tied up in a triangular cloth, the arm being fastened to the body. Where moistening by urine, etc., is feared, the gauze bandages should be soaked in collodion.

Perichondritis and *osteochondritis* occur, of course, in earliest infancy only, mostly under the influence either of rhachitis or of syphilis, most frequently in the forearm and the leg, also on the ribs or clavicles, and terminate either in cutaneous infiltration or disruption of epiphyses. Pain is rare, and the "pseudo-paralysis" of Parrot means but the functional disturbance due to infiltration of the tissues. *Periostitis, ostitis,* and *osteomyelitis* are due, in the first instance, to the disposition created by the activity of metamorphosis and by the physiological succulence of the bones, whose growth starts from the periosteum, from the marrow, and from the periepiphyseal cartilage. The vulnerability of general scrofula and hereditary influences add to their liability to become diseased. Proximate causes of inflammation are trauma, colds, infectious diseases such as hooping-cough and measles, and the invasion of

cocci and bacilli. The termination of periostitis is either in absorption, or thickening, or suppuration. In "*albuminous periostitis*" pus is substituted by serum and fat. In scrofulous children ostitis is mostly found in the short bones and in the epiphyses. The bones swell, become softened (porotic), in their interior suppuration loosens the tissue and dilates the medullary spaces so as to inflate and expand the thin external layer (*spina ventosa*). *Tubercular ostitis* softens the bones into a yellowish caseous or fungous mass, and thereby forms cavities, which may heal by means of absorption of the liquid contents and calcification of the remnant, but mostly end in caries or necrosis, in fistulæ, in persistent suppuration, and not rarely in amyloid degeneration. The degrees of the different forms vary considerably. For instance, necrosis may be superficial, with a favorable prognosis; or central, with the formation of a sequestrum the removal of which incites granulations and new formation of bone; or total, and thus removes whole bones, such as the calcaneus, the cuboid, entire phalanges, or the diaphysis of a tibia.

The prognosis is best when the process is superficial. Absolute rest, elevation of a limb, cold applications, tincture of iodine, occasionally leeches, and deep incision in case of very severe pain which betrays small quantities of pus comprise the proper treatment of an acute periostitis. Chronic thickening will usually be reduced, perhaps even removed, by moderate pressure, iodide of potassium internally, and (or) an ointment of the same with lanolin. Syphilitic periostitis requires iodide of potassium in increasing doses, occasionally combined with mercury. Ostitis and osteomyelitis (deep, agonizing pain, with but little swelling at first) require a treatment similar to that of periostitis. The bone should be kept at rest, well elevated and supported by splints, and ice applied. In mild and slow cases tincture of iodine, or the ignipuncture of Kocher, will yield favorable results. Syphilis demands its specific treat-

ment. Incision may strike an abscess, which is then drained. Sequestrum is removed, and will be replaced by bone as long as there is no dangerous general affection. Antiseptic irrigations are indicated in most of these cases, and antiseptic applications should be made constantly if gauzes are not used to fill a cavity or fistula. When caseous degeneration has taken place to a great extent, the question of mere scraping or of resection presents itself. Osteomyelitis requires an early operation, sometimes within a few days after the appearance of the first symptoms. Esmarch's bandage, the chisel, and the sharp spoon are the main reliances of the surgeon; the seat of the disease must be reached and entirely uncovered; counter-openings and ample tamponing may be demanded. Spina ventosa should be treated in a similar manner; part of the remaining external osseous layer should be removed and the cavity filled with iodoform or other antiseptic gauze.

In every case of this kind—in fact, every case of subacute or chronic inflamation of the osseous tissue—phosphorus ought to be given. It may be continued in such doses as are recommended elsewhere (p. 102) for two or three months in succession.

Inflammations of the joints are frequent,—more so in infancy than in childhood. Acute cases are rare, however, in children eight or ten years old, who have more control of their muscles and take better care of themselves. Younger children are more exposed to traumatic injuries; besides, not to speak of the phlebitis of the newly-born, there are in the earlier years distinct predisposing causes of joint-disease in such infectious diseases as scarlatina and diphtheria. The synovial membrane, the fibrous capsule, and the cartilage are affected either separately or collectively, and the contents of the diseased cavity are either serous, or purulent, or fungous. Most of the latter are tubercular, and were known to be so long before the tubercular bacillus was discovered. Indeed, as early as

1873, Koster recognized the tubercular nature of "tumor albus."

The prognosis is fair when the secretion is serous. Fluctuation is easily recognized when the joint is superficial. It remains as "hydrarthros" in chronic cases. The treatment requires absolute rest, and in the acute stage the flexed position of the limb—which is either voluntarily chosen because it relieves tension, or is the result of a reflex contraction—must be respected. Other aids are: cold applications, rarely a local depletion, mustard plasters; in less urgent cases, tincture of iodine, pure or diluted with alcohol, once or twice daily; in chronic cases, a vesicatory either to its full effect of applied for half an hour only, and repeated daily or several times a day; later, ointments of iodide of potassium and lanolin, or mercurial plaster, which may be made to cover the whole joint and may be changed once every few days; two daily applications of iodoform in collodion (1:8–20) over the whole joint; and moderate compression. Iodide of potassium internally will render good service while the affection is of a purely inflammatory character. Persistent contracture must be overcome by massage, passive movements, and forcible extension, either without or with anæsthesia.

Tubercular cases have a decided tendency towards either suppuration or fungous degeneration. About the knee the abscess is often outside the capsule and permits of an incision which does not reach the interior. Intra capsular abscesses, the opening of which was once so dangerous as to be considered semi-criminal, are no longer the bugbear of surgery. Antiseptic irrigations and tamponing and draining have reduced the dangers and are daily swelling the records of recoveries. General treatment to overcome the anæmic and cachectic condition, and particularly antituberculous hygiene and medication, are demanded in most cases.

Lately (*Deutsche Zeitsch. f. Chirurgie*, vol. xli., July 30,

1895, p. 378), E. Wieland published a contribution to the treatment of surgical tuberculosis in childhood with iodoform injections which, to my mind, contains everything now known on the subject and all that is sound and advisable. Iodoform treatment is certainly not a panacea. Cases of tubercular coxitis, for instance, complicated with large abscesses and with perforation of the acetabulum, which offer great difficulties in the way of irrigation, of thorough cleaning out, of injections, and of compression, are liable to resist iodoform treatment as well as to yield unfavorable results after a radical operative interference. But in a large percentage of cases injections of iodoform emulsions, aided by orthopædic measures (bandages, stays, plaster of Paris) or by mild operative procedures, and last, but by no means least, by constant attention to the general health (air, food, clothing, and bathing), and by medicinal support with arsenic, creosote, or, preferably, guaiacol, yield good results. It is true, this treatment takes patience and time, is even apt to be expensive, and certainly exhibits no tangible proof of a great surgical achievement to the impressionable lay mind; but it is efficient, and has the advantage of not interfering with the growth and development of the limbs, which are mostly injured, and permanently so, by subjecting the epiphyses and the periepiphyseal cartilages to a radical operation. In not a few cases the absorption of iodoform, when employed in solutions, has proved dangerous through a consequent toxic nephritis. For this reason, solutions in ether or oil are not to be recommended; for, after all, it is the local effect of iodoform which is aimed at, and not a general one. Emulsions are preferable. Krause employs a suspension of ten per cent. of iodoform in water, with the addition of but little glycerin and gum-arabic.

The places to be selected for injections, according to him, are,—for the wrist-joint, below the styloid process of the ulna; for the elbow, above the capitulum radii; for the

shoulder, exteriorly from the coracoid process; for the hip, above the trochanter major; for the knee, below the patella; for the ankle-joint, below the malleolus, in an upward direction. Periarticular abscesses should be incised and scraped thoroughly before an injection is made. The same holds good for fungous degeneration of the capsule of a joint. Bones in a very diseased condition—the talus, for instance—should be removed entire. If pus cannot be removed thoroughly, counter-openings are required. At first, for the purpose of thorough cleansing and disinfection, injections may be made with a mild solution of bichloride of mercury (1 : 5000), to be followed for a few moments by a stronger one (1 : 1000–2000). The principle of conservatism must never be lost sight of. All are unanimous at present that conservative treatment is the more urgently demanded the younger the patient. Radical operations are indicated only when the case is one of extensive and protracted irremediable suppuration with progressive destruction of tissue. Resection, however, must not go beyond the cartilage between epiphysis and diaphysis. If tuberculosis be markedly developed, either locally or generally, it is better to amputate than to resect. Fistulæ which do not contract or shorten should be treated with strips of gauze dipped in equal parts of balsam of Peru and alcohol, and when they are very dry and indolent, with (Villate's) injections composed of sulphate of copper 10 parts, sulphate of zinc 10 parts, and distilled water 120 parts. It is particularly the knee- and elbow-joints that require conservative treatment, both cautiously and patiently.

Another method of conservative treatment of tubercular joints has been introduced by A. Bier (*Arch. f. Klin. Chir.*, 1894, p. 306). Encouraged by the fact that lungs in a condition of passive hyperæmia resulting from cardiac disease or from kyphosis have a rather pronounced immunity from tuberculosis, he advises to produce a passive venous congestion

of the tubercular joints by bandaging the limb tightly below the affected joint and compressing it above with an india-rubber band (Esmarch). To secure a moderate amount of hyperæmia and cyanosis, and to avoid undue pressure and œdema, the bandaging should be interrupted once or twice a day. Such a degree of passive hyperæmia is known to give rise to the new formation of connective tissue and to induration. This, it is suggested, affords a certain degree of protection against the proliferation and action of bacilli. At least this is the effect aimed at by Landerer when he recommends cinnamic acid, and by Lannelongue, who injects chloride of zinc for that purpose. That such was Koch's theory when he introduced tuberculin is well known.

Bier continues his treatment at least three months. Massage, formerly used simultaneously, he has discarded. He found his method particularly practical when employed for tuberculosis about the ankle-, knee-, and elbow-joints, also for the testis, less so for the shoulder, not at all as yet for the hip-joint. He found, however, that if there were much suppuration, the limbs thus obstructed now and then tended to acute inflammation, lymphangitis, or erysipelas. Ulcerations increased in size, but finally healed; sometimes large granulations sprang up, but recovery eventually took place. Tubercular sequestra were often absorbed, and sometimes firmly attached to and embedded in the surrounding osseous tissue. Even tubercular skin was benefited by frequent dry cupping, but not to such an extent as joints and bones by the above treatment. Glands were not accessible to the same method, except the cubital. Sarcoma and lupus were rather the worse for it; so was extensive suppuration with strepto- and staphylococci.

The treatment, however, is not to be confined to this method alone. Abscesses are aspirated, if possible, in their upper part to avoid persistent discharge, and filled with

a ten-per-cent. iodoform emulsion. Slight compression may follow, and the injection is repeated in about a week. If there be considerable purulent discharge, the iodoform treatment is continued or Villate's solution (p. 473) employed. Under its use bone fistulæ heal rapidly. If loose splinters be accessible, they are removed. Forcible extension by apparatuses under anæsthesia, tenotomy, and plaster of Paris should be employed in the treatment when indicated; so should passive movement, massage, and warm baths, particularly where there is functional anchylosis. True anchylosis requires resection when the false position of the extremity becomes intolerable, for a considerable curvature of the lower extremity or the extension or hyperextension of the upper cannot be borne. That generous diet and proper hygiene and antiscrofulous and antitubercular medication must not be omitted in an ailment which either is the result or may be the beginning of a generalized infection is self-evident.

So far as the antitubercular treatment with guaiacol is concerned, I can but repeat what I said on the subject some time ago (*International Medical Magazine*, November, 1892, and Transactions of the American Climatological Association, 1892). No one treatment of all forms of tuberculosis ever satisfied me to the same degree as has that with guaiacol. In the different varieties of pulmonary tuberculosis, when the destructive process was not too acute, it has almost invariably improved both appetite and general condition, rendered expectoration less purulent, and increased the weight of the body as well as improved the complexion. The more chronic the cases the more perceptible is the effect of guaiacol. Thus, in tuberculosis of the osseous system its action is very satisfactory. The dose for a small child is from a drop to two drops, to be repeated three or four times a day. If the taste be objectionable, the carbonate of guaiacol (an almost tasteless powder) may be substituted in three or four daily doses of

from one to three or four grains each. Both of these preparations, particularly the latter, may be combined with other drugs, according to indications,—preferably with arsenic in generalized tuberculosis of the soft tissues, with phosphorus in extensive inflammations of the bones of a chronic or subacute nature.

Coxitis begins mostly in the head of the femur, and is rarely attended with very acute symptoms. As it is curable when recognized early, every case of dragging, of untimely fatigue, of favoring either limb, of vague pain, and of slight increase of body temperature in the afternoon requires careful and repeated examination. Pain in the knee depending on irritation of the obturatorius and internal saphenus nerves is not increased by pressure. Limping and apparent lengthening of the limb with abduction and shortening with adduction are found not to be actual, but the result of voluntary change of position. These conditions are overcome by rest, the local applications mentioned above, and conscientious extension in bed. At a later period, when all the symptoms of acute irritation have disappeared, counter-extension and extension by apparatuses may be employed for the purpose of permitting active exercise. When, however, the swelling increases, an abscess is formed, and perforation takes place, a spontaneous luxation will be the result, with either elongation or shortening (luxation upward and backward with adduction and inward rotation of the extremity). The os ilium may perforate, or what is left of the head of the femur may start for the sciatic foramen, or upward, and all of the head may be lost by suppuration. Even in these bad cases partial recovery sometimes takes place. A new joint may be formed or actual anchylosis result from the healing surfaces joining each other. The size of the incisions will depend on that of the abscesses, and the operations on the bones on their condition. Complete resections ought to be made in as few instances as

possible; the periepiphyseal cartilage controlling the growth of the limb requires careful protection.

Tubercular coxitis is eminently a disease of early age. Nearly fifty per cent. of the cases occur during the first decade of life, nearly forty during the second. One-third of all the cases remain free of suppuration; of these, seventy-seven per cent. get well; of the purulent form only forty-two. Altogether, about forty per cent. terminate fatally, death ensuing from tuberculosis of the lungs or of the meninges, or from general miliary tuberculosis, amyloid degeneration, or exhaustion by suppuration or by sepsis. About fifty-five per cent. get well under conservative treatment; still, the motility of the hip-joint is impaired by contraction, so that either adduction (in two-thirds of the cases) or abduction, with actual or apparent shortening of the extremity, results therefrom. Actual shortening depends either on retarded growth or (in the process of bone destruction) on displacement of the acetabulum, which is more frequent than spontaneous luxation; apparent shortening on the voluntary elevation of the hip.

The general rules of constitutional and local treatment hold good for *gonitis* (inflammation of the knee-joint), which is liable to be tubercular in perhaps a larger percentage than any other joint. Deformity becomes very marked at an early date, the leg is very apt to be luxated backward, and both pseudo-anchylosis (adhesion of the ends of the bones by connective tissue) and true anchylosis (solid connection of the cartilages or of the bones) are frequent.

Inflammations of the *ankle-* and *tarsal-joints* are mostly tubercular. They take a slow course in most instances, and result but rarely in recovery unattended by deformity. Unfortunately, constitutional tuberculosis is a frequent complication, and death is not uncommon before even a local restitution can take place. The *elbow-joint* exhibits the same tendency to

deformity and anchylosis, but is rarely the source of a hectic condition and of death. Early fixation in a sling and the application of either water-glass or plaster-of-Paris bandages are indispensable, while the forearm and the humerus should be placed nearly rectangularly. The same position must be secured for the foot. In coxitis and gonitis the limb ought to be kept entirely or nearly straight.

Tuberculosis of the body of a vertebra (more frequent than that of the arch or of a process) underlies *spondylitis* in almost every case. The intervertebral cartilages are but secondarily affected. In many cases a trauma is charged with being the proximate cause, in others the process develops spontaneously, with but few symptoms. Stiffness on moving, pain on moving and pressure, very little, if any, increase of temperature, inability to bend and rise without support on a knee or some near solid object, are quite often the persistent, but only, symptoms. When spondylitis is cervical, it is liable to produce headache, dyspnœa, and retro-pharyngeal abscess; when lumbar, pain in the thigh or symptoms resembling those of coxitis. Usually there is already pus either in the bone or at some distance from it. It finds its way along the fascia, rarely into the vertebral canal, and is met with in the gluteal region, in the small pelvis, along the psoas and internal iliac muscles, and along the rectum. There is rarely a recovery without some deformity. Cases with much suppuration exhibit lasting and marked kyphosis or scoliosis, or kypho-scoliosis. As soon as the diagnosis can be made, the patient must remain on his mattress, with a moderate amount of extension. Ice will relieve local pain. When it is moderate, tincture of iodine will answer. Hueber recommended the subcutaneous injection of a two-per-cent. solution of carbolic acid. When there is no fever, the time for a plaster-of-Paris jacket, according to Sayre, has arrived. What the latter requires, however, is that the child should not be too young. To be useful, a certain length of the spine is necessary

for its application. Thus, it is principally in the dorsal spondylitis of children of a certain age that it exhibits its best results. The jury-mast is added to support the head and thereby to reduce local pressure in cervical cases. Abscesses gravitating downward are better not touched before they reach the surface. Then, or after their spontaneous perforation, antiseptic irrigations and the use of iodoform emulsions are indicated.

Genu valgum (*knock-knee*) is the exaggeration of a normal disposition produced by a slight depression of the external parts of the articular surface, mainly of the thigh. This disposition is increased by the rhachitical softening of the bone (in later life to an eminent degree by the pressure brought about by the occupation of bakers, waiters, saleswomen, etc.). The speedy cure of rhachitis is an essential preventive. A plaster-of-Paris support (which ought to be renewed every few weeks), made to dry while the extremity is gently flexed, procures a normal position while the bone is hardening under the influence of phosphorus, etc. The elastic length-garters, which have to a great extent taken the place of the circular ones, applied below or above the knee, must not be tense, for in that case they increase the external concavity. They ought to be worn on the inside of the thighs, or both inside and outside. In bad and chronic cases osteotomy is performed above the condyle of the femur, also on the diaphysis of the tibia, and the bones are then allowed to heal in extension. *Genu varum* is almost always the result of a rhachitical outward curvature of (and below) the epiphysis of the tibia. It is but rarely that the femur participates in the deformity. If it be noticed in time, straightening can be effected before the parts harden. After this has taken place, osteotomy or osteoclasy must be resorted to.

Pes varus (*club-foot*) is often congenital. Defective supination is normal in the fœtus, and becomes exaggerated by the

pressure of the uterus when amniotic liquor is scanty. In many cases there is at birth a deformity of the talus of such a character that its neck is long externally and the head turned inward; also of the calcaneus, whose anterior process is raised and articulations somewhat dislodged. According to H. von Meyer, the posterior tibial muscle is always primarily affected. The paralytic variety of club-foot results from immobility of the extremity, caused by-complete paralysis or by some other sickness necessitating protracted rest in bed, or from paralysis of the extensor muscles of the lower extremities consequent on poliomyelitis. The deformity is rather an equino-varus than a mere varus.

As the articulations begin to suffer at a very early period, and growth is very rapid, treatment should begin at once. Indeed, the foot which at birth is seventy-five millimetres in length, is one hundred and seven millimetres after a year, 122.3 millimetres after two years, and 136.4 millimetres after three years. There is an increase of forty-three per cent. in the course of the first year; this increase is the more rapid the younger the infant. After three months the foot has added one-seventh part to its original length, and another ninth in the second quarter. Therefore, recovery from a moderate degree of club-foot, when treatment begins at birth, will take three months; when after a year, twelve months.

Manual correction must be resorted to many times during the day. At night the tender foot of the newly-born bears quite well a pasteboard splint, well lined, and strapped with a snug bandage. Later, or in procrastinated cases, a plaster-of-Paris bandage or one of water-glass will be required to preserve the normal position. As there is occasional anæsthesia of the surface, great care must be taken lest undue pressure be exercised. After the above treatment has had a satisfactory effect, Scarpa's, Stromeyer's, Sayre's, or any other shoe which permits of walking should be used. Tenotomy is required in

a great many cases,—either of the tendo Achillis, or the anterior tibial, or the plantar aponeurosis, or several of them at the same time. The open operation of A. M. Phelps has gained many friends. He cuts all the layers of the soft parts at the sole of the foot successively, avoiding the ramifications of the plantar nerve, and occasionally incising the articulations of the talus and of the navicular and internal cuneiform bones. The paralytic muscles require persistent use of both the interrupted and the continuous currents. The function of the muscles can be improved, provided the patience both of the physician and of the patient is equal to the necessity of the case.

Pes equinus is the result of paralysis, either local, or spinal, or cerebral, and is complicated with atrophy of the muscles of the calf and of the sole of the foot, the sole becoming concave and the toes pointing downward. Here also tenotomy of the tendo Achillis and of the plantar aponeurosis, together with the employment of electricity and galvanism, are indicated. An apparatus is required to lift the anterior part of the foot, and while the patient is lying down or sitting up, he may practise upon a band properly attached to temporarily restore the normal position. Children will easily learn to look upon the exercise as play.

Pes calcaneus in a mild form is often congenital and sometimes complicated with pes valgus. The desirable position is restored by a shoe supplied with a high heel and so constructed as to press the foot down. But lately operative surgery appears to have accomplished some of its greatest triumphs.

Nicoladoni, to heal a talipes calcaneus with paralysis of the muscles of the calves, severed the peroneal muscles behind the malleolus and the tendo Achillis above the heel, and joined the central ends of the peroneal tendons to the stump of the tendo Achillis. Pocas, in a case of paralytic pes valgus,

connected the tendons of the extensor hallucis longus and of the paralyzed anterior tibial. Ghillini, to supplant the action of the paralyzed anterior tibial muscle, cut the tendon of the peroneus longus near the cuboid bone, also that of the anterior tibial six centimetres above its insertion, and joined both subcutaneously, with satisfactory result.

Pes valgus (*flat-foot*) is not infrequently congenital, the talus being found downward and forward. In other cases the deformity is rhachitical. Both to prevent and to cure it, antirhachitical treatment and temporary rest are demanded. There are also (rare) paralytic cases occasioned by paralysis of the supinator muscles of the foot. In these electrical treatment and the subcutaneous use of strychnia, together with massage and stimulating embrocations and friction with cold or hot water, will render service. In all cases walking should not be permitted until a reasonable time has elapsed; the lower extremity should be raised, symptoms of vascular irritation relieved by applications of cold water, a normal position enforced by plaster-of-Paris bandaging, which must be continued through weeks and months, and when walking appears to be again permissible, the inner margin of the foot must be raised by thickening part of the sole of the shoe, or by elevating it by springs which are elastic enough not to injure by pressure.

From a practical point of view, the subdivision of *scoliosis* into three varieties is as follows: the first degree comprises those cases in which suspension of the body removes the deformity altogether; the second, those in which this effect is but partially attained; the third, such as are not influenced by it. The prognosis in the first is favorable; in the second it is fair when the growth of the skeleton is not completed; in the third it is not good, but should not be considered absolutely bad. It greatly depends on whether the scoliosis results from a relative or an absolute insufficiency of muscles,

or whether it is caused by a deformity of the vertebral bodies. The latter may be congenital, but is frequently the result of rhachitical softening. In such instances a thorough anti-rhachitical treatment, with proper food and hygiene and phosphorus, must not be postponed a single day. The habitual scoliosis of the first eight or ten years is of muscular origin, and mostly total and universal; the convexity generally to the left, or sometimes lumbar. This condition is found in babies who are persistently carried on the left arm; in school-children who rest the left arm on the table while the body is accommodating itself to the book and leans to the right; in girls who approach the bench sideways and pick up their skirts under the right gluteal region. The danger of becoming scoliotic is particularly great in those school-children whose sight is defective. Those who stand a great deal and carry the right shoulder forward develop a right dorsal with a compensatory left lumbar scoliosis. The prevention of all varieties consists in the avoidance of their causes. A baby must not be persistently carried on one arm: a mother is more apt to obey this rule than a nurse. The muscles must be exercised at an early age,—simple domestic gymnastics, but not overexertion; and the habitual use of cool or cold washing once or twice a day, with good food and air and plenty of sleep on a hair mattress, are indispensable. The school sessions ought not to be longer than forty or forty-five minutes; there must not be too many of them; there should be ample light from the left side while the child is studying or writing; defective sight must be corrected by glasses; the chairs or benches supplied with a support up to the lower dorsal region of the spine. During school sessions a light corset may also be worn, and at night an apparatus to restore the equality of the two sides. Massage of the defective side and of the muscles in general will add to the good effect, and the concave side of the chest may be exercised by the enforcement of the habit of

deep inspiration while the hand is firmly planted and pressed on the convexity. Dr. Teschner's successes are due to the systematic exercise and strengthening of all the muscles of the body.

In more obstinate cases the foot corresponding with the lowered hip may be raised by thickening the sole of the shoe. Volkmann recommended the raising of the chair or bench under the dropping hip. Sayre's corset is either worn constantly or is made to be detached. Rauchfuss's apparatus is so constructed as to leave the defective side but little or not at all supported while the patient is lying down.

The *kyphosis* of feeble rhachitical children requires general antirhachitical treatment. The baby must not sit up until the muscles have become stronger; the bed should have a hair mattress; and the patient must take the air while being carried either on a hair mattress or in a wire cuirass, or in a tin or pasteboard or sole-leather mould sufficiently lined to be comfortable. As the baby grows, walking must not be encouraged. He will rise when his bones are hard enough and his muscles sufficiently strong.

XVI.

ADDENDA.

VALUABLE additions to pediatrics have been made within a short time. Laborde's method of treating *asphyxia* of the newly-born consists in rhythmical traction of the tongue, which is caught in a forceps and drawn out at regular intervals twenty times a minute. The same method has been employed in the apnœa of anæsthesia. *Pernicious anæmia* has been treated by Fraser with bone-marrow. In one of his cases, in which, though iron, arsenic, and salol had been given previously, the number of blood-cells in a cubic centimetre was reduced to one million and hæmoglobin to twenty-five per cent., speedy improvement took place. Small doses, either raw or broiled, ought to be given in the beginning, for the taste is not acceptable to the patient. Methylene blue is rapidly coming into favor in the treatment of *carcinoma*. I never saw a case cured by it, but very many improved and retarded. The daily dose for a young child ought not, at first, to exceed three or four centigrammes (gr. $\frac{1}{2}$–$\frac{2}{3}$). In *sarcoma* the toxin of the erysipelas bacillus combined with that of the bacillus prodigiosus, according to Coley, appears to be beneficial. In carcinoma it seems to be useless.

Infantile scurvy ("*Barlow's disease*") has become very amenable to treatment, both in its early and in its advanced stages. Its main and characteristic symptoms are pain in the (mostly lower) extremities, swelling (mainly) of the diaphyses depending on subperiosteal hemorrhages, petechiæ and ecchymoses of the skin, particularly of the eyelids, spongy condition and purple color of the gums, and sometimes separation of an epiphysis. These symptoms are frequently complicated with the tumefied epiphyses and other marks of rhachitis. The

prognosis is good. The principal remedy is fruit juice,—from one-half to two oranges a day, or a pineapple, is the specific. Complications with rhachitis require, besides, the elixir of phosphorus. Sterilized milk, if the only nutriment, as in many instances it will be found to have been, must be combined with cereal decoctions, and meat broths should be added as a regular food.

Since the almost uniform efficacy of thyroid gland in *myxœdema* and its partial effect in *cretinism* became established facts, many more experiments have been made with the substances or extracts of other animal glands; for instance, in *tetany* and *exophthalmic goitre*. But in neither of these have the results been such as to permit the establishing of proper indications for its use. It is not improbable, however, that the next few years will greatly add to our knowledge of the action of animal substances, particularly glands. Macalister has employed thymus gland in pseudo-hypertrophy, and Mikulicz in goitre and Graves's disease; in the latter it has also been used by Owen and Cunningham. The action of some of the glands may be excretory only. When they are removed or diseased, their secretion is believed to accumulate in the body and thereby give rise to autoinfection. Others may constantly contribute a secretion which is required for the normal life of the tissues, which exhibit a toxic effect through its absence. This, at least, is the theory advanced by Schaefer and Oliver in reference to the supra-renal capsules.*

Not quite so efficacious as thyroid in myxœdema, but still more beneficial in its general usefulness because of the vast number of cases in which it is applicable, is the antitoxin of *diphtheria*. Though its claims are not yet recognized by all, and not equally estimated by its friends, its general results are no longer questionable. Nor is there a practitioner but has

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* British Medical Journal, August 10, 1895.

at present the right—or, rather, the duty—to give it a place among his most reliable remedies. If present experience is confirmed by many more similar facts, it will be entitled to be claimed as a specific, though it have not the power to cure every case of diphtheria any more than quinia cures every case of malaria or mercury of syphilis. Not counting isolated cases spread over the journals, the three hundred of Heubner's, five hundred of Baginsky's, thousand of Roux's, and the many hundreds of the hospitals of Paris and Vienna, besides those of our own country, yield a basis on which to establish calculations. All observers agree on this point, that the sooner the antitoxin is injected the more certain is its effect. Some go so far as to assert that no case injected the first day need die. Dr. Henry Koplik, however, tells me that in cases complicated with pneumonia it acts badly.

The doses to be administered are, according to Behring, as follows: according to the severity of a case, six hundred, one thousand, or fifteen hundred "antitoxin units" should be injected in a part of the body which contains loose subcutaneous tissue and is not exposed to pressure. This dose may be repeated if the symptoms are not improved within a day. A "unit" is equivalent to one cubic centimetre of what is called "normal serum." Normal serum is the blood-serum of an immunized animal, which has been made so efficacious that one-tenth of a cubic centimetre will antagonize ten times the minimum of diphtheria virus fatal to a guinea-pig weighing three hundred grammes (ten ounces).

It appears to be a fact acknowledged by all that there is rarely, if ever, an immediate bad result of the injection. Not infrequently, however, there is redness, erythema, or urticaria around the point of injection. Besides, some of the after-effects are liable to be very severe. Urticaria, polymorphous eruptions, petechiæ and suggillations, excessive perspiration, swelling of glands, severe pain and swelling in feet and

limbs and joints, pruritus recti, severe diarrhœa and vomiting, nose-bleeding, and great debility have lasted for weeks, yet terminated in recovery. A few deaths have also been reported, but the cause was doubtful, it appears, in every case.

Dr. James Ewing* studied the effect of antitoxin on the number and nature of leucocytes. While leucocytosis begins a few hours after the invasion of diphtheria, and increases up to the climax of the disease and steadily declines during convalescence,—remaining high only in most of the bad and fatal cases,—antitoxin, according to Ewing, within thirty minutes after its injection, causes a reduction of the number of leucocytes. This reduction affects specially the uninuclear leucocytes, while the proportion of well-stained multinuclear cells is increased. In favorable cases, after the injection of antitoxin the leucocytosis never again reaches its original height. In severe and less favorable cases the injection is followed in a few hours by more hyperleucocytosis and fever. In very bad cases the immediate result may be either rapid increase or decrease of leucocytes, and death. The multinuclear leucocytes found in the blood of favorable cases after treatment with antitoxin show increased affinity for gentian violet. This change may be observed within twelve hours after the injection, and its non-occurrence is a very unfavorable prognostic sign.

The existence of the after-effects mentioned above is not denied by any of the most enthusiastic admirers of antitoxin, but it is claimed that no serious or lasting results follow, and that if every life threatened by diphtheria were known to be protected by enduring the untoward effects of the remedy, we should willingly submit to them in every case. The balance of what we know of antitoxin is thus far favorable, and this addition to our therapeutical powers will forever be remembered as creditable to Emil Behring. The lack of

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* New York Medical Journal, August 17, 1895.

recognition, which was some time ago withheld from him by many, was, most unfortunately, his own fault. The morbid vanity and some personal motives displayed in almost every one of his writings tallied so badly with the tendencies and spirit of a scientific benefactor as to render suspicious both his veracity and his motives. It is, therefore, a pleasure to notice the circumspection and moderation of his latest elaborate paper on the same subject.*

Altogether, the effects of antitoxin injections are very favorable. The fever of diphtheria is much lessened within or after a day, and the second fever-wave—so common between the third and the fifth days—is said not to appear. The membrane is speedily disintegrated and disappears on the sixth day or sooner, while in cases not injected with antitoxin it lasts eight days or longer. Besides, there are but few cases on record in which the membrane returned after antitoxin, and not many in which it grew in size. In 181 cases of Heubner's there were but three relapses. Albuminuria and nephritis are common occurrences in diphtheria as early as the (second and) third day. Among these 181 cases of Heubner's, of those injected on the first day, five-sixths remained free; on the second, two-thirds; on the third, one-half; on the fourth, one-third. The results of Baginsky, Roux, and Widerhofer are similar. In 525 cases of Baginsky's treated with antitoxin there was albuminuria in 40.95 per cent., clinical nephritis in 12.57 per cent., and nephritis (post-mortem) in 15.80 per cent. However, among 933 cases treated without antitoxin there was albuminuria in 42 per cent., clinical nephritis in 25.78 per cent., and post-mortem nephritis in 16.31 per cent.,—rather a favorable showing for antitoxin. In his 525 cases, heart-failure was noticed as the cause of death in eight; it occurred

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* Results and Aims of Serum Therapy, Deutsche Med. Wochenschr., September 19, 1895.

in 5.69 per cent. of all the cases, while it took place in 10.9 per cent. of the 933 treated without serum, from 1891 to 1894. In Heubner's practice it occurred nine times, but was not fatal.

It is claimed that whenever antitoxin is injected before laryngeal stenosis has developed, the larynx will remain free. Thus both tracheotomies and intubations have become less in number. In Baginsky's hospital service there were, between the years 1890 and 1894, 1258 cases of diphtheria ; 418 tracheotomies and 135 intubations were performed, with a total mortality in these 553 operations of 62 per cent. In the 418 tracheotomies the mortality was 64.4 per cent. ; among these were 77 which were performed after intubation ; these 77 had a mortality of 69 per cent. ; 58 intubations without secondary tracheotomy had a mortality of 41.8 per cent. This condition of things changed with the period of antitoxin treatment. No case of laryngeal stenosis developed in those in whom the remedy had been injected before the larynx became affected. Thus, in 525 cases there were but 53 tracheotomies and 54 intubations, the former with 34 deaths, the latter with 2. It became necessary to perform tracheotomy after a previous intubation in 12 cases ; of these, 9 died. The speedier disintegration of the membranes and the (almost general) discontinuance of their growth after the injection of antitoxin are the reasons why Baginsky prefers at the present time, in the injected cases, intubation to tracheotomy.

Other observers arrive at similar results. Heubner had 33 operations in 181 cases,—viz., 23 tracheotomies with 52 per cent., 10 intubations with 80 per cent. recoveries.

Paralysis is no less frequent in antitoxin cases than it was formerly. But we must not lose sight of the fact that it never was exclusively found in very bad cases, but quite often after mild ones. Perhaps it results more from a mild but protracted poisoning than from a sudden and severe one. It may

be, also, that many cases which survive with antitoxin and develop paralysis would not have lived to become paralyzed under a less satisfactory treatment.

The principal question, however, to be raised in reference to any medication in cases of serious disease is its life-saving power. In its issue of August 8, 1895, the *Deutsche Medicinische Wochenschrift* published a preliminary result of its collective investigation of antitoxin treatment. The report refers to 10,312 cases of diphtheria treated in the city of Berlin and outside: total mortality, 11.8 per cent. Of that number, 4479 were treated without antitoxin and 5833 with it. Of all the patients, 1233 were below two years, with a mortality of 29 per cent.; 6740 from two to ten years, with a mortality of 11.4 per cent.; 2339 over ten years, with a mortality of 3.9 per cent.

Of the 4479 treated without antitoxin (mortality 14.7 per cent.), 498 were below two years, with a mortality of 39.7 per cent.; 2710 from two to ten years, with a mortality of 15 per cent.; 1271 over ten years, with a mortality of 3.7 per cent.

Of the 5833 treated with antitoxin, 735 were below two years, with a mortality of 21.8 per cent.; 4030 from two to ten years, with a mortality of 8.8 per cent.; 1068 over ten years, with a mortality of 4.1 per cent.

On the first and second days antitoxin was injected in 401 cases of less than two years, with a mortality of 11.8 per cent.; 2256 cases of from two to ten years, with a mortality of 4 per cent.; 696 cases of over ten years, with a mortality of 1 per cent.; total, 3353 cases, with an average mortality of 4.2 per cent.

On the third day and later antitoxin was injected in 334 cases of less than two years, with a mortality of 34.4 per cent.; 1774 cases of from two to ten years, with a mortality of 14.9 per cent.; 372 cases of over ten years, with a mor-

tality of 9.9 per cent.; total, 2480 cases, with an average mortality of 16.9 per cent.

Among the antitoxin cases there were 1018 of diphtheritic croup, of which 701 were treated without tracheotomy, with a mortality of 17.9 per cent.; 317 with tracheotomy, with a mortality of 33.1 per cent. These figures show, undoubtedly, that only the very urgent and most severe cases were subjected to the operation. Of all the cases of laryngeal stenosis, there were, below two years, without tracheotomy, 130, with a mortality of 29.3 per cent.; below two years, with tracheotomy, 49, with a mortality of 49 per cent.; from two to ten years, without tracheotomy, 484, with a mortality of 15.9 per cent.; from two to ten years, with tracheotomy, 250, with a mortality of 30 per cent.; over ten years, without tracheotomy, 87, with a mortality of 12.7 per cent.; over ten years, with tracheotomy, 18, with a mortality of 38.8 per cent.

Not the least interesting statements refer to the quantities of antitoxin employed. In 3497 cases, 600 antitoxin units, or less, were used in 497 cases under two years, with a mortality of 16.1 per cent.; 2370 cases from two to ten years, with a mortality of 5.3 per cent.; 630 cases over ten years, with a mortality of 1.8 per cent.; the average mortality being 6 per cent.

In 2336 cases, up to 1000 antitoxin units were used, of which 238 cases were under two years, with a mortality of 33.6 per cent.; 1660 cases were from two to ten years, with a mortality of 13.8 per cent.; 438 cases were over ten years, with a mortality of 7.5 per cent.; the average mortality being 14.6 per cent.

These figures show that the milder cases, in which 600 units were considered enough, did best; that those which from the beginning offered a worse prognosis were given more antitoxin and did not behave so well.

Among the most enthusiastic eulogizers of antitoxin there is none but admits failures. Many of these are attributed to an

insufficient strength of the serum. Mere serum of an immune animal does not suffice. Others—and these are the most conclusive—depend on the insufficient power of resistance on the part of the patient. Thus the antitoxin injection alone should not be relied on. Nutrition and alcoholic and other medicinal stimulation, such as I have detailed in another part of this book (p. 189), must be resorted to. In regard to other treatment the authorities differ. Some, like Escherich, Baginsky, and Roux, favor it, Escherich particularly after the membranes have fallen off. Heubner rejects it. At all events, there are but few left who maltreat both the throat and the child by the former cruel methods of local applications and cauterizations. I have advised, whenever I had an opportunity, the combination of my mercurial treatment with the antitoxin, for the reports on the efficacy of mercurial treatment as recommended by me (p. 201) are becoming more and more favorable. Benney's Australian results and reports are very conclusive.* Some New York friends, to whom I offered antitoxin, declined it, declaring themselves fully satisfied with the results they obtained from mercury and intubation. On the other hand, a towns-fellow of ours who handles antitoxin a good deal pronounces mercury and antitoxin to be incompatible, and believes that mercury will interfere with the effect of antitoxin. This assertion has not been proved, but shows the facility with which postulates may be substituted for experience during a period of enthusiasm.

So far as immunization through small doses of antitoxin is concerned, it appears to have been accomplished, in the opinion of many; but they all agree that it does not last long. Those who know that diphtheria, once induced, predisposes rather than protects will have no particular confidence in the effect of antitoxin as an immunizer; but if it saves the lives

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* Australian Medical Journal, January 20, 1895.

of many who are stricken, its sphere of usefulness will be indeed extensive. The collective investigation of the American Pediatric Society (Montreal session of May, 1896) extends over many thousands of cases and is equally favorable.

It is evident that great and successful strides have been made in medical therapeutics. Improvements take place partly through the aid of pharmaceutical preparations and of the products of biological research, partly through new methods and appliances for hygienic and preventive purposes. It is mainly the infectious diseases which have been served by the former, and both public and individual hygiene by the latter. Early life has been particularly benefited, and by nothing more than by careful endeavors to improve the diet of the young, and thereby to remove the dangers of intestinal disorders and the sources of excessive mortality. Nothing has been more successful in that direction than the wide-spread practice of sterilization and pasteurization of cow's milk. Both are the logical development of the plan of treating milk by boiling which I have persistently advised these thirty-five years at least, and detailed in my "Infant Diet," in Gerhardt's "Handbuch," in Buck's "Hygiene," in "Intestinal Diseases of Infancy and Childhood,"* and in my clinical lectures delivered during the last third of a century. There can hardly be a doubt that if raw milk could always be had unadulterated, fresh, and untainted, it would require no boiling. It would even contraindicate it, for high temperatures destroy at once the bacteria whose action is desirable for normal digestion. But such ideal milk cannot be had so long as

* P. 18. "After boiling, milk destined for the use of a baby during the day should be kept in clean bottles containing from three to six ounces, filled up to the cork, and the bottles then turned upside down in a cold place; such will keep longer than milk preserved in the usual way. Before being used it should be heated in a water bath; and by repeating this heating of the whole amount of the day's milk several times during the twenty-four hours, fermentation will be retarded and digestibility improved."

cows are tuberculous, scarlet fever and diphtheria are met with in the houses and about the clothing and on the hands of dairy men and women, and typhoid stools are mixed with the water which is used for washing utensils.

Now, what is it that boiling can and will do? Besides expelling air, it destroys the germs of typhoid fever, Asiatic cholera, diphtheria, and tuberculosis, also the oidium lactis, which is the cause of the change of milk-sugar into lactic acid and of the rapid acidulation of milk with its bad effects on the secretion of the intestinal tract. Some varieties of proteus and most of bacterium coli are also rendered innocuous by boiling. Thus it prevents many cases of infant diarrhœa and vomiting, but not all of them, for the most dangerous bacteria are influenced neither by plain boiling nor by the common methods of sterilization. Besides, "diarrhœa" is but a symptom of many causes, and "cholera infantum" is a name for a condition occasioned by many. Ebstein emphasizes the fact that babies at the breast are subject to cholera infantum, particularly in southern climates, also in public institutions. The influence of external temperature is a very important factor; its sudden changes produce intestinal disorders. Babies taken from a hot railroad car to the deck of a lake steamer, from a warm bed to a draughty room, may develop a catarrhal enteritis which disposes to worse forms of disease, for the morbid condition of the epithelium caused by such sudden changes is a proximate cause of disease because it opens the way to all sorts of infecting substances. Poisons in the food of cows, indigestible baby foods,—either indigestible *per se* or through a morbid condition of the digestive organs,—produce diarrhœa of many varieties. It need not even depend on ingested food, for, according to W. Schild's recent investigations (*Zeitsch. f. Hyg. u. Infect.*, xix.), germs of diseases may be found in the intestine of the newly-born in from ten to seventeen hours after birth (minimum four, maximum twenty).

The meconium of the newly-born being free of germs, is supplied through the mouth with the bacterium coli, and through the anus with the bacillus fluorescens, subtilis, and proteus. Even adults are infected through the same inlet. Linen, the bath, the air, the blood, are sources of local invasion. In such cases what is the sterilization of artificial food to accomplish? They are not reached by it.

Not even the natural food, breast-milk, is free of germs possibly attended by dangers. M. Cohn and H. Neumann found germs in the healthy breast-milk, even after the mamma and nipples had been washed with alcohol and with solutions of corrosive sublimate. A. Palleske met with the staphylococcus pyogenes albus in one half of all healthy women, F. Honigmann (*Zeitsch. f. Hyg. u. Infect.*, xiv.) in most of them, and H. Knochenstein (Inaug. Diss., 1893) in the mammæ of eight puerperal and nursing women. Evidently they had immigrated from outside; they proved innocuous. But who can doubt that if the epithelium of the milk-ducts had been morbid, there would have been a chance for mastitis, or if the staphylococcic milk had come in contact with a sore stomach or intestine, there would have been an opportunity for gastritis or enteritis?

Nor is boiling, or sterilization, a safe protection under all circumstances. Aerobic bacteria, the so-called hay or potato bacilli, with very resistant spores, which are found in cow-dung and in the dust of stables, of the soil and streets, and of hay, peptonize casein and liquefy it and render the milk bitter. They are very poisonous; their pure culture gives young dogs a fatal diarrhœa. It takes hours of sterilization to kill them; in some instances it required five or six hours. Even the bacillus butyricus takes an hour and a half. But such a protracted sterilization, besides being far from certain in its effect, is a clumsy procedure and one not calculated to benefit the milk. Thus, hay feeding is an absolute necessity,

for the bacilli are destroyed by a six weeks' drying. Besides, it is important to keep the stables scrupulously clean, to avoid dirt and dust, to employ peat instead of straw for bedding, to wash the udder and tie the tails before milking, to throw away the first milk, and to remove foreign material from the milk by centrifuging. But no absolute security can be guaranteed. Therefore, Flügge adds to his expositions a warning against some wholesale manufacturers who, always anxious about somebody's—their own—welfare, were (are?) known to conceal the changed condition of the milk and the separation of butter particles by coloring the glass of their bottles.

Whatever I have here brought forward is certainly not to disparage the boiling of the milk; it is meant to prove the danger of relying on a single preventive when the causes of intestinal disorders are so many. It is true, however, that the large majority of the latter depend on causes which may be met by sterilization, but not by sterilization only; also by pasteurization,—that is, heating the milk to 70° C. = 165° F., and keeping it at that temperature for thirty minutes,—a procedure which destroys the same germs that are killed by a more elevated temperature without much change in the flavor and taste of the milk.

One of the questions connected with the employment of sterilized or pasteurized milk is this, whether the milk to be used for a child ought to be prepared at home, or whether the supply may be procured from an establishment where large quantities of milk believed to become immutable for an indefinite period by sterilization are kept for sale. In regard to this problem, Flügge plaintively expresses his regrets that "we have allowed ourselves to be guided by people who are neither hygienists nor physicians, but chemists, farmers, or apothecaries, and whose actions have been based on three false beliefs. Of these the first is that boiling for three-quarters of an hour destroys germs, the second that whatever bacteria remain un-

destroyed are innocuous, and the third that proliferating bacteria can always be recognized by symptoms of decomposition." Nothing is more erroneous. Soxhlet himself, the German originator of sterilization, knew at an early period that the fermenting process is now and then but partially interrupted by boiling, that butyric acid may be found in place of lactic acid, that a strong evolution of gas may be caused after such boiling, and that such milk may give rise to flatulency. Aye, milk which happens to contain the resistant spores of bacteria becomes a better breeding-ground for them by the very elimination of lactic acid, and the longer such sterilized milk is preserved and offered for sale the worse is its condition. It may be true that these conditions are not met with very frequently, but an occasional single death in a family caused by poisonous milk will be more than enough. Therefore, the daily home sterilization is by far preferable to the risky purchase from wholesale manufacturers who cannot guarantee because in the nature of things they cannot know the condition of their wares.

Another alteration of a less dangerous character, but far from being desirable, is the separation of cream from sterilized milk which is preserved for sale. Renk (*Arch. f. Hyg.*, xvii.) found that it took place to a slight extent during the first weeks, but later to such a degree that 43.5 per cent. of all the cream contained in the milk was eliminated.

Sterilization has been claimed to be no unmixed boon because of its changing the chemical constitution of milk. Still, opinions on that subject vary to a great extent, the occurrence of changes being both asserted and denied by apparently competent judges. But what I have said a hundred times is still true and borne out by facts,—viz., that no matter how beneficial boiling, or sterilization, or pasteurization may be, it cannot transform cow's milk into woman's milk, and that it is a mistake to believe that the former, by mere sterilization, is a

full substitute for the latter. It is true that when we cannot have woman's milk we cannot do without cow's milk. There is no alleged substitute that can be had with equal facility or in sufficient quantity. But after all it is not woman's milk. Babies may not succumb from using it, and may but seldom appear to suffer from it; indeed, they will mostly appear to thrive on it; but it is a makeshift after all and requires modifications. Hammarsten was the first to prove the chemical difference between the casein of cow's and woman's milk. Whatever was known on this subject at that time I collated in Gerhardt's "Handb. d. Kind.," vol. i., 1875 (2d ed., 1882). But lately Wroblewski demonstrated the difference in solubility of the two milks. Woman's casein retains, during pepsin digestion, its nuclein (proteid rich in phosphorus) in solution: it is fully digested; in cow's casein the nuclein is not fully digested: a "paranuclein" is deposited undissolved and undigested. Besides, woman's casein contains an additional albuminoid which is not identical with either the known casein or albumen. (H. Koplik in *N. Y. Med. Journal*, April 13, 1895.)

Ergo, cow's milk is not woman's milk. It is not identical with it. Sterilization does not change its character; it merely obviates such dangers as result from the presence of pathogenic germs and from premature acidulation. The substitution of cow's milk or of sterilized cow's milk for woman's milk as the *exclusive infant food* is a mistake. Experience teaches that digestive disorders, such as constipation or diarrhœa, and constitutional derangements, such as rhachitis, are frequently produced by its persistent use, and it appears to be more than an occasional (at least co-operative) cause of scurvy.

Since the advisability of finely dividing and suspending the casein of cow's milk and of adding to the nutritiousness of the latter caused me always to teach the admixture of cereals

to it, even in the very first days of infancy, the subject of infant feeding has never been lost sight of by medical men, scientists, and tradesmen. No subject has been treated more extensively, more eagerly, sometimes even more spitefully, than that of infant feeding. The philosopher's stone has not been so anxiously sought for nor so often found in medical journals, books, and societies as the correct infant food and the appropriate treatment of cow's milk. After the finally faultless thing had been discovered very many times, it was not a surprise but a source of gratification to me to meet, in the *Berl. Klin. Woch.*, No. 10, 1895, an article of Heubner's, who, after having contributed for years as much as any writer (if not more) to the literature of the subject, recommends the "utilization of flour in the intestines of young nurslings." Basing his remarks, first, on the researches of Schiffer, Korowin, and Zweifel (quoted in my early writings on that topic more than twenty years ago), who, by experimentally proving the digestibility of a certain amount of starch in the saliva (and pancreatic juice) of young infants,* justified my empirical findings of many previous years, and, secondly, on what he is pleased to call "Jacobi's practical experience," the Berlin physician recommends in intestinal diseases of the very young the simplest flours, mainly of rice and oats (which have a finer microscopical structure than wheat). He pointedly adds, "Very young infants do better on a dilution of milk with a thin rice decoction than with mere milk-

* Bias dies hard. While it took Heubner more than twenty years to avail himself of very accessible physiological experience, a celebrity of equal rank (Philip Biedert, Handbuch der Kinderkrankheiten, 11th ed., 1894, p. 39) still appears to approve of the opinion that a nursling must have "no amylacea" because of their indigestibility, before the protrusion of teeth. Before long it will be a generally accepted axiom that cereals must be given to make teeth when milk food alone does not suffice for their development.

sugar solution. Practical experience surpasses theoretical conclusions." * There is but one point in which the famous teacher does not yet agree with me, for in his expositions we meet with the remark that he "cannot approve of the colossal dilution recommended by the authority of Jacobi." The "colossal dilution" alluded to is that of milk in four or five parts of oatmeal- or barley-water for the use of the newly-born. In regard to this dilution also I trust I shall yet see my illustrious colleague siding with me. The demands of pepsin digestion and of rapid growth and the necessity of restitution of losses experienced by eliminations and excretions are just so many reasons for extra allowances of water in the diet of very young infants, who have to rely on the services of others. Older children know how to find it and how to serve themselves. In addition, it is certainly true that a large amount of water passing through the kidneys removes the inconveniences and dangers of the peculiar physiological process which takes place during the first three weeks of every life,—viz., uric acid infarctus,—the results of which are gravel, renal calculus (by no means rare), and nephritis. Indeed, since the rather frequent adoption of my plan of supplying the very young with quantities of water, I hear less of renal complaints in them than I did dozens of years ago.

Perhaps the tide is already beginning to turn in my direction. Norbert Auerbach, whose researches on the difficulty of destroying the hay bacillus and the bacillus butyricus are very meritorious, recommends larger percentages of water in infant feeding than the customary ones. His mixtures for the first and second months of life are three parts of water and one of milk; for the third and fourth, two and one; for the fifth and sixth, one and one; for the seventh and eighth, one

* "Probiren geht über Studiren."

and two. His figures are, therefore, not exactly like mine, but even they may appear heretic to my critic. In connection with this subject I am also pleased to state that Auerbach agrees with me on another subject. The sugar he adds to the milk food of infants is not milk-sugar, but cane-sugar, of which he gives twenty grammes daily, and—also according to my old teaching—more during constipation. He undoubtedly prefers cane-sugar for the reasons which guided me in my recommendations, though it is true that milk-sugar is being stripped of its dangers in the same degree as boiling, sterilization, or pasteurization is carefully practised.

Virtually, sterilization has been practised by me these more than forty years, and has been taught by me for thirty-five years, both in lectures and in books and essays. My method has been referred to. I always urged that safety increased with the number of boilings. Still, certain New York gentlemen have been pleased to say, even lately, and one of them has printed, though he was told of his mistake before printing, that Jacobi was an opponent of sterilization.

Actual sterilization, according to Soxhlet, was introduced in New York by A. Caillé. Then manufacturing firms took it up as a matter of course. One of them was prevailed upon by me to execute a device of Dr. A. Seibert, who advised the determination of the amount of sterilized food and the graduation of the feeding-bottles according to the weight of the infant. In most cases this plan is good, for the condition of the child can mostly be measured by the increase of its weight. Only fat, clumsy, rhachitical children are exceptions; in them the rapid increase of weight is rather a morbid condition than a symptom of healthy development. Besides, he improved his food by adding, in conformity with my practice, and sterilizing at the same time with the milk, either barley- or oatmeal-water. A recommendation of his sterilizer is its cheapness, which makes it more accessible to the poor. No

matter what kind of sterilizer is used, filtration before sterilization adds to the purity of the milk.

The writings and practical instruction of Dr. Rowland Godfrey Freeman have been a great advantage to New York, particularly to its poor population. He insists upon pasteurization as a sufficient method of safety. As the adviser of Mr. Nathan Strauss in his successful endeavors to supply thousands with a safe article of food, he has benefited the city and aided in setting an example which should and will be imitated.

Pasteurization is also employed by Rotch. In a paper read before the American Pediatric Society at Boston, May 4, 1892,* he presented, among others, the following statements, which I gladly repeat, as I know his teachings to have done a great deal of good. Indeed, I was so much impressed by them that I encouraged the gentleman who had conducted a milk laboratory on Dr. Rotch's plan in Boston to establish a similar institution in New York. Some of Dr. Rotch's statements are as follows:

"What the profession needs is the knowledge that they may have milk laboratories where the materials are clean, sterile, and exact in their percentages. Slight changes in the three elements of milk of which we have the most accurate knowledge—namely, fat, sugar, and albuminoids—are of real practical value in managing the digestion and nutrition of the infant (normal percentage of fat, 2.02–4.37; of milk-sugar, 5.70–7.10; of albuminoids, 1.08–3.07; of mineral matter, 0.12–0.20). The digestive capabilities of infants differ just as do those of adults, and nature therefore provides a variety of good breast-milks adapted to the individual idio-

* The Value of Milk Laboratories for the Advancement of our Knowledge of Artificial Feeding, by T. M. Rotch, Archives of Pediatrics, February, 1893. Also Pediatrics, the Hygienic and Medical Treatment of Children, Philadelphia, 1896, pp. 153–287.

syncrasy of the special infant. With this fact impressed upon us, we can well see that in artificial feeding no routine mixture will in all cases prove successful.* We are in need

* All this proves also that nature allows a great deal of latitude, for the milk of a woman is changing, sometimes quite rapidly, and still the baby continues to thrive. It also proves that an attempt at regulating the percentages of milk according to invariable rules, while circumstances of surroundings and individual health—perceptibly changed or not—may differ, is liable to be very deceptive. Altogether, no iron-clad rule holds good for a living body in which organic assimilation is not regulated by the fixed laws of crystallization. This is, indeed, proved by nothing better than by the variability of the constituents of good milk. According to the very figures presented by Dr. Rotch himself, fat may vary from 2.02 to 4.37, albuminoids from 1.08 to 3.27, and still the milks exhibiting these wide differences are "normal."

In regard to the percentages of fat in cow's and in woman's milk, the results of chemical analysis have lately changed in favor of the latter. But the general principles in regard to fat feeding—its effect on digestion, and the normal occurrence of fat in the healthy fæces of an infant fed on normal nourishment (breast-milk)—are not thereby altered.

Neither mathematics nor chemistry alone directs the organic economy. If that were so, the chemist Soxhlet, otherwise so deserving and justly famous, would be justified in the advice he coolly gives the physician to add milk-sugar when there is no fat in the food, and thereby to obtain the necessary amount of carbon hydrates. Fortunately, organic chemistry is not identical with physiology.

The methods of Biedert and Arthur Meigs are based upon these modern analyses of milk. The former prepares a cream mixture which contains one per cent. of casein, two of fat, and four of sugar. It is to be mixed with milk in different proportions. One of the reasons urged by him for the addition of cream is the greater dilution (accomplished by my cereal decoctions) of the cow casein, the difficult digestion of which he takes for granted. The mixture of Dr. Meigs is well thought of by many physicians; but it is too easily influenced by irregularities and by accidents happening to the cream while being obtained and to the milk-sugar solution to be proof against frequent failures and to become popular among the masses.—(Jacobi's Intestinal Diseases, p. 32.)

Dr. N. B. Coit, who acts on the assertion that cow's milk, when properly prepared, furnishes a whole and sufficient diet for an infant and supplies all its needs for robust health, gives the following rules for "modified milk for infant feeding, made with one quart of bottled cow's milk: first

of a means by which we can prescribe exactly according to the idiosyncrasy of the digestion we are dealing with.

"A separator with many thousands of revolutions in a minute separates from the milk foreign material and divides it up into a cream of a stable percentage and separated milk. The milk-sugar and the albuminoids, also the mineral matter of this milk, are fairly well known, and thus the laboratory worker is enabled to put up any prescription, which, for a healthy baby of four months, would read: fat, 4 parts; milk-sugar, 7 parts; albuminoids, 1.50 parts. Put up eight tubes, each four ounces, with lime-water ten per cent. Pasteurize (75° C. = 167° F.) for twenty minutes. In this mixture the lime-water is just sufficient to slightly alkalinize the cow's milk.* In this way the food of the child can be

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six months, the top milk, cream one-half pint, boiled water one pint, milk-sugar seven hundred grains; from six to nine months, the top milk, cream one pint, boiled water one pint, milk-sugar nine hundred grains; from nine months to one year, the top milk, cream one and one-half pints, boiled water one-half pint, white sugar three teaspoonfuls."

* Cow's milk is either alkaline, or neutral, or acid. The constant recommendation of five per cent. of lime-water for the purpose of alkalization is, therefore, far from exact and strictly scientific. Besides, how much alkalization is effected by one and a half drachms of lime-water? They contain exactly, or are presumed to contain, one-eighth of a grain of lime.

Lime-water (liquor calcis) is a saturated aqueous solution of calcium hydrate whose percentage varies with its temperature. At 59° F. it contains somewhat over 0.17 per cent., in rising temperature less, at the boiling-point one part of lime in thirteen hundred of water. It redissolves as the liquid cools. If the food containing lime-water be given at a temperature of eighty or ninety degrees, part of the lime is thrown out. Lime-water warmed loses most of its alkaline reaction; it is markedly alkaline when cold, only faintly so when boiled. An experiment made with good milk from the household supply gave the following results: Reaction acid, also on boiling. One-twentieth part of lime-water added to it changed the reaction but slightly; it remained acid. The mixture being boiled, reaction remained the same. When again cooled and shaken up it was still acid, but slightly less so than before the dilution of the milk with lime-water.

modified according to age and to changed conditions of health."

In a case of duodenal jaundice in a girl of six years, the doctor prescribed fat, 0.5 part; milk-sugar, 6 parts; albuminoids, 4 parts. Give four ounces every two hours. Send twelve tubes, each four ounces, lime-water ten per cent. In a case of summer diarrhœa in a girl of four months, fat, 2 parts; milk-sugar, 5 parts; albuminoids, 1 part. Send twenty tubes, each one ounce and one drachm. At time of each feeding add lime-water, three drachms. Sterilize at 212° F.

One of the beliefs guiding the author of this method is as follows: "The constituents of the nutriment which nature has provided for the offspring of all animals and human beings that suckle their young are essentially animal, and not vegetable. Human beings in the first twelve months of life are carnivora. An animal food entirely and always free from any vegetable constituents has been proved to be the nutriment on which the greatest number of human beings live and the least number die."

Those who have followed my teachings at any time during the last third of a century know that I take some exception to this broad statement. Saliva and pancreatic juice are good for something better than idle elimination, and "nature" prepared the animal young from the first moment for more than mere pepsin digestion. The proof Dr. Rotch refers to is his experience only. Mine has taught me somewhat differently from the axiomatic positiveness of his assertion. But be it far from me not to present Dr. Rotch's case in full. His standing and merits are such as to give him a hearing wherever and whatever he discusses. His rules, which, moreover, may be modified by my method at any time, are thoroughly good; they are scientific, exact, and well thought out. Moreover, they have been proved to be practicable. No matter whether it is the careful handling of a cautiously prepared milk, the methodical composition according to percentages, or

the faithful pasteurization, or all of them, the results are good. I know of a number of babies who in health and disease have done well on the protracted use of the laboratory milk. Only one observation struck me in a few cases. The formation of the muscles, and particularly of the bones, appeared to be slow; the teeth came a number of weeks or even months too late; the cranial bones turned slightly soft in a few instances. In a few such cases I had to add animal broths or juice before the usual time; in one I tried phosphorus (elixir phosphori), which was rejected; in others it was well borne and useful. But, taken all in all, the method appears to be sound and successful, so far as it can be with cow's milk and the casein of cow's milk. It is to be deplored that for the present it is a method only accessible to the rich; mine has the advantage of being one for the people, both rich and poor. If, or as long as, the circulars of the laboratory keep free of pretentious exaggerations,—they have been taking that turn lately,—the profession will do well to rely on it, or its like, as one of the means of furnishing the baby a food deprived of dangers and in most cases sufficient. When found insufficient as regards tissue-building, cereals can always be furnished in the same mixture. The empirical knowledge of their beneficial effects with which we have been furnished for more than a generation has lately again been tested experimentally by Springer, of Paris, who improved the development of bone by a decoction of mixed cereals boiled for hours in succession. This long duration of the boiling process is, however, not demanded.

Like Professor Rotch, Professor G. Gaertner,* of Grätz, employs the centrifuge† for the purpose of obtaining a milk

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* Über die Herstellung der Fettmilch, Wien, 1894. Professor Escherich, Die Gaertnersche Fettmilch, eine neue Methode der Säuglingsernährung. Both in Wiener Med. Woch., 1894.

† Recommended for the preparation of children's milk in my Intestinal Diseases, 1887, p. 23.

resembling that of woman. The latter was found by Escherich to contain casein 1.82, fat 3.10, and sugar 6.23 per cent. The average of many examinations of cow's milk resulted in casein 1.76, fat 1.81, and sugar 2.4 per cent. That of "fat milk" contained casein 1.76, fat 3, and sugar 2.4 per cent. This "fat milk" is obtained by so arranging the tube which expels the cream from the centrifuge separator that just one-half of the milk contained therein is expelled and collected. In this way, as casein, sugar, and minerals are not affected by the process of centrifuging, the percentage of the latter is not changed, while that of the fat is doubled. The difference between Gaertner's and Rotch's methods is this: that the former is applicable to the large majority (but that only) of infants who require cow's milk appropriately prepared; and that the latter permits of all sorts of changes and percentages, and of all adaptations to the requirements of both the well and the sick, according to the opinions and intentions of the physician in every individual case.

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