

Disease in children : a manual for students and practitioners / by James Carmichael.

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Carmichael, James.

Publication/Creation

Edinburgh : Young J. Pentland, 1892 (Edinburgh : Morrison and Gibb.)

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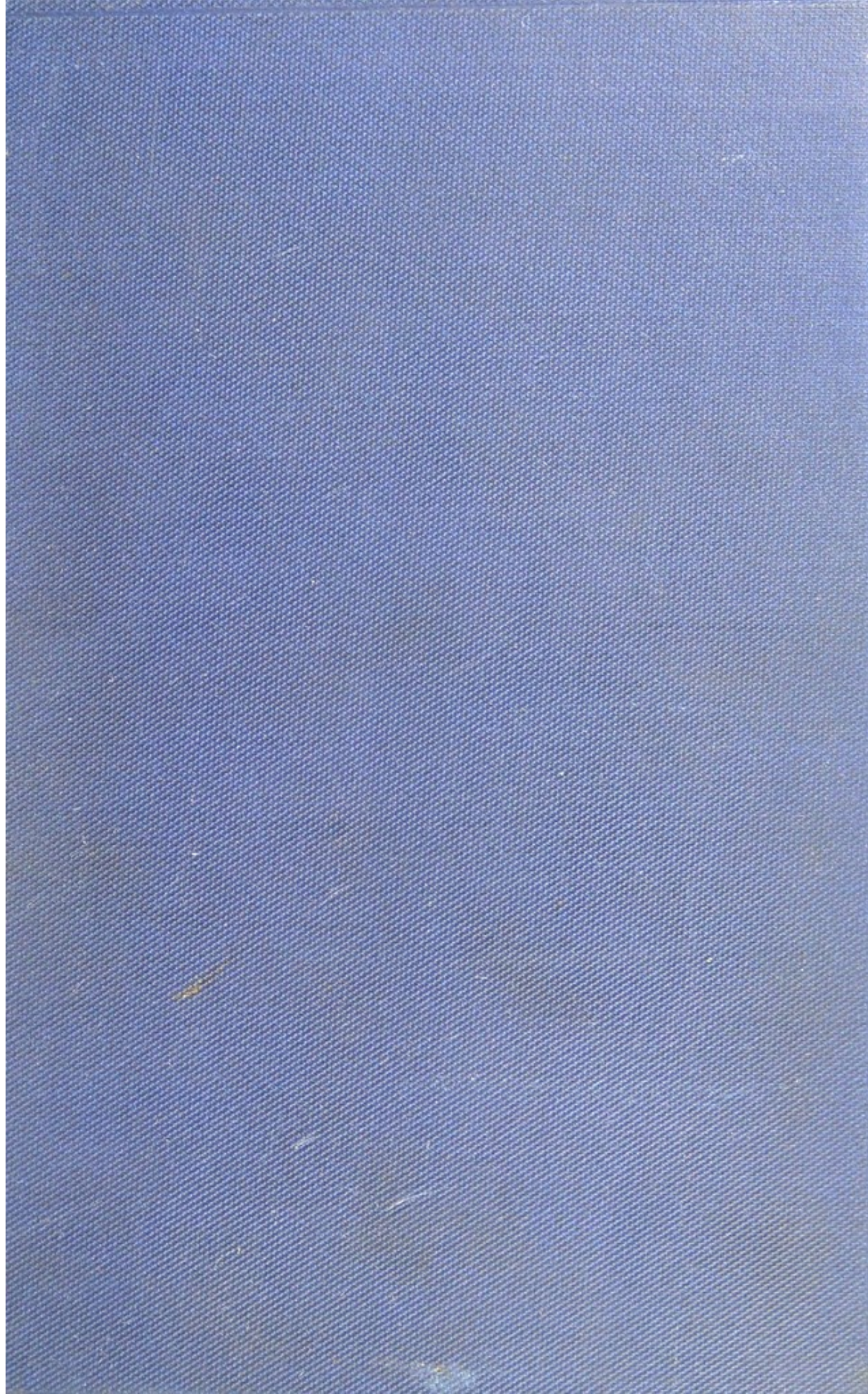
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Pentland's Students' Manuals.

DISEASE IN CHILDREN.

CHILDREN

PREPARED BY CHILDREN

OF THE

87192

DISEASE
IN
CHILDREN

A MANUAL FOR STUDENTS AND PRACTITIONERS.

BY

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ILLUSTRATED WITH THIRTY-ONE CHARTS.

EDINBURGH & LONDON:
YOUNG J. PENTLAND.

1892.

3152

14 806 602



EDINBURGH: PRINTED FOR YOUNG J. PENTLAND, 11 TEVIOT PLACE, AND
38 WEST SMITHFIELD, LONDON, E.C., BY MORRISON AND GIBB.

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PREFACE.

IN writing this Manual, the author has endeavoured to give a concise account of the clinical features of the more common diseases met with in children. He has assumed that the reader is acquainted with general medicine and the diseases of adult life.

While dealing for the most part, in a pathological sense, with the same morbid conditions as in adult life, it is the duty of the clinical teacher in the department of pediatrics to show how the anatomical and physiological characteristics of the periods of infancy and childhood tend to modify in many ways the features and clinical relations of disease in children.

No attempt has been made, but in exceptional instances, to give a detailed and systematic account of symptoms and physical signs as in lengthened monographs and treatises, of which there are many and excellent ones in this country and abroad. The space given to each subject has been limited or extended, in proportion to its importance. Some subjects have only received passing allusion for the sake of connection, and others of less

importance have of necessity been omitted from a work of this size.

The matter forms the basis of the author's experience in public and private practice and as a clinical teacher. Grateful acknowledgment must be made of the light and leading which he has obtained from the writings, among others, of such men as Barlow, Cheadle, Gee, Ashby, Goodhart, and Eustace Smith, of Rilliet and Barthez, Henoch and Gerhardt, of Jacobi, Meigs, and Lewis Smith.

I have also to acknowledge the valuable assistance received from Dr. G. P. Boddie in the preparation of the chapter on Diabetes.

J. C.

EDINBURGH, *September 1892.*

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DISEASE IN CHILDREN.

DEPARTMENT OF THE INTERIOR

DISEASE IN CHILDREN.

CHAPTER I.

PREVENTION OF DISEASE IN CHILDREN.

THE highest aim of the physician is the prevention of disease. It is only during the present century and within very recent times that the labours of earnest workers, such as Pasteur, Koch, Lister, and others, have, with the aid of the microscope and the adoption of true scientific methods of research, revealed to us the existence of those simplest forms of vegetable life, the invisible and destructive agents which play such an important part in spreading disease, pestilence, and death. The exact relation of these organisms to the poisons producing such diseases as anthrax, relapsing fever, septicæmia, tuberculosis, fowl cholera, and swine fever, are not yet finally determined. Whether they are the generators or merely carriers of the poison, or active agents in its elaboration, is yet to be ascertained. Suffice to say, their presence and active participation in the pathological processes at work in such diseases is proved. It seems probable that the growth and development of cocco-bacterial forms of plants plays an important part in the multiplication and spread of the particular poisons in the whole group of infective diseases—such as measles, scarlatina, typhoid, and erysipelas, and the labours of pathologists are now directed to ascertain whether

any of these organisms are specially related to the different diseases. There are many and insuperable difficulties in the way of proof, which can only be obtained when the disease is produced in the human subject, or in animals equally susceptible of it, by inoculation of cultivations of the specific germs. Let us hope that before long further discoveries will be made, which will enable us to put in practice the crowning method of prophylactic treatment, long ago foreshadowed by the inoculation practice of Jenner, by which virulent poisons can, by cultivation and attenuation, be rendered innocuous, and, when injected into the system, actually protect against attacks of the original disease. Recent researches seem to show that it is not so much the pathogenic organisms themselves, as certain poisons, variously called ptomaines or leucomaines, which they are capable of generating, that produce these dire effects on the human organism, and it is predicted that, when we know more about the composition and properties of such substances, synthetical chemical methods may produce compounds of analagous molecular and chemical constitution, which will turn out to be valuable remedies in the treatment of infective disease. Such results, if attained, would be of inestimable benefit, and raise prophylactic medicine to a far higher level than it has hitherto arrived at.

Pari passu with these recent investigations on the pathogenesis of disease, a no less interesting series of observations has been made on the power of resistance which the blood and tissues of the body can offer to pathogenic organisms. The researches of Metschnikoff, Behring, Kitasato, Buchner, and Emmerich go far to show that, under strictly physiological conditions of the system, the battle between the tissues of the body and disease germs is all in favour of the higher organism.

In the periods of infancy and childhood, the system is peculiarly susceptible of infective influences, and it becomes a primary and important duty, on the part of the pediatric physician, to bring all the knowledge which researches of

recent date have unfolded, to bear upon the question of prevention of disease in early life. His first aim should be to maintain or revive the normal or healthy standard of nutrition of the body. In early life the nutritional processes are in a state of hyperactivity as compared with mature age, and, in addition, rapid growth and development are going on. Under these conditions, we know the nutritive processes are very liable to be interfered with, not only by disease, especially the acute diseases of childhood, but by anti-hygienic conditions generally. Depressed nutrition and lowered vital tone abolish, to a greater or lesser extent, the resistance of the tissues to the inroads of morbid agencies. While a perfectly healthy child may, it is believed, ingest or inhale tubercular virus with impunity, the same child, debilitated by an attack of measles, falls a victim to tuberculosis.

Such considerations enable us to name the first and the most important agency in the prevention of disease—*immunity*, due to the natural powers of resistance which the body inherently possesses of dealing with and throwing off disease-producing germs. As we never know whether the system will be able successfully to cope with these agencies, we employ the resources of our art in either rendering it insusceptible, by artificial means such as *inoculation*, or destroying by *disinfection* the germs before they can attack the patient, or removing him from the infected area, *isolation*.

Inoculation as a means of prophylaxis is as yet in its infancy, but let us hope the future is pregnant with discovery in regard to this method.

Isolation is one of the readiest and most universally adopted means of preventing the spread of infectious disease. It requires no argument in its favour, and should always be adopted whenever practicable.

Disinfection is carried out in various ways: (a) Disinfection of the patient; (b) of the house and furniture and all moveable articles; (c) of the drains, water, and food supply. In illustration, take the case of scarlatina or measles, careful disin-

fection of the patient is all-important both in regard to the body and the clothing. For this purpose we make use of antiseptic baths and sponging, or apply oils or unguents to the surface of the body, and steep all the clothes when dis-used in 1 to 40 solution of carbolic acid. The floors and furniture should likewise be regularly washed with an antiseptic solution. In drain diseases, such as diphtheria, diarrhœa, or cholera, the drains should be carefully dis-infected, the water supply at the same time being carefully regarded. *Sterilisation* of food, by thorough cooking, is one of the most important means of disinfection, and will be afterwards alluded to more fully. This brings us to the consideration of *heat* as a disinfectant. It is one of the most valuable and certain agents for this purpose at our disposal. Linen clothes should be steeped for twelve hours in a solution of carbolic acid in water, 1 to 40, and thereafter boiled for one hour. Bedding, blankets, cloth clothes, or carpets, may be disinfected by steam at 212° , or dry heat, in which case the temperature must be raised to about 240° , as at this range it has been proved that even the spores of the anthrax bacillus are destroyed. By far the most reliable antiseptic solution for disinfecting purposes is that of mercuric chloride. One part in 5000 will destroy the spores of the anthrax bacillus in ten minutes. Carbolic acid is far inferior in disinfecting power to the mercuric solution. Carbolic acid, chloride of zinc, salicylic acid, although slow, are yet effectual after longer periods in destroying bacilli, but not the spores, excepting carbolic acid, which, in a solution of 1 to 20, is said to destroy their vitality at the end of twenty-four hours. The only two reliable gaseous disinfectants are chlorine and sulphurous acid, the former being the more powerful. The presence of moisture is necessary to their efficient action. *Fumigation*, as a perfect means of disinfection, is totally inadequate for the purpose. For disinfecting drains, carbolic acid, sulphate of iron, chloride of lime, and chloride of zinc are the most useful substances.

CHAPTER II.

SCHOOL HYGIENE AND PATHOLOGY.

THE congregation of children in schools is the most frequent means by which infectious disease is spread. In order to insure efficient prophylaxis, stringent rules should be laid down, and co-operation between the head-master and the parents or guardians of children should be hearty and efficient. Even with the utmost care and attention, contagion may take place through the agency of mild cases of disease which are unrecognised. This is most liable to occur in day schools, especially in such diseases as mumps and varicella, sore throats of all kinds, measles and scarlatina, and ringworm. In boarding schools, where supervision of scholars is systematically carried out by the medical officer, infectious diseases are recognised and isolated at a more early period.

In every well-regulated school, definite and distinct rules should be laid down for the guidance of parents and teachers, and a strict adherence to these assists largely in preventing the spread of infectious disease. The subject is so important as to deserve some notice here. In all schools, whether boarding or day, no pupil should be admitted after the holidays, unless a certificate be produced from a medical man stating that the pupil *has not entered any house or been exposed to an infectious disease during the previous three weeks.* Should the pupil have suffered from or been exposed to infectious disease during the holidays, intimation should be sent, with particulars, to the head-master, who will grant an order for admission of the pupil, if satisfied that all preventive measures have been

adopted. In issuing an order for admission, the head-master should satisfy himself that the pupil is free from all infection. In the case of a pupil who has been exposed to infection, a quarantine period must be enforced before he is allowed to return.

In Diphtheria,	12	days	quarantine.
„ Scarlet fever,	14	„	„
„ Measles,	16	„	„
„ Rötheln,	16	„	„
„ Chicken-pox,	18	„	„
„ Small-pox,	18	„	„
„ Typhoid fever,	18	„	„
„ Typhus fever,	18	„	„
„ Pertussis,	21	„	„
„ Mumps,	24	„	„

In any case, before a pupil returns to school, a certificate form should be filled in by the medical attendant, stating the fact that personal disinfection and that of the house has been carefully carried out, and that, in his opinion, the pupil may return to school without risk of conveying infection to others.

In *boarding schools*, each pupil should have morning supervision by the master and the medical officer. It should be an offence for a boy not to admit feeling ill. All cases of illness should be at once isolated in the sick house for observation. When infectious disease breaks out, intimation of the fact should be sent to every parent or guardian, and the responsibility thrown upon him of allowing the pupil to remain in school or removing him.

In *day schools*, there has been, and still is, too much laxity in endeavouring to prevent the spread of infectious disease. All parents of pupils should, two weeks before the beginning of the session, be served with a printed copy of the regulations adopted by such school, based upon the suggestions already laid down, with the important addition in the case of day schools, that the parent must, during any period of the term,

at once intimate to the master if any case of infectious disease occurs in the house, in which event the pupil must on no account be allowed to return to school until certified as safe by a medical man. When a pupil is absent for two consecutive days from the school, the head-master should write home and ascertain the cause. In spite of all such precautions, children are not unfrequently, from wilful neglect or carelessness of parents, allowed to go to school when there is suspected infectious disease in the family. To obviate the risks of non-compliance on the part of parents with the rules laid down, the head-master, if he meets the whole school assembled in the morning, or if not, the master of each class, should require a declaration every day, either publicly or privately, from each pupil who (*a*) feels unwell, or (*b*) whether any one has been taken ill in the house where he resides, since the previous day. In this way cases of infectious disease, unsuspected or unknown, are often found out. Medical men, in judging of the time which should elapse before allowing a child to return to school after suffering from infectious disease, should be guided by the following rules:—In the case of

Ringworm, when the scalp presents a perfectly healthy appearance on being closely shaved and inspected by a lens and by microscope ;

Scarlet Fever, in six weeks after the first appearance of the rash, if *desquamation has ceased* and the naso pharynx is quite healthy ;

Measles, in three weeks after the appearance of the rash, if desquamation has ceased and there is no cough, otorrhœa, or ophthalmia ;

Rötheln, in two weeks after the commencement of the disease ;

Small-pox or *Chicken-pox*, when all the scabs are off, especial care being taken in the case of chicken-pox to see that there are no scabs on the scalp, for which purpose the hair should be kept very short, and the head washed frequently ;

Mumps, at the end of a month, if all glandular swelling has disappeared ;

Pertussis, when all spasmodic cough or whooping has ceased, or whenever cough has entirely left ;

Diphtheria, in three weeks, provided there is no sequela of any kind, such as albuminuria or chronic discharge from any mucous surface.

HYGIENE.—The hygienic aspect of the present system of education in Great Britain is attracting more and more attention every year. The examination system and payment by results has been adversely criticised by many teachers, but especially by the medical profession in this country. The tendency to treat children as mere brain-working machines, without reference to individual capability and powers of endurance, has been attended with most disastrous results in the physical and mental deterioration of their health. Systematic investigation on a large scale regarding the effects of school work on children has not been attempted in this country. In America, however, the subject has been taken up in a practical manner. Dr. Lincoln¹ gives some very interesting statistics. In the Cleveland High School for girls, out of 186 girls 76 were known to have suffered in health from school work. Headache, backache, defective sight, anorexia, insomnia, and menstrual disorder were the chief ascertained causes. Hertel of Copenhagen, as quoted by Lincoln, has made an exhaustive research in regard to the higher schools in that city, with the following interesting results :—

	Healthy.	Sickly.	Imperfect Report.	Total.
Boys, .	1900	978	263	3141
Girls, .	644	477	90	1211

This brings out the important fact that girls suffer in a larger proportion than boys. The chief ailments in them were anæmia, scrofula, nervousness, headache, epistaxis, spine disease, eye disease, and consumption.

¹ "School Hygiene," *Keating's Cyclopædia*, vol. iv.

PATHOLOGY.—The ailments referable to school life are numerous.

Nervous System.—Many children, especially girls, suffer from loss of nerve tone without any symptom referable to particular organs, a true neurasthenia. In my experience this is much more common in young women at the end of the school training.

Headache is a common symptom, of which the causes may be various. It may be a true cephalalgia, a neuralgic headache, or associated with dyspepsia, generally indicated by frontal headache, or with constipation or anæmia, the dull heavy headache, or with hypermetropia—a not uncommon condition, cured by the adaptation of suitable convex glasses.

Insomnia and disturbed sleep, with dreaming or somnambulism. These are always anxious symptoms, and require prompt and careful treatment.

Chorea, coming on as it does during the second dentition on to puberty, is frequently the product of school life acting on a child predisposed to nerve instability. Such children should at once be removed from school on the recurrence of the earlier symptoms, indicated by change of temper, apathy or irritability, and loss of memory. In many such children, who are often subjected to correction, an acute attack is brought on, which might have been warded off had the early symptoms been recognised.

Epilepsy cannot be said to be a disease induced by school life. Children, however, who are subject to it even in the mildest form, should not be sent to school.

Backache is a symptom requiring careful discrimination. It may be directly the result of over-fatigue, sitting in constrained position during study, playing the piano, or working too much before breakfast. In all cases the spine should be examined, back pain being often the precursor of some serious mischief. Lateral curvature is common in overgrown girls who get little physical exercise, and sit too long at lessons, piano playing, and sewing. Gymnastic exercises, not rigid supports, must be prescribed.

Dyspepsia, with which is often associated constipation, is a common result of prolonged hours in close class-rooms, little open air exercise, and want of regularity in meal hours. Constipation is particularly common in girls, and is closely associated with want of "regular habit." The pupil hurries over breakfast, or perhaps takes very little if any, and rushes off to school without attending to nature's appeal. The want of a proper meal in the middle of the day is a serious one. Although this defect is now remedied to some extent in our large day schools, it is not regulated in such a way as to be of real benefit to the child. Sufficient time is not given for the meal, nor a proper interval allowed, with some open air exercise, before resuming study. It is worse than useless to give a child half-an-hour to take a meal after four hours' work in a close class-room, and immediately thereafter require it to resume work. Two hours' interval in the middle of the day is absolutely necessary to insure time to take a meal and allow of suitable relaxation after it. The feeding of children during school hours, as at present carried out in our day schools, is a direct cause of dyspepsia and other ailments.

Anæmia is a condition we are often called upon to deal with in school children, and although it may not always be referable to school life, in many cases no other cause can be made out for the depravity. Girls suffer in far larger proportion than boys, and in those approaching puberty delayed menstruation generally results.

Disordered Menses.—The causes leading up to menstrual disorders after puberty are so often associated with conditions of life obtaining during previous years, as to justify a passing reference in the present chapter. The observation of all those who have given attention to the subject, affords proof that girls suffer in far larger proportion than boys from school life. Having given this subject a good deal of careful thought during recent years, I conclude that in girls the nervous system is less able to bear the strain of continuous study than in boys; that the present system of educating girls very much

on the same lines as boys, in order to fit them for professional women or teachers, is apt to cause ill health from over-strain ; that the effects of this are not always manifest during school life, but show themselves more remotely when womanhood is attained, and are manifested by general want of tone and debility, and inability to discharge in a healthy manner the functions of child-bearing and lactation. The neglect of physical education and a proper amount of regular open air exercise is a potent factor in the causation of ill health in school-girls. With all these conditions is associated delay or disorder of the menstrual functions. The care and supervision of girls at school after the age of eleven or twelve should have special reference to the accession of the menstrual function, yet how few mothers or superintendents of girls' schools give this a serious thought. The approach of puberty and the development of the menstrual function in girls is the ruling factor in their constitution at this period, the mainspring which regulates their functional and intellectual activity. I am favoured with a few matured thoughts on this subject from the head of a leading ladies' boarding school, which may not inaptly be quoted here. She is of opinion that all girls require special supervision, and many of them careful treatment, in view of the approach of the menstrual molimen. Her observation, she states, leads her to class girls at this time under three types:—

1. *Active, eager, and energetic girl*, who generally becomes more so as the period approaches.—Things left undone for weeks are suddenly taken up and attended to ; correspondence rushed at ; examination work prepared. This period of activity is followed by headache and prostration towards the end of menstruation. The temptation to rush into work at the beginning of the period, leading to prostration from over-activity, may be avoided by sensible restraint of mental and physical energy at the time.

2. *The morbidly nervous girl*.—As the period draws near she becomes irritable, heavy, and dull at work, rude to her

teacher and fellow-scholars, sleepy and constipated, generally lethargic. A dose of aperient medicine at the proper time generally helps to bring on the period, and gives relief to the morbid symptoms.

3. *The girl who appears equable in temper and strong throughout.*—This class of girl requires as much care as the other two types, from the very absence of disturbance, which is apt to throw mother or teacher off their guard, and lead them to permit as hard work during the period as at other times.

The general management of girls during menstruation requires care immediately before and after and during the period. Semi-laziness and repose should be enforced, and the substitution of some improving pleasure or light work for ordinary study. In this way the girl's energies are conserved, and allowed to expend themselves not too largely, and in the proper channels.

A due attention to ordinary hygienic rules in school life is so eminently desirable and necessary, that it seems almost incredible that hitherto so little attention has been paid to it. In this country, in our day schools, where most of our children are educated, medical men, who are naturally the conservators of the public health, are not always taken into the confidence of school managers. Rules and regulations are drawn up without reference to the most important consideration of the health of the children, often apparently more to suit the convenience of teachers than pupils, with the inevitable result that the children suffer to a greater or lesser extent. In order to insure a proper hygiene in our day schools the following points should be attended to:—

1. The *school* and *class rooms* should be in a perfect state as regards drainage, water supply, and ventilation, a proper amount of cubic space being allowed for each child. The ventilation should be continuous, and regulated according to the most approved modern methods. The class-room should be properly heated.

2. *Regulation of school hours*, with reference to work and recreation, should be carefully attended to, the ages of the children being taken into account in deciding this. Under ten years, four hours' lessons with one hour interval should be insisted on; above the age of ten, six hours' lessons with two hours' interval is desirable.

3. *Physical exercise* and recreation should be encouraged in all schools, and is as necessary every day as on Saturdays. In girls' schools the recreation hours for physical exercise are as needful as in boys' schools.

4. All children during school life should be under *medical supervision*, whether in boarding or day schools. At home parents cannot be too particular in preventing their children from over-working at lessons in the evening, in attending to regularity in regard to meals and recreation, action of the bowels, and keeping sitting and bed rooms well ventilated. Food should be plain and nourishing, well cooked; milk should always be sterilised in a proper apparatus for the purpose.

CHAPTER III.

CLINICAL EXAMINATION OF THE CHILD.

THE only basis for the clinical study of disease is a sound knowledge of pathology in its full sense, including morbid anatomy, and this founded on accurate anatomical and physiological information. A consideration of the anatomy and physiology of infancy and childhood must necessarily be excluded from such a work as the present, limited in extent and of a purely clinical character. Until within recent years little has been done in this department. Such works as that of Symington on the *Anatomy of the Child*, or M'Lellan's¹ *Anatomy of Children*, and Angel Money's² remarks on the *Physiology of Infancy*, are well worthy of an attentive perusal.

In the study of disease in children, it must be remembered that, with few exceptions, and those mainly of a congenital nature (malformations), we are dealing with the same diseases as in adult life, modified as they are by the conditions of growth and development going on in the child. It is not strictly correct to talk of diseases *of* children, as we would of women, who suffer from ailments peculiarly their own. Disease *in* children must be studied exactly on the same lines and by the same methods as disease in adults. The separation of children from adults in our hospitals has no special significance, being merely a matter of clinical convenience. To my mind it is a mistake, as it necessitates the student going to a different place, and allotting an extra hour, which unfortunately

¹ *Keating's Cyclopædia*, vol. i. p. 51.

² *Treatment of Disease in Children*.

in the present state of the medical curriculum in our schools he is often unable to do, to the study of disease in children in a special hospital. From a purely teaching point of view children's hospitals are no doubt of great value.

It need hardly be premised that accurate diagnosis of disease in children as in adults is the first end we desire to attain in our clinical work. A study of the method of clinical examination in the child is all-important. It must be carried out in a thorough, painstaking, and systematic manner, on the anatomical method. The scheme I have used for many years in the Edinburgh Royal Hospital for Sick Children, is similar to that generally used in the teaching of clinical medicine in the Edinburgh Infirmary, and is based upon the method introduced by the late Professor Hughes Bennett.

The first step in the examination of the child is to obtain a *statement* from the *mother* or *nurse* of all she knows regarding its present illness and previous history, and for this purpose the cross-examination should be full and detailed, special questions being put in regard to each particular point. General questions, as leaving a good deal in reply at the discretion of the mother, are often apt to mislead, especially when we have to deal with hospital or dispensary patients of the poorer class. This point may be illustrated as follows. To the question, "Has the child had any previous illness?" the mother often gives a negative answer, which if followed by the question, "Has the child ever had measles or whooping-cough?" an affirmative reply is given. The importance of ascertaining the history of previous ailments in the child, particularly the ordinary acute diseases, such as measles, whooping-cough, scarlatina, etc., cannot be over-estimated, as often giving a clue to the condition under consideration. Take for instance the case of a child suffering from chronic ill-health of an indefinite nature. The fact that the patient has previously suffered from pertussis or measles will lend suspicion to the possible existence of tuberculosis. It is always interesting in children to trace out and note the connecting links between

one morbid condition and another. When the nutritional functions have been once interfered with by disease, especially the acute febrile affections, the tendency to further evolutions of morbid processes in tissues or organs is initiated. This is well illustrated in regard to the lymphatic system, which is so intimately connected with nutritive activity, and is so liable to disease in early life. Any catarrhal affection and many inflammatory cutaneous diseases are apt to set up disease of the lymph glands, often of a serious, may be of a fatal, character. After having requested specific information as to all the more common affections with which the child may have been possibly affected, the general query, "Any other ailment whatever?" may conclude our examination on this point. The rearing of the infant, whether natural or artificial, must always be ascertained; dentition, its date of commencement and termination. Then should follow queries as to health of other children and parents. It is always of great importance to ascertain the nature of the hygienic surroundings of the child. The previous and family history having been obtained, the date of commencement and particulars of the present illness should be elicited, and thereafter should be proceeded with the,—

Examination of the Child.—In young children symptoms are objective. In older children subjective symptoms should be noted if they can be elicited, but they are often of little value from want of sense and judgment on the part of the child. At first the student is apt to be dismayed at the impossibility of finding out the child's subjective feelings, but to those accustomed to deal with children this is no hindrance. On the contrary, in children it is an advantage to the clinician to know that, although he is unable to obtain much valuable information which could be elicited in the case of an adult, no element of simulation or misstatement of subjective phenomena is likely. He is thus left to the clinical examination of his patient, relying solely on his own powers of observation of the purely natural phenomena of disease. Clinical work

among children thus stimulates the observant faculty of the physician, teaching him self-reliance and the necessity of careful physical examination, which in the adult is too often carried out in a perfunctory manner, and subordinated to the history the patient has given of his present sufferings and previous illnesses.

In *inspection* of the child it should be stripped naked and rolled in a blanket and a thorough investigation made. Previously, the temperature and height and weight may be taken. By simple inspection the physician obtains a deal of information, and may even arrive at a probable diagnosis of the diseased condition. The child may either be laid on a bed or couch near the fire, or, as is more frequently necessary to keep it quiet, on its mother's knee. We are able at once to observe its general conformation and development, also the state of nutrition of body and limbs, its attitude, decubitus, gestures, expression of face, and cry. The various systems are then gone over as in the following scheme. They should be taken up in the most convenient order, generally the one most obviously affected first. In dealing with the alimentary system it is well to leave the examination of mouth and pharynx to the last, as this puts the child most about, and if done at first it is apt to hinder the rest of the examination. With reference to the examination of the respiratory system, a moderate amount of crying, without struggling, rather favours the examination, because the child respire more freely, and we can readily make out the crying resonance. Satisfactory examination of the heart on the other hand is impossible when the child is crying, and must be completed at a future time. An accurate determination of the frequency of pulse and respiration is most readily obtained when the child is asleep. The exercise of a little tact and kindness on the part of the physician will greatly facilitate examination, especially in private practice. On going into the nursery it is well at first not to approach too near the child or stare at it too much. It gradually becomes accustomed to the presence of the doctor,

and if he approaches it with a pleasant smile and playful manner he soon wins it over sufficiently to permit examination.

DIAGNOSIS.—After concluding the examination a probable or absolute diagnosis may be made. The diagnosis of disease in children by the experienced physician is not attended with any more difficulty than in the case of adults. If the examination has been thorough in all respects, a definite or at all events probable opinion may be arrived at. Too great caution cannot be observed in expressing a hasty opinion to the patient's friends, unless the signs of disease are evident and unmistakeable. The distinction between symptoms and physical signs, and the frequent difficulty of interpreting the former, should be borne in mind. The frequency in children of apparently serious and considerable constitutional disturbance from trivial and temporary, or so-called functional causes, should lead the physician to exercise caution and patience in expressing an opinion. On the other hand it must be borne in mind that there is often a remarkable latency in chronic diseases of a grave nature. In such cases the vital tone and nerve sensibility are often so lowered that the child presents no very obvious symptoms in such grave conditions as pericardial effusion, chronic pleuritic effusion, peritonitis, or even some cases of cerebral disease. Such symptoms as headache, delirium, drowsiness, or convulsions must not be too hastily ascribed to cerebral disease, being often the result of functional derangement or disease in other organs than the brain.

TREATMENT.—Rational and scientific treatment is based on correct diagnosis. In the absence of a positive diagnosis, the relief of the most obvious or urgent symptoms is called for until the true nature of the disease becomes manifest. In hospital practice we are untrammelled by the necessity of prescribing until the nature of the case has become evident. In private practice, on the other hand, it is necessary, in cases where the diagnosis cannot at first be made, to adopt tentative measures to begin with. The general principles of treating disease in the child are the same as in the adult. Careful dieting and

hygiene hold the first place, drugs come next. All physicians are agreed that children should be treated with as few drugs as possible. They exhibit a great tolerance of many remedies and a marked intolerance of others. Purgatives are generally well borne, but the dose must be suited to the age of the child. The constitutional peculiarity must be borne in mind in dealing with any given disease—the syphilitic, strumous, rheumatic, or neurotic habits requiring special remedies applicable to the condition. Blood-letting by venesection and leeches must be cautiously used in children, as they do not bear depletion so well as adults. Blisters must be very cautiously used and kept on for a short time, the liquid form being preferable to the plasters. Of narcotic remedies, opium requires great caution in administration; belladonna, on the other hand, may be prescribed more freely. Hyoscyamus, lobelia, and chloral, in doses suited to age, are well borne. Arsenic agrees well, and may be given in increasing doses. Mercury is a most useful drug in suitable cases. Children are with difficulty salivated. Alkalies, bitter tonics, and carminatives are readily taken with good results.

CLINICAL EXAMINATION OF THE CHILD.

NAME—AGE—RESIDENCE—BIRTHPLACE—DATE OF ADMISSION—DATE OF EXAMINATION—REPORTED NATURE OF ILLNESS—DATE OF COMMENCEMENT.

STATEMENT OF MOTHER OR NURSE.

Duration of present Illness—State of Health antecedent to present Illness, especially as regards such ailments as *Whooping-Cough, Measles, Scarlatina, Varicella, Vaccinia, Varioli, Typhus, Typhoid, Diphtheria, Diarrhæa, Vomiting (of persistent nature), Rheumatism, Sore Throat or Mouth, Worms, Skin Eruptions, Swollen Glands, Incontinence of Urine, Fits, or any other Ailment, Acute or Chronic*. Rearing of the Infant—*Natural—Duration of Lactation—Artificial—Nature of Food*; Dentition—Age at commencement and conclusion—Whether easy or difficult. Number of other Children—Their State of Health or cause of Death—Health or cause of Death of Father and Mother (miscarriages)—General Hygienic conditions as regards Dwelling-House and Surroundings, and Amount of Open Air Exercise.

EXAMINATION OF THE CHILD—[Take the Temperature.]

N.B.—In young children, symptoms objective; in older children, subjective phenomena should be noted, if they can be elicited.

General Inspection.—Height—Weight—Diathesis—General State of Nutrition—Conformation and Development—Attitude—Decubitus—Gestures—Expression of Face—Nature of Cry—Any other observable peculiarity.

Cutaneous System.—State of Skin: *Dry, Harsh, Perspiring, Soft*—Subcutaneous Fat—Surface of Face, Limbs, and Body: *Rounded, Plump, Emaciated, Flabby, Wrinkled*—Œdema—Eruptions—Description of Elements of Skin affected—Swellings or Nodules.

Locomotary System.—Deformities and General Conditions of Bones (*including Cranium and Spine*), Muscles, Joints.

Alimentary System.—MOUTH, including Lips, Tongue, Gums, Cheeks, Tonsils, and Pharynx. Condition of Secretions, Salivary—*Mucous—Diminished—Increased*. TEETH—Number and Quality. Deglutition—Vomiting: *Examination* (macroscopic and microscopic) *of Ejections*. Condition of Bowels—Frequency—Appearance of Stools: *Colour, Consistence, Homogeneous or Mixed, Mucous, Bloody*—Undigested Food—Worms—Microscopic Examination. EXAMINATION OF ABDOMEN: *Inspection*—Distension—Retraction—Form. Palpation—*Superficial*—Flaccidity—Resistance—Fulness—Hardness—Deep Palpation (of Liver, Spleen, Stomach, Intestines, Kidneys, and Mesenteric Glands)—Fluctuation—Percussion Dulness, of Organs, particularly Liver and Spleen.

Lymphatic Glandular System.—Thymus and Thyroid Glands. Note any Enlargement of Superficial or Deep Lymphatic Glands or Vessels, on Head and Neck, Trunk or Limbs. By Abdominal Palpation and Percussion, and Examination of Thoracic Cavity, obtain evidence as to possible Enlargement of Visceral Lymphatic Glands—*Bronchial—Mediastinal—Mesenteric*.

Circulatory System.—Inspection of Præcordia. PALPATION—Position and Character of Heart's Impulse. PERCUSSION—Extent of Dulness. AUSCULTATION—Rhythm and Quality of Sounds in various Areas—Diffusion of Sounds, Anteriorly, Laterally, or Posteriorly. PULSE—Character—Rhythm—Frequency—Visible Pulsations in Vessels—Other Abnormal Appearances of Arteries, Capillaries, or Veins over Cutaneous Surface—Ocular Murmurs—Cephalic Murmurs. EXAMINE BLOOD—Count Corpuscles, and estimate Hæmoglobin, if necessary.

Respiratory System.—Inspection of Thorax—Development of Chest—Deformities. BREATHING—Movements of Thoracic Walls—Frequency—Easy or Laboured—Thoracic (adult type) or Abdominal—Movement of Nares—Snuffling. COUGH—Laryngeal or Croupy—Harsh—Deep—Short—Hacking—Painful, with Cry—Paroxysmal—Irregularly Intermittent—Diurnal—Nocturnal. SPUTA—Naked Eye and Microscopic Appearance. NARES AND LARYNX—Special Examination of. VOICE—Its Character. CRY—Nature and Frequency. PALPATION OF CHEST—Fremitus (Bronchial, Vocal—Crying or Speaking). AUSCULTATION—*Anterior—Lateral—Posterior*. RESPIRATION

—Its Frequency—Quality—Rhythm—Shallow or Otherwise—Resonance of Voice, Cry, or Cough—Relative Duration of Inspiratory and Expiratory acts—Accompaniments, Extra or Intra Pulmonary—Communicated Sounds—(*Laryngeal or Tracheal Râle*). PERCUSSION (more lightly than in adult, and generally practised after Auscultation)—Mediate—Immediate.

Urinary System.—MICTURITION—Frequency—Voluntary or Involuntary (Diurnal or Nocturnal). PAIN—as evidenced by crying during the act. URINE—Sp. Gr.—Its various Deposits and Constituents—Quantitative Estimation, if required—Microscopic Examination of Deposits.

Nervous System—

SENSORY FUNCTIONS.—Sensibility to Touch. PAIN—Apparent (*Young Children*) or Real (*Older Children*). MUSCULAR SENSE—SIGHT—General and Ophthalmoscopic Examination of Eye. HEARING—Examination of Ear and Throat. SMELL AND TASTE—(Little information except in older Children).

MOTOR FUNCTIONS.—ORGANIC REFLEXES—Deglutition—Breathing—Micturition—Defæcation, etc.—Convulsions, Spasms, Paralyzes, Local or General. SKIN AND DEEP REFLEXES—Examination of Muscles and Groups of Muscles—Electric Irritability (continuous and interrupted currents).

VASOMOTOR NERVE FUNCTIONS.—Local Congestions—Œdema—Sweatings—Wastings, etc.

CEREBRAL AND MENTAL FUNCTIONS.—Congenital or Acquired Morbid Conditions—Intelligence—Temper—Speech—Sleep—Delirium (*indicated by sudden screams, staring, and frightened look*)—Stupor—Coma—Shape of Head—State of Fontanelles.

DIAGNOSIS. TREATMENT—Hygienic—Dietetic—Medicinal.

AVERAGE HEIGHTS AND WEIGHTS OF CHILDREN.			PULSE IN CHILDREN.	
Age.	Height in inches.	Weight in pounds.	<i>Sleeping.</i>	
At Birth,	19·7	6·8	At Birth, . . .	130 to 140
1 year,	27·5	19·8	1 year, . . .	115 to 130
2 „	31·0	24·2	2 „ . . .	100 to 115
3 „	34·2	27·5	3 „ . . .	90 to 100
4 „	36·6	30·8	7 „ . . .	85 to 90
5 „	38·8	34·9	14 „ . . .	80 to 85
6 „	41·2	39·1	<i>Waking—average 5 to 10 beats more.</i>	
7 „	43·4	43·3	RESPIRATION.	
8 „	45·7	47·5	<i>Sleeping.</i>	
9 „	48·1	51·7	In Infancy, . . .	40
10 „	50·4	55·4	2 to 6 years, . . .	24
11 „	52·5	59·4	6 to 12 „ . . .	22
12 „	54·5	68·8	12 to 15 „ . . .	20
			<i>Waking—average 3 to 6 higher.</i>	
			Normal Pulse Respiration—ratio,	
			1 to 3, or 3·5.	

CHAPTER IV.

FEVERS.

SCARLATINA.

SCARLATINA is a contagious exanthematic fever, running a definite course, varying greatly in intensity in different epidemics, and often accompanied by various complications and sequelæ. The period of incubation in this disease varies from twenty-four hours to seven days, rarely longer. The specific nature of scarlatina poison is as yet unknown. The blood, skin, and secretions are infected with micro-organisms, micrococci, and bacteria of different kinds. Klein, Eddington, and others have described organisms which they consider peculiar to the disease, but their observations have as yet not been corroborated by others. Experiments on the lower animals, with cultivation of these organisms, have not been shown to produce any disease which has been identified with scarlatina.

The specific virus, whatever it may be, is very readily communicated by direct contagion, or indirectly to third persons, by those who have been in contact with the patient or present in the sick-room. The media of communication are innumerable—air, water, food whether liquid or solid, clothing, solid materials of any kind which have become infected in the sick-room. Clothes, books, paper, coins, dogs, or cats have all been known to communicate the disease. The poison is one of the most persistent known, and may linger about a house for an indefinite period. As an example of this a case occurred in a large country-house. All

the other members of the family were removed to town, and the patient left with a nurse. Every precaution as regards disinfection and clothing was adopted, the room fumigated and afterwards painted and papered. The house was left in charge of a housekeeper till the following summer, nearly a year elapsing before the family returned. Within a fortnight after they came back two cases occurred among the other children.

Scarlatina occurs at all periods of the year, and appears to be less influenced by meteorological conditions than many other fevers. Probably the autumn and winter are the most frequent seasons during which epidemics occur. Predisposition to the disease is greater in early life. Young infants, especially at the breast, enjoy a peculiar immunity. Pregnant women often escape. Puerperal women, on the other hand, are especially prone to be affected. Other diseases, whether acute or chronic, do not secure immunity from it. Second attacks are rare, but may occur. The mortality in different epidemics varies. Of 537 cases of all kinds, noted in the Royal Edinburgh Hospital for Sick Children, 72 deaths occurred.

SYMPTOMS AND COURSE.—The *invasion* is generally rapid—sometimes only a few hours, perhaps a few days, during which the child is languid and out of sorts; sometimes headache or dyspepsia, with tenderness of the cervical glands, is observed, but these latter signs exceptionally. Sooner or later the child has a rigor, more or less marked; occasionally, and more rarely than in measles, a convulsion may take its place. The temperature rapidly rises from a normal or slightly subnormal register to 102° or 103° or 104° . It generally remains from two to three days, at this average range, with little variation. On the fourth or fifth day a fall takes place, and by the sixth or seventh day a normal register is obtained. During subsequent days it is often subnormal, gradually rising to its normal level, and remaining so during convalescence unless some complication arises, when it may

exhibit many variations, according to the nature and severity of the condition. During the period of invasion the child becomes restless and the skin dry, vomiting is a very constant

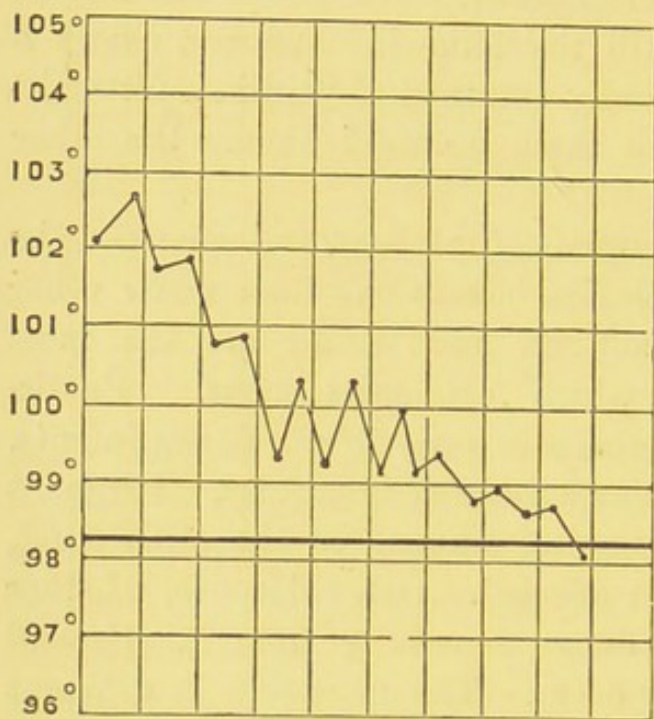


Chart 1.—Mild Scarlatina—Recovery.

initial symptom, the tongue rapidly becomes coated and the lips dry, headache is not unfrequent, sometimes delirium.

Period of Eruption.

—At the end of twenty-four hours from the period of invasion the characteristic eruption comes out from above downwards, appearing first on the face, neck, and chest, and then all over the body and limbs. The rash is of

a red colour, of varying tint and amount, in the malignant form of a somewhat livid hue, often less diffuse and of a patchy character. In ordinary cases, small, scattered, pinkish spots first appear, and soon the general surface becomes uniformly red. The rash is not elevated and disappears on pressure. It is also partially evanescent, coming out and “going in,” as it is called, from time to time. The tongue in this disease is highly characteristic, being red and covered with a nearly pure white or yellowish white fur, the papillæ being swollen and prominent. The mucous surface of the mouth is redder than natural, the fauces and tonsils are red and often swollen, but not invariably so. In hospital practice I have made some very careful observations on this point, with the result that, exceptionally, and in a small proportion of cases, there is absolutely no redness of the fauces or sore throat of any kind. In seventy cases thus noted, in three there was

entire absence of sore throat or even fauceal redness. These were all cases of a well-marked character as regards eruption and general symptoms. Most physicians describe sore throat as an absolutely constant symptom in scarlatina, which is hardly correct. Other symptoms of the febrile state are often present, such as drowsiness or delirium, headache, epistaxis, scanty and high-coloured urine. The bowels are usually more or less constipated and the stools natural.

Period of Desquamation.—The process begins as a rule immediately after the disappearance of the eruption, but may be longer delayed. It is generally first apparent on the delicate skin of the face and neck and anterior surface of the body in the shape of branny scales. The skin in these situations desquamates rapidly, and the process is over in two or three weeks; a much longer period elapses before the cuticle separates from the limbs, especially the palms and soles. In some cases the whole process is indefinitely delayed in its commencement, six weeks or even two months elapsing before separation of the cuticle begins on the denser parts.

VARIETIES OF THE DISEASE.—In certain epidemics and in individual cases great variations may occur. Thus the disease may be so mild as to escape detection. This is not unfrequently the case. A patient is brought to hospital suffering from some of the sequelæ of the disease, the fever having been undetected at the time, but on cross-examination of the mother a distinct history of sudden invasion, with two or three days' slight subsequent illness, is elicited. In some cases the fever is of a very mild type and the eruption hardly observ-

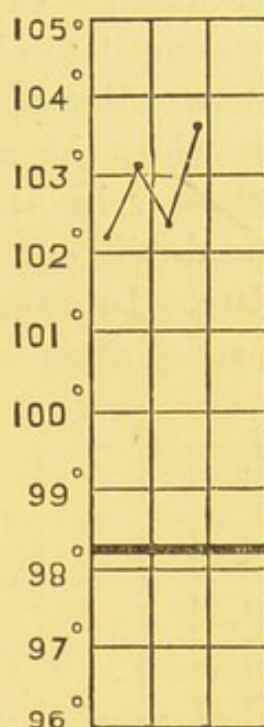


Chart 2. — Scarlatina Maligna.

Death on fourth day. Dark livid rash; no sore throat; cervical glands swollen.

able. A variety of the disease has been described without eruption, *scarlatina sine eruptione* of older authors. The entire absence of eruption, however, may be doubted, yet many competent observers describe such cases. Dr. Copeland attributes the absence of eruption to internal complications, which he says are generally present. Dr. Murray, a practitioner in Aberdeenshire, described twenty cases having occurred without eruption in an extensive epidemic in his practice. In 1833 a large epidemic occurred in Edinburgh, and some cases were described as without eruption. Dr.

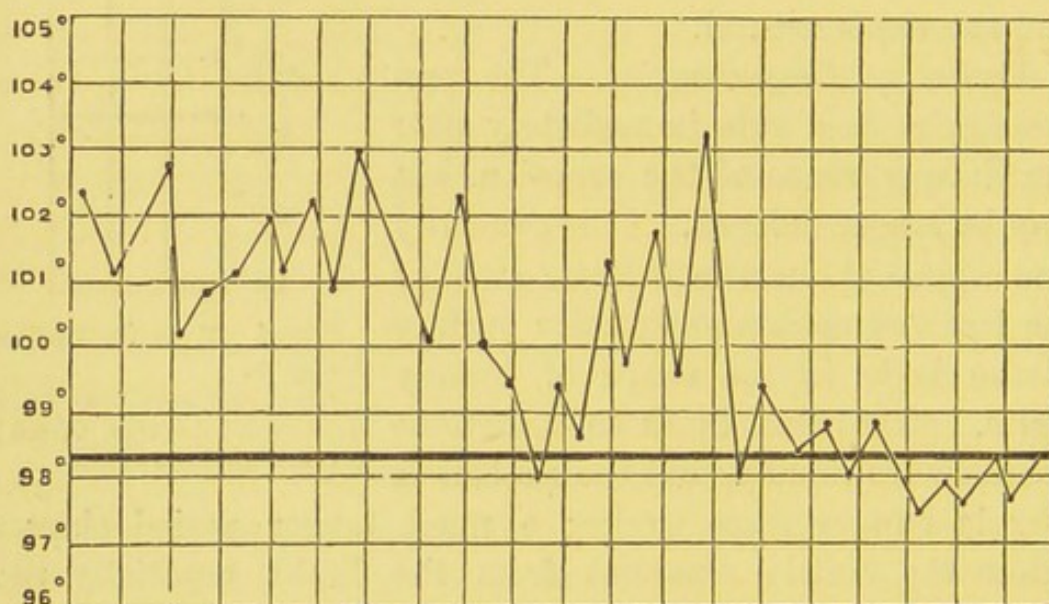


Chart 3.—Scarlatina Anginosa—Recovery.

Robert Williams of London says there is seldom a year in which scarlatina has been in any degree epidemic, that cases have not occurred in which patients, not having previously had scarlet fever, are seized with severe fever and sore throat unaccompanied by any eruption, and in subsequent exposure to the contagion of scarlatina have been found insusceptible of the action of the poison. That it may not be seen, or overlooked, is likely enough, for in these mild cases the eruption is often sparse and remains out for a very short time. I have not met with a case in which the eruption was entirely absent. The occurrence of a secondary

eruption during the second week, after the primary rash has disappeared, I have noticed in several cases. The eruption is darker in colour than the primary one, comes out chiefly on the body and limbs, more particularly the legs. It is somewhat raised and often papulated, and does not disappear altogether on pressure. In all the cases observed it appeared contemporaneously with the commencement of desquamation, and remained out for about ten days. During the earlier days of this rash the temperature showed slight elevation.

Malignant forms are perhaps the most fatal of all the diseases of childhood. I think Dr. Lees' division of the malignant forms is perhaps the best. The *Ataxic* form is characterised by a sudden and rapid development of symptoms chiefly referable to the nervous system, restlessness, sleeplessness, and delirium. The eruption generally comes out well, with high fever and severe sore throat. The restlessness and delirium continue to be the most prominent symptoms. The delirium is of an active nature, the child crying out, and seeming alarmed and wishing to get out of bed. Its manner is unnatural, eyes blood-shot, pulse very rapid, vomiting and diarrhoea being frequent symptoms. After a few days, signs of exhaustion come on, delirium becomes less active, the countenance anxious, the pulse more rapid and feebler, the complexion of a dusky hue, the extremities cold, deglutition difficult, continuous vomiting, and often a tympanitic belly. Stupor soon takes the place of delirium, convulsions come on, and death soon ends the scene.

Adynamic variety is the most rapidly fatal of all the forms. The system seems to be overwhelmed with the intensity of the poison. From the first the symptoms are those of extreme depression. The child is pale and collapsed-looking, with delirium of a feeble nature, vomiting and diarrhoea. The eruption is faint or hardly comes out at all. The surface of the body is cold, yet the thermometer in the rectum or axilla indicates a high temperature, generally about 105°. Sometimes a degree of reaction takes place and the child looks

better for some hours, but the depression soon returns, the lips become livid, and coma supervenes with or without convulsions, the pulse being very rapid, the respiration irregular, the skin bathed in cold clammy sweat, and the surface of the body livid, with mottled patches of a similar colour. These signs indicate a rapidly fatal termination. Many of these cases die within twenty-four hours. Few survive more than two or three days.

Mixed form.—This variety exhibits clinical features unlike either of those just described, showing neither the high excitement of the ataxic form, nor the prostration and exhaustion of the adynamic variety. The symptoms are as follows:—The case does not appear a grave one at first, the symptoms pursuing very much the course of the regular form to begin with, but about the third or fourth day the child gets restless and drowsy, or alternately in the one state or the other, the pulse becomes very rapid, the temperature maintains a high range, the countenance has a vacant look, the face, especially the lips, appears more or less swollen and the mouth tender, copious perspiration comes out, the tonsils and cervical glands become enlarged and tender, and a viscid and irritative mucus is secreted from the buccal and pharyngeal cavities. The tonsillar follicles become blocked with secretion, and the surface of the glands patched over with yellowish white secretion and superficial ulcerations. A similar condition of the posterior nasal mucous surfaces develops itself, rapidly spreading to the anterior nares, which discharge a viscid, offensive fluid. Diarrhœa is frequent in these cases, often due to follicular enteritis. Deglutition is difficult or impossible. The patient becomes rapidly enfeebled, and dies exhausted. This class of case runs a much longer course than the other malignant varieties, and although very dangerous does not always end fatally.

Relapse or Recrudescence.—A secondary renewal of the original febrile and eruptive symptoms has been occasionally noticed in this disease. Dr. Caiger,¹ of London, out of

¹ *Lancet*, June 13, 1891.

1008 cases, met with six which he carefully noted. *Three* of them relapsed during the second and third weeks, on the twelfth, fourteenth, and seventeenth days respectively; *two* in the fifth week, and *one* in the seventh week. The real nature of the secondary attacks seems doubtful. Further and closer observation of a larger number of cases would seem desirable before arriving at definite conclusions. In such a disease as scarlatina, where the symptoms are often mild and transient, close observation is needed to prove the nature of both attacks, one or other being liable to misinterpretation. Dr. Caiger's cases seem to have been very accurately and closely observed, and apparently of the nature of true relapses or recrudescence of the original disease, and not reinfection from without the body.

COMPLICATIONS AND SEQUELÆ.—These are numerous and important, but I should just like to refer to the intercurrent of other acute infectious diseases during the progress of scarlatina. It is well known that specific fever poisons in children, while they render the patient for a time or altogether insusceptible to attacks of a similar kind, increase the susceptibility to other diseases of a like nature. Thus whooping-cough often complicates or immediately succeeds measles. In like manner measles is often similarly allied to scarlatina. As example of this I note two cases. A little boy, two and a half years of age, under treatment in hospital, passed through a regular attack of scarlatina. The temperature fell as usual to normal range at the end of the first week, remained so during the second week. On the fifteenth day a sudden rise took place to 102° , and on the twentieth day to 104° , on the twenty-fifth day temperature was noted 103° , and a copious eruption of measles appeared, which ran the usual course, the child making a good recovery. A second case, that of a little boy aged four, also a regular case of scarlatina, pursued the usual course till the end of the second week, when the temperature rose on the fifteenth day to 103° , an eruption of measles appearing on the

evening of the twentieth day, the child making a good recovery.

Pharyngitis, Rhinitis, Stomatitis.—Stomatitis in greater or lesser degree is present in all cases of scarlatina. In mild types of the disease it may be of the simplest catarrhal form. The mucous membrane of the pharynx is generally in a similar condition, probably also that of the nares. In malignant cases a more severe form of affection of the mucous surface is met with. The mucous membrane is not only red, but swollen and sometimes œdematous. There is a copious muco-purulent ichorous discharge from the surface. Respiration is impeded through the nose, deglutition is difficult. The tonsils are swollen and generally covered more or less with yellowish white glairy secretion, and sometimes patches of superficial ulceration. The cervical and tonsillar glands are enlarged and tender, and cellulitis may be set up in the neck. The process appears to be essentially a septic inflammation of the mucous surface, primarily catarrhal in its nature, accompanied often by superficial ulcerations of the surface, and extension of the inflammatory action to the submucous tissues. It is often accompanied by constitutional symptoms of septicæmia. Inflammation is apt to extend along the Eustachian tube to the middle ear (*otitis media*).

Adenitis and Cellulitis, in a greater or less degree of severity, are apt to accompany the severer forms of angina. Sometimes in children disposed to lymphatic inflammation, it may complicate even the simpler forms of sore throat. The process may consist of glandular hyperplasia and cellular infiltration, and may resolve *pari passu* with the decline of inflammation of the mucous surface, or it may go on to abscess or sloughing of the cellular tissue of the neck. The process, according to Billroth, essentially consists of "abundant formation of young round cells and transudation of serum."

Sometimes extensive sloughing takes place. In a little girl, lately under my care, suffering from the malignant form of the disease, the muscles on one side of the neck down to the

carotid sheath were laid bare. Ultimate recovery took place. In these cases it is interesting to note that the muscles, on account doubtless of their larger blood supply, generally escape the necrotic process, which is usually confined to the glands and cellular tissue.

Sore Throat (Tonsillitis and Pharyngitis) is met with in all degrees of severity, from the simplest catarrhal form, passing on to follicular tonsillitis, usually accompanied by simple (croupous) exudation on the tonsils, with or without superficial ulceration, or the more severe and deeper inflammation, accompanied by sloughing or necrosis (diphtheria). The varieties of sore throat are several, and vary in degree as in ordinary primary angina. I know of no kind of sore throat which is specially characteristic of scarlatina.

Tonsillar Abscess (Parenchymatous Tonsillitis) is rare in scarlatina. I have seen a few cases in older children.

Diphtheritic Sore Throat may complicate the simpler forms,

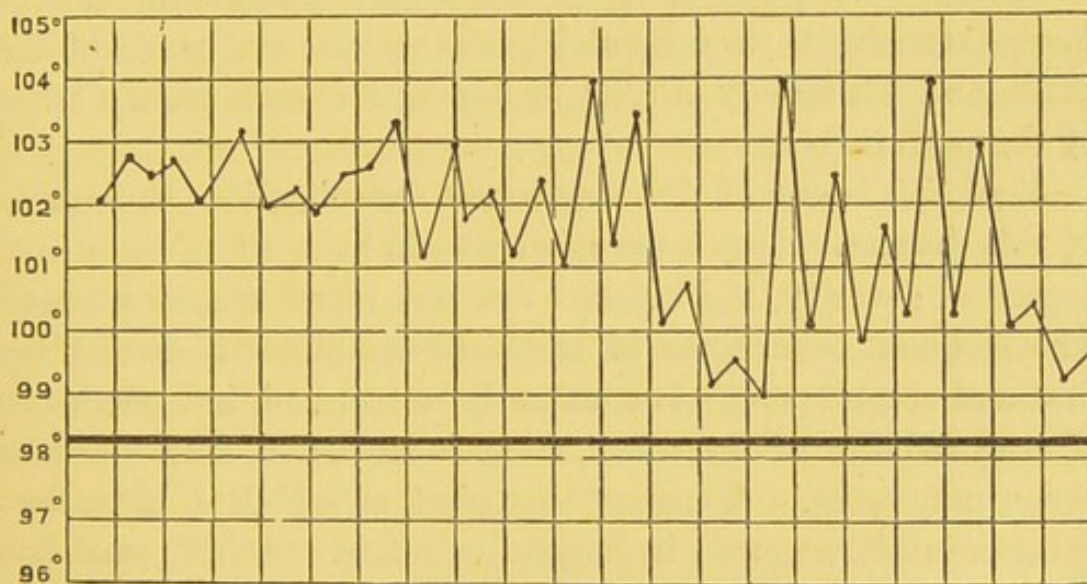


Chart 4.—Scarlatina—Diphtheria—Deep Cellular Abscess—Recovery.

or the inflammatory process may be so severe from the first as to cause more or less necrosis of the tissues of the fauces and tonsils. I believe the diphtheritic process may be due to intensity of the specific (scarlatinal) inflammation of a low form, causing death to a greater or less extent of the tissues

involved. Many physicians believe that in these cases the patient has been infected with diphtheria from some other source, but, in the present uncertain state of our knowledge regarding the initial pathology of diphtheria, the question remains undecided. The battle rages between those pathologists who consider the disease due primarily to cocco bacteria, and those who believe it to be caused by a poison unknown, which produces certain morbid changes, accompanied by presence of these organisms. Whatever be the cause, we know the morbid anatomy, which essentially consists in a low form of inflammation, accompanied by necrosis of tissue, and often secondary septic infection. In scarlatina the diphtheritic process as a rule primarily affects the fauces, often spreading upwards to the nares or downwards to the air passages.

Otitis.—Almost invariably due to extension of catarrhal inflammation from the throat along the Eustachian tube to the middle ear, may be simply catarrhal, accompanied by exudation and perforation of the drum membrane, or of a more extensive nature, involving the ossicles and bones of the skull, and ultimately ending in cerebral abscess from disease of the petrous bone.

Nephritis is one of the commonest complications or sequelæ of this disease. It is a question whether, in all cases of any degree of severity, the kidneys are not more or less affected. The frequent occurrence of transient albuminuria during the first and second weeks is constantly noted, and, independently of coagulability of the urine, there is reason to believe kidney lesion may exist. A case of this kind, of which I have seen several, lately occurred in hospital practice. A boy, aged ten, was brought in at the end of the second week, desquamation having already begun. The urine was almost totally suppressed during the first two days. Sufficient was obtained, however, for examination, and it was found free of albumen. On the second day after admission the boy became affected with anasarca, which gradually disappeared at the end of a week. The secretion became re-established, and seventeen ounces were

noted on the fourth day, and an average of about twenty-two ounces was passed during the week succeeding. He made a good recovery, and during no period of the time, although the urine was examined several times a day, was a trace of albumen discovered. Nephritis may come on at any stage of the disease, but most frequently during the active period of the desquamating process in the third week. The signs indicating acute nephritis are signalised by diminished secretion, bloody urine with puffiness of the face or anasarca, vomiting, and headache. Often the process is of a less acute nature and comes on insidiously, the urine containing no blood, but granular and epithelial casts, with one-third to one-fourth albumen, the anasarca varying in amount. The temperature generally rises in proportion to the sudden or acute nature of the attack. In grave cases uræmia with epileptiform convulsions and coma may supervene. The serous cavities may be involved either with passive effusions accompanying the general dropsy, or secondary serous inflammation—pericarditis, pleuritis, or peritonitis. A rare complication, but one of possible occurrence, is œdema glottidis, which should always be dreaded when aphonia or hoarseness come on. The scarlatinal poison is one of the commonest causes of hæmatogenous nephritis. The poison appears to act as a distinct irritant to the secreting structure of the kidney, particularly the glomeruli. Klein believes that changes occur in most cases during the first week, characterised by proliferation of the glomerular epithelium and hyaline changes in the blood and vascular walls. According to Langhaus, the endothelial cells of the capillary loops become swollen and proliferate, and are liable to undergo ultimate degeneration. Although the glomerular form of nephritis is common in scarlatina, different grades of disease are met with, varying in degree from the simple cloudy swelling to the fully-developed glomerulo or parenchymatous nephritis.

Scarlatinal Synovitis and Rheumatism is characterised by pain in the limbs or joints, most commonly those of the ankles, wrists, or phalanges, accompanied, as a rule, by little swelling or

effusion. The question is still under debate whether the joint affection is due to rheumatism or simply the result of the septic effects of the scarlatinal poison. The fever poison, while it appears to attack in the first instance the skin, and mucous surfaces, particularly of the mouth and pharynx, seems specially prone in many cases, during the second or third week, to affect the sero-fibrous textures of the joints, pericardium, or pleura. In many cases the affection is characterised by shifting pains in the limbs, body, or neck, in others there is a distinct polyarthritides not to be distinguished clinically from ordinary rheumatism.

Of the other complications may be mentioned *epistaxis*, which in children specially disposed, is occasionally troublesome. *Pulmonary complication* may be said to be infrequent in this disease, compared with the other acute febrile complaints. *Pleurisy*, however, is not uncommon, and if effusion takes place, it often becomes purulent.

Pericarditis, as well as *Endocarditis*, may occur during the second or third week.

Dilated Heart in severe cases is frequently met with, and is a condition often giving rise to the greatest anxiety. As in all malignant fevers with a high range of temperature, so in this disease there is a tendency to parenchymatous changes in the heart tissue, and the muscular fibres are apt to be affected with fatty and granular degeneration. Feeble muscular action is the result, and imperfect emptying of the cavities during systole is apt to give rise to dilatation. It is in such cases that blood clotting is liable to occur, which may, in itself, produce fatal results from obstruction in the cavities or larger vessels, or the detachment of emboli, producing lesions in more distant parts.

Diarrhœa is one of the rarer complications of scarlatina. As a rule it is not of a serious nature, although it may usher in enterocolitis of a severe form. I have occasionally seen well-marked follicular enteritis, and also swelling and prominence of the solitary and Peyerian glands, not unlike the

typhoid appearance. In these cases there is generally some hyperplasia of the mesenteric glands.

MORBID ANATOMY.—Apart from the condition due to the various complications or sequelæ when present, certain appearances are found after death in this disease. The skin shows evidence not only of active hyperæmia, but of more or less exudation into the rete mucosum, with cellular proliferation. The lymph glands, especially in the neck, are generally in a hyperplastic condition; sometimes also, as already noticed, the mesenteric glands are affected when enteritis has existed. The liver, spleen, and kidneys, in severe cases, show more or less cloudy swelling and hyaline degeneration of the intima of the smaller vessels. Klein also has found in the liver evidence of interstitial inflammation, with increase of the round cells, and hypertrophy of connective tissue. The blood, especially in malignant cases, is of a dark fluid colour with small clots in the larger vessels. There is generally no increase of fibrin. Cocci are almost invariably present, and also, in some cases, bacterial organisms. In cases fatal from uræmia, the blood contains urea in excess.

TREATMENT.—In the management of scarlatina, prophylaxis is all-important. Three methods deserve notice: isolation, disinfection, and inoculation. The last method has not yet been accepted by the profession, but it is certainly warranted in principle, if a modified or attenuated virus could be obtained, which, by inoculation, would confer immunity from the disease. Experiments in this direction have already been made by Dr. Strickler in America, who inoculated children with virus obtained from the horse supposed to be suffering from scarlatina, or an allied disease. The children contracted local sores at the point of puncture and some degree of lymphatic enlargement in the neighbourhood, and subsequent immunity from the disease after exposure to infection. Various drugs have been from time to time tried as prophylactic in this disease. Belladonna was the first of those, but after repeated trials it has been discarded as valueless. The era of micro-

organisms has brought into use various antiseptic drugs for this purpose. Those used most frequently and with greatest success are boracic acid, listerine, and the sulpho-carbolates. When isolation is impracticable in a family where there is an outbreak of scarlatina, the other children may be dosed every two or three hours with, for a child five years old, one to two drachms of a saturated solution of boracic acid, or twelve to fifteen drops of listerine. In my experience, the sulpho-carbolates, especially that of sodium, in doses of ten to fifteen grains, well diluted with water, are preferable. Sulpho-carbolates are very soluble and not unpleasant to take, and are given, I believe, often with good results. Along with the administration of such remedies, careful attention should be paid to the hygienic and dietetic care of the other children; perfect ventilation of the house is all-important, fumigation with sulphur may also be used. *Isolation* of the patient, as soon as the diagnosis is made, is the most successful means at our command for preventing the spread of the disease. This may be effected either by his removal to another house or to hospital, or by isolation in the infected house itself. When this is determined on, a large and well-ventilated room should be selected, if available, on the top flat, or as far removed as possible from that portion of the house used by the other members of the family. A trained nurse should be obtained, and the patient put under her sole charge, no one being allowed to enter the room except the parents, and that only in serious cases. When the mother enters the room, she should put on a cotton dressing wrapper, which may be hung outside the door on retiring. A special pair of slippers should also be used in the same way. The room requires special preparation. The carpets should be lifted. All curtains and woollen or other similar materials should be removed, and also every article of furniture, except what is absolutely required for the necessity of the nurse and patient. All pictures should be taken from the walls. The door should be protected on the outside by a sheet which is kept constantly moist with a

solution of carbolic acid in water, or bichloride of mercury. The room should be well ventilated by keeping a fire going constantly, and the window kept, night and day, two inches down from the top. The patient's bed should be so placed as to be out of draught. The nurse should be provided with a large galvanised iron pail and a mop, with which, every day, she should wash over the floor with warm water and carbolic acid, 1 to 40. This disinfects the dust and skin particles, and obviates the necessity of sweeping the floor. Fumigation may be used from time to time with the vapour of eucalyptus, pumiline, or sulphur, the latter only if it does not produce much respiratory irritation in the patient. No books, newspapers, toys, or other articles taken into the room, should be again removed till the patient is well, and even then it is better to have them destroyed, rather than retained with the risk of after infection. No cats or dogs should be allowed to enter the room, as it is well known they have been the means of spreading the disease. Bed or body clothes, when soiled, should be steeped for twenty-four hours in a tub or bath with carbolic acid solution, then wrung dry and removed to the laundry, to be boiled and washed separately from the other linen. The next point to be attended to is the disinfection of the patient during desquamation. This may be effected either by the use of medicated baths or inunction of oils or unguents. Carbolic oil, 1 to 40, is a favourite application. The body may be anointed with this once a day. If ointments are preferred, carbolic acid, mixed with benzoated lard or vaseline, or a mixture of lanoline and vaseline in proportion of twenty to thirty grains to the ounce. Medicated baths, temperature about 112° , with either permanganate of potash, or carbolic acid, or perchloride of mercury, 1 to 4000, may be used daily or every second or third day during desquamation. From long experience in public and private practice, I have no hesitation in giving the preference to baths as the best and safest means of disinfection and promoting desquamation. Patients generally express themselves as more comfortable and relieved after a

bath than inunction. The desquamated particles of cuticle are more likely to be disinfected thoroughly in the bath than by inunction, and, I think, a healthy action of the skin is better maintained. The palms of the hands and soles of the feet are the last to desquamate, and the process being often very tedious I have found great advantage from the application of an ointment of 40 to 60 grains of salicylic acid to the ounce of lanoline. This speedily removes the cuticle, but its application should not be too long persisted in, in case undue cutaneous irritation be produced.

Curative Treatment.—In all cases the patient must be kept in bed during the febrile stage, and until desquamation is well advanced, for at least three weeks, generally for four or five weeks in severe cases. The temperature of the room should not be lower than 60°, nor above 65°. Ventilation must be attended to. The diet should consist of milk and light soups during the first week, with a little farinaceous food added during the second or third week. Animal food should be excluded from the dietary for the first month, and given only sparingly, white fish or fowl only being allowed till the end of the sixth week.

Drug Treatment.—In uncomplicated cases very little medicine is required. At the commencement of the disease, when there is nausea and headache without vomiting, an emetic of sulphate of zinc and ipecacuanha often affords great relief. Of equal service in such circumstances, if preferred, is a calomel purge. Diaphoretics may be prescribed with advantage, such as a mixture containing one to two drachms of liq. acet. ammonia with five to ten grains of sulpho-carbolate of sodium in an ounce of water every three or four hours. Tepid sponging with water and aromatic vinegar is very grateful during the febrile stage. When the temperature rises to 104° I always employ the tepid bath or wet sheet, and have seldom found it fail to afford relief to the patient. The wet sheet produces very free diaphoresis, and is in my belief the most ready and the safest means of treating hyperpyrexia. Antifebrine and antipyrine

are useful remedies, especially the former. I prefer small doses—two grains to a child of five years, repeated every hour till three doses have been given, unless the temperature is reduced by the first dose. During convalescence the patient should be carefully treated. Over-feeding must be avoided, and, as already recommended, little solid animal food should be given, until the end of six weeks, and then only white fish, fowl, or game to commence with. Quinine is a valuable tonic at this time. I generally give it at the end of the third week, or sooner, combining iron with it, as soon as the state of the digestive system warrants its use.

In *severe or malignant cases* the treatment must be suited to the special exigencies of the case. Milk, soups, and nourishing gruels must be the staple food, and along with diaphoretics and stimulants, such as carbonate of ammonia or aromatic spirit of ammonia, in frequently repeated doses, every hour or two or three hours. In some cases, ten to twenty drops of the ext. cinchona liquid every alternate hour with the ammonia answers well. In other cases, iron combined with ammonia—thus, sp. ammon. arom. ten drops, ferri ammoniæ citratis gr. iii, glycerine ʒss, and water to ʒss—is an excellent combination. In some cases, if the condition of the heart is such as to indicate it, five to ten drop doses of digitalis every four hours should also be given. In severe sore throat, the tinct. of perchlor. of iron in ten drop doses, with five drops of liq. hydrarg. perchlor. in half an ounce of water with ʒss of glycerine to each dose, is of great value. The iron and mercury, in addition to their constitutional effects, act locally on the throat with good result. Dr. Illingworth recommends biniodide of mercury, especially locally, in bad throat cases. The solution is made by adding a 1 in 4 solution of iodide of potassium to two ounces of liq. hydrarg. perchlor. until a cloudy red liquid is produced, glycerine being added to suspend the precipitate.

Complications and Sequelæ must be treated as they arise.

Sore Throat.—The milder form requires little drugging.

The severe varieties should receive prompt treatment from the first. In very young children it is often difficult to carry out topical medications, and if the child resists very much it is better to give it up altogether than run the risk of exhausting it by repeated efforts, and perhaps putting it off taking food or medicine altogether, as sometimes is the case. I am satisfied more harm than good may be done in this way. Applications may be made either with the brush or atomiser, or by insufflation. If the former method be used, Condyl's fluid is an excellent application, so also is the glycerine borax $\mathfrak{z}\text{i}$, with $\mathfrak{z}\text{i}$ of bicarbonate of soda; or of salicylate of sodium, gr. xx to the ounce. Glycerine of carbolic acid $\mathfrak{z}\text{ij}$, chloride of sodium $\mathfrak{z}\text{i}$, to the $\mathfrak{z}\text{i}$ of water; or hyposulphite of soda $\mathfrak{z}\text{i}$, glycerine $\mathfrak{z}\text{ij}$, water $\mathfrak{z}\text{v}$, I have found very useful. With the atomiser, Condyl's fluid, $\mathfrak{z}\text{i}$ to the $\mathfrak{z}\text{i}$ of water; lime water; or Benger's liq. pancreaticus $\mathfrak{z}\text{ij}$, glycerine $\mathfrak{z}\text{ij}$, water $\mathfrak{z}\text{ij}$; or liq. hydrarg. perchlor. $\mathfrak{z}\text{ij}$, glycerine $\mathfrak{z}\text{ij}$, water $\mathfrak{z}\text{ij}$, in diphtheritic cases. Insufflation of iodoform $\mathfrak{z}\text{ij}$, pulv. acaciæ $\mathfrak{z}\text{vi}$, or boracic finely powdered, are often most useful when other methods have failed. Internally in severe follicular or diphtheritic tonsillitis, iron along with chlorate of potash or liq. hydrarg. perchlor. are most useful. Such combinations not only have powerful constitutional effects, but act topically on the fauces when swallowed; the mixture should be well diluted, and given every hour or two hours. The recipes I use are as follows:—

R Tinct. ferri perchlor. $\mathfrak{z}\text{i}$, liq. hydrarg. perchlor. $\mathfrak{z}\text{iss}$,
glycerini $\mathfrak{z}\text{i}$, aquam ad $\mathfrak{z}\text{vi}$.— $\mathfrak{z}\text{ij}$ to $\mathfrak{z}\text{iv}$ every two
hours.

R Tinct. ferri perchlor. $\mathfrak{z}\text{i}$, potass. chloratis $\mathfrak{z}\text{ss}$, glycerini
 $\mathfrak{z}\text{i}$, aquam ad $\mathfrak{z}\text{vi}$.— $\mathfrak{z}\text{ij}$ to $\mathfrak{z}\text{iv}$ every two hours.

In *Otorrhœa* the condition of the throat must be attended to. The middle ear catarrh is generally the result of extension of the inflammation along the Eustachian tube from the fauces. The ear should be kept clean by washing out with boracic lotion, or Condyl's fluid and water, and Politzer's bag used daily.

In *Nasal Catarrh* or *Diphtheritic affection* antiseptic washes should be frequently used with the nasal douche.

Kidney complication must be treated according to the principles laid down for nephritis. Purgatives with compound jalap. powder, scammony or elaterium, diluent drinks, diaphoretics, of which the most useful is full doses of the liq. ammonia acetatis, subcutaneous injections of pilocarpine, gr. $\frac{1}{8}$ to $\frac{1}{16}$. Hot-air baths are of great value, so is dry-cupping over the loins. I always put on and retain a wet compress on the kidneys, which I am satisfied is of great service. The food should consist solely of milk, or skimmed milk given warm, or barley or oatmeal decoctions. Diuretics, if given, must be of the non-irritating varieties. Thus acetate of potash alone or combined with the liq. acetat. of ammonia, or acid tartrate of potash with sp. of juniper. Digitalis is useful in many cases, but not always certain in its action.

Adenitis and Cellulitis.—All peripheral irritation about the mouth or throat must be treated as the primary cause, and when inflammatory action sets in, fomentations or poultices give great relief. I prefer a compress of warm wet boracic lint covered with Macintosh cloth. When suppuration takes place, the abscess must be freely opened and dressed antiseptically.

During the progress of these glandular complications, the child is generally much debilitated, and requires as much nourishment as the digestion will allow—milk, strong soups, or meat extracts, with white animal food if convalescence is far enough advanced, citrate of quinine and iron mixture being given at the same time, or the following mixture:—Liq. calcii chloridi $\bar{3}$ i, liq. ferri perchlor. $\bar{3}$ ij, syrupi simplicis $\bar{3}$ i, aquam ad $\bar{3}$ vi.— $\bar{3}$ ij to $\bar{3}$ iv ter die.

CHAPTER V.

FEVERS—*continued.*

TYPHOID.

TYPHOID FEVER in children has often been called infantile remittent, but this term is now falling into disuse. Clinically the name had some significance, as it expressed one of the leading features in the type of the pyrexia, its variable remissions, which are often more marked than in the adult. It is a miasmatic contagious fever of indefinite duration, accompanied as a rule by the eruption of successive crops of rose-coloured spots chiefly on the body. It probably never occurs spontaneously, but arises from a specific poison developed in a person previously affected with the disease. Gaffky has demonstrated the presence of bacilli one-eighth the diameter of a red-blood globule, with rounded extremities. They are united in groups, and form irregularly-shaped masses of a crenated appearance. They are found in greatest numbers in the small intestines, and specially in the follicles of Lieberkuhn and also in the mesenteric glands and spleen. More rarely they have been met with in the blood. The bacilli readily form spores. Cultivations have yielded negative results in experiments on the lower animals. The poison is generally disseminated from the evacuations of patients, and may be communicated by fomites, or through the influence of miasmatic gases evolved from cesspools and drains into which the excreta of patients have been thrown. It is probable that in sewerage the poisonous germs undergo multiplication. Drinking water and

milk, probably through the medium of water with which it is mixed or with which the utensils have been washed, are frequent media of transmission. The air seems to be a less frequent medium for carrying the poison, but there can be no doubt it may be communicated in this way. The infective material, whether it multiplies or not, retains its vitality for a long period in the media to which it has obtained access, especially in liquid or solid material such as water or sewage, so that cases often occur in a locality many years after the original outbreak has disappeared.

Unfavourable hygienic conditions generally favour the spread of the disease, and render persons receptive of the poison. The season of the year and also the meteorological conditions seem likewise to influence its development. In summer and autumn the germs appear to increase more rapidly than in winter. Children of all ages are liable to be attacked, but not more so than young adults between the ages of sixteen and thirty. After mid life, as is well known, typhoid is less frequent. It is also believed that males are more liable to be attacked than females. Children in health are more liable to suffer than those who are debilitated. One attack usually confers immunity from a second, but not invariably so. The incubation in typhoid is uncertain as regards its exact duration, but may be said to range from ten or twelve to fifteen or twenty days. In children it is probably shorter than in adults. Typhoid is the least contagious of all the fevers, so much so that cases are sometimes treated in the general wards of hospitals, without contagion resulting in the case of the other patients or nurses.

CLINICAL FEATURES IN THE CHILD.—These may be summed up in remittent fever, with ordinary febrile symptoms—roseolar rash (which occasionally is absent), hypertrophy of spleen, bronchial catarrh, and sometimes diarrhoea. Compared with the disease as seen in adults it is more benign, all the symptoms being as a rule of a milder type. Of 137 cases noted by Henoch, only sixteen proved fatal. Of 184 cases in the Edinburgh Royal Hospital for Sick Children, only sixteen deaths occurred.

The pyrexia is essentially of a remittent type, varying infinitely in different cases. In looking over the chart-books of hospital cases, nothing is more striking than the variations in the temperature curve. E. S., aged eleven and a half years, was admitted on the seventh day of the disease. It was a well-marked case throughout—copious eruption, enlarged spleen, slight bronchial cattarrh, constipated bowels requiring an occasional laxative, or the daily or alternate daily use of a simple enema to relieve the bowels. On admission, the average morning temperature for the first three days was 98° , evening $101^{\circ}5$. This continued till the fourteenth day. From the

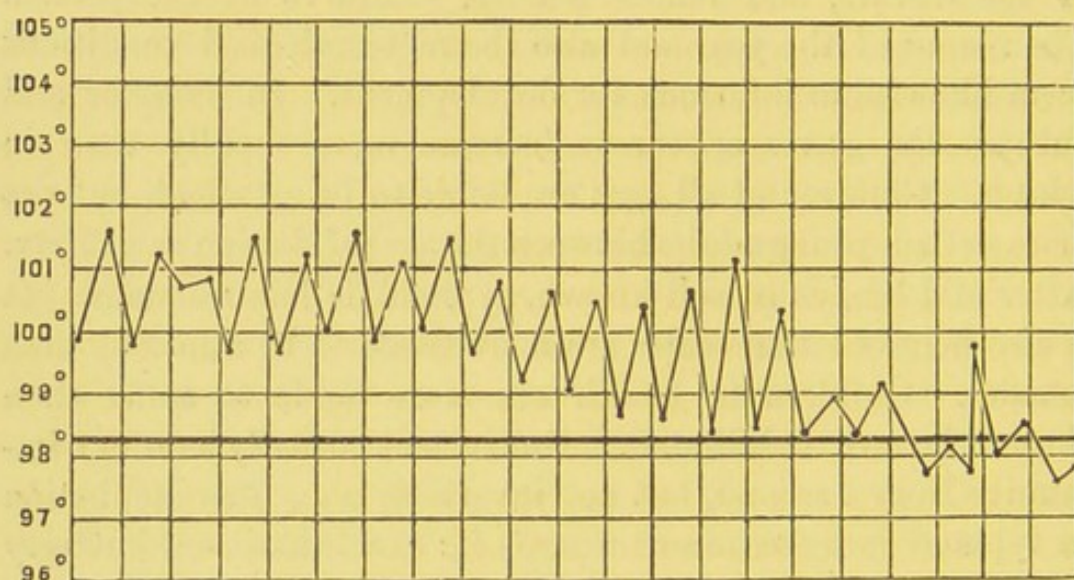


Chart 5.—Typhoid Fever—Average Case—No Complication.

fifteenth to the thirty-sixth day, when convalescence was established, the temperature averaged, from the sixteenth to twenty-fifth day, about 103° , occasionally going up to 105° ; thence on to the thirty-sixth day, average being 100° , morning temperature being always normal or subnormal, on three days 96° , evening temperature 101° to 103° . Another case contrasting with E. S.'s was that of M. A. B., aged nine, convalescent on twenty-sixth day. The temperature was more regular, averaging during the second week $101^{\circ}5$, and during the third week 100° . On the twenty-sixth day it was normal, and continued so. In this case there was also constipation,

with well-formed pale motions. Two or four hour charts in typhoid cases show even greater variations in temperature than the morning and evening charts. Complications affect the temperature variously; thus diarrhœa causes a rise which persists in proportion to the degree of severity of the enteric complication. Hæmorrhage, if large in amount, causes a sudden and rapid fall; perforation, a sudden fall, with a rapid and persistent rise. Pulmonary or cardiac complications also modify the pyrexial type.

Pulse generally corresponds to the height of the temperature, but there are exceptions to this rule. In quality it is usually small and compressible, sometimes markedly dicrotic. In frequency it is at its height during the second and third week. The evening pulse is quicker than the morning. The absolute frequency is less in this fever than in any of the others, probably owing to the specially depressing effect of the typhoid poison on the nervous system.

Skin is generally dry, although in some cases perspiration is present. The eruption bears no relation in amount to the severity of the case. It consists of rose-coloured spots, disappearing on pressure, coming out in crops commencing after the first week, chiefly seen on the body, most copious on the anterior surface, occasionally and sparsely on the limbs.

Tongue is often coated with a whitish fur at first, with red tip and edges. As the fever advances the fur disappears, and the tongue becomes red and glazed or "beefy" looking, denuded of epithelial coating, and sometimes cracked or fissured, the lips being dry and in severe cases covered with sordes.

Appetite is greatly impaired or wholly lost. Thirst is generally present, sometimes great. Nausea and vomiting are not constant symptoms, but when occurring during the third week are often associated with enteric disturbances or peritonitis.

*Abdominal pain and tenderness—tympanitis—*are not constant but frequent symptoms. When present they generally

are proportionate to the amount of enteric lesion, but it must be noted that in some of the worst cases of this kind little or no pain or tenderness exists. Tympanitis is present in by far the larger proportion of cases, although no active symptoms of enteric lesion are present. It is more pronounced when serious enteric symptoms exist.

Enlarged spleen is the rule in children. It begins with the fever, and is generally well marked by the beginning of the second week. The organ may enlarge to two or three times its natural size. It generally diminishes during the fourth week, or on the subsidence of the fever.

Diarrhœa in children is by no means common in cases *under treatment*. Constipation in my experience is quite as frequent. When present it generally arises from improper feeding, and if persistent and intractable, Peyerian ulceration may be considered almost a matter of certainty. In cases of average severity the presumption is that *ulcerative* enteritis does not exist, and if the child is properly fed, receiving only that amount and quality of nourishment which the stomach and intestines are able to digest, no diarrhœa results. If, on the other hand, the quality or quantity of the ingesta are not carefully regulated, diarrhœa is sure to come on from over-taxation of the digestive function, which is always impaired to a great extent in this disease. In practice we often find, when called to a case of typhoid, as frequently happens, at the beginning of the second week, diarrhœa is present from improper feeding, and this very soon gives place to constipation under careful nursing and dieting. When loose, the stools are of a pale light yellow colour and homogeneous; blood may be present if ulceration exists. When constipated, the stools are of natural consistency, but generally pale and to a great extent acholic and foul-smelling.

Intestinal hæmorrhage is always a sign of anxious import, and generally indicates ulceration in a greater or lesser degree. When the ulceration is superficial and of small extent the stools show slight streaking with blood; in many cases this

slight streaky hæmorrhage results from the rupture of minute vessels on the mucous surface of the congested Peyerian patches, without any real ulceration of the mucosa. In extensive and deep ulceration the blood is passed in large quantity. Slight hæmorrhage gives rise to no constitutional symptoms. When severe, on the other hand, depression, sometimes amounting to collapse with a sudden drop in the temperature, comes on. When perforation takes place, pain and tympanitis, with rapid rise of temperature due to the supervention of peritonitis, are the usual signs. A short period of depression is often present at first, during which there may be a drop in the temperature, but this very soon rises abnormally and maintains a high range. *Epistaxis* is met with occasionally, and may sometimes be of a severe and exhausting nature. *Hæmatemesis* and *hæmaturia* occur rarely, and usually in cases of profound alteration of the blood. In these cases petechiæ may also be present.

Respiratory System.—*Bronchial catarrh* is a constant accompaniment. It generally involves only the larger or medium tubes, and gives rise to little disturbance or cough. There is always a tendency to *hypostasis* at the pulmonary bases. Unless it is extensive, it requires no special attention. Occasionally where the heart power is much weakened and the hypostasis extensive, *hypostatic pneumonia* results. It is distinguished from lobar pneumonia by the absence of rigor or increase of fever, and the slow and gradual manner in which the signs of consolidation are developed. *Lobar pneumonia* comes on most frequently at the commencement of convalescence, but may occur as early as the second or third week. It is characterised by all the usual physical signs and general symptoms. When resolution does not take place, abscess of the lung or gangrene may result.

Circulatory System.—The depraved nutrition resulting from typhoid, and evidenced by the remarkable emaciation which is often seen, is very liable to affect the heart muscle, and dilatation of the cavities results, especially the ventricles, from

thinning or degeneration of the muscular walls. Increased area of dulness, feeble and diffuse impulse, and systolic murmurs are generally sufficient to indicate the physical condition. In such cases we often meet with heart clot, or thrombosis in some of the larger vessels, such as the pulmonary artery, as a result of which embolic pneumonia or gangrene of the lung may be set up. Endo and peri-carditis are unusual complications. The pulse as a rule corresponds to the range of temperature, but exceptions to this rule are not uncommon, a comparatively slow pulse of 96 to 120 accompanying a very high temperature of 104° or more. Sometimes the pulse is unusually rapid throughout, even in cases which recover.

Urinary System.—The urine is generally diminished in quantity and of high specific gravity from the commencement to the height of the fever. As convalescence begins, the secretion becomes more copious and of paler colour and lower specific gravity. The urea is increased during the febrile period and below normal in amount during convalescence. Albumen was found to be present by Murchison in 28·6 per cent. of his cases. It is usually transitory, and passes off with the fever. Hæmaturia is not common unless nephritis be present, or in patients constitutionally predisposed to hæmorrhage.

Nervous System.—*Headache* is generally a symptom in the early stages of the disease, but as a rule it is not severe. Pains in the back and limbs are often met with. *Delirium* occurs in most cases of any degree of severity, especially at night. *Muscular twitchings* or *tremors* are more or less constant symptoms, and vary in degree according to the severity of the case. *Hiccough* I have seen occasionally, and it is often persistent and troublesome. *Deafness* is common during convalescence, although not so frequent, I think, as in typhus. *Convulsions* are rare, the nervous system being in a state of diminished excitability. *Cutaneous* and *muscular hyperæsthesia* or *anæsthesia* are occasionally met with, Murchison says, most commonly in children. A girl under my care in hospital, during a tedious

convalescence, with great depression and absence of nerve tone, besides being very deaf, had anæsthesia of the lower half of the body and partially of the legs, which disappeared during convalescence. Neuralgiæ are occasionally present, most often

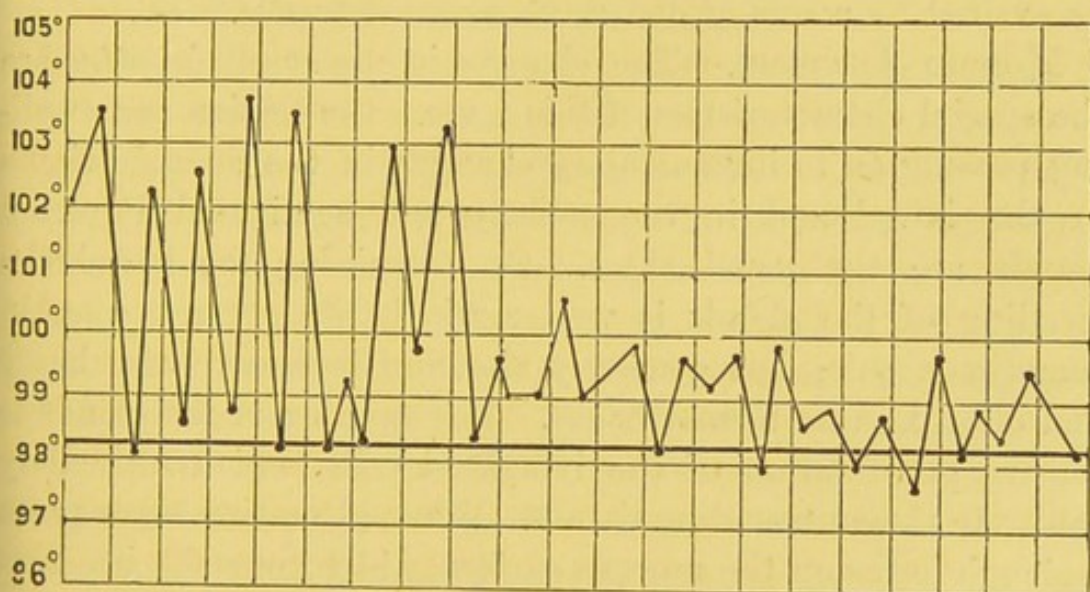
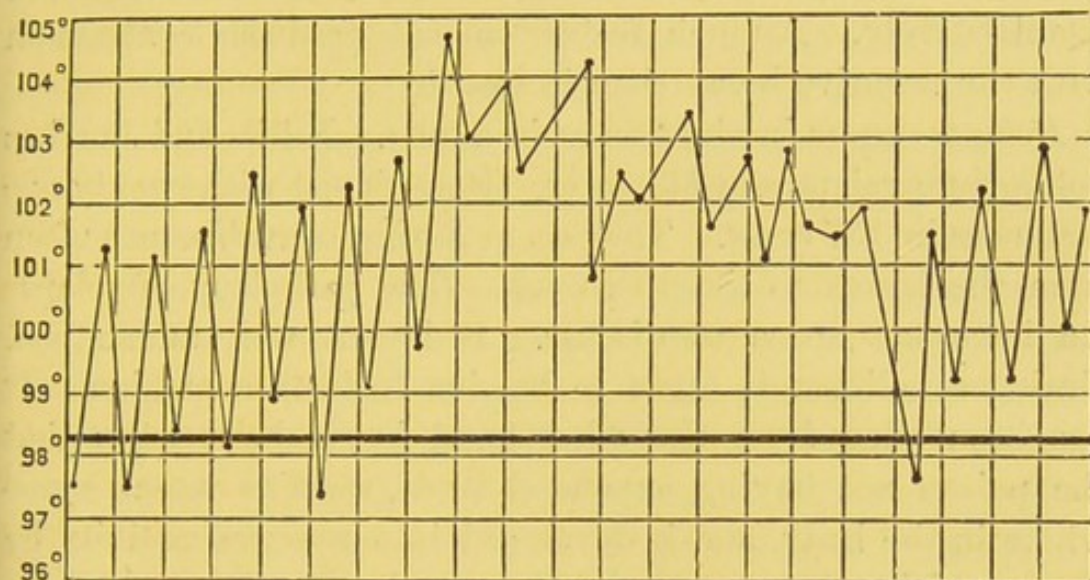


Chart 6.—Typhoid Fever—Protracted.

during convalescence. The pain may be in the face (sensory branches of the fifth) or in the scalp, sometimes in the limbs, most frequently the feet or ankles. Of the cerebral sequelæ aphasia is the most common. It is often complete. Recovery usually takes place. Hemiplegia or paraplegia, or paralysis of

single muscles or groups of muscles, are more rare but sometimes met with. The reflexes are as a rule altered, the cutaneous being almost invariably increased. The patellar reflex is sometimes increased, but often diminished or absent. The electrical reactions are altered both qualitatively and quantitatively. A much feebler current produces contraction with the negative break than in health.

Relapse occurs in children as in adults. Rilliet and Barthez notice three relapses in 111 cases. Henoch met with twenty-one instances in 137 cases. They occur during convalescence often from the fourth to the fifth week. The pathology of relapse we have not space to discuss. It is not well understood. Grainger believes it often to be due to fresh contagion. It has been alleged on the other hand by Liebermeister, that the poison not having expended itself, remains latent somewhere in the body, and is developed into renewed activity by some exciting cause. Undoubtedly relapses often appear to be excited by errors of diet during convalescence.

MORBID ANATOMY.—The changes in the *small intestine* are the special characteristics of this fever. Congestion and swelling passing on to inflammatory changes in the adenoid tissue of the bowel and in the solitary and agminated Peyerian glands are the usual signs. On examining the bowel the swelling of the glands is well marked, the surface smooth, sometimes pale, but generally showing increased vascularity and often minute hæmorrhages. The swelling of the glands is due to proliferation of the lymphoid cells, which ultimately infiltrate the surrounding tissues. When ulceration takes place a slough forms on the mucous surface, which generally involves to some extent the submucous tissue. The *mesenteric glands* are generally in a more or less hyperplastic condition. Resolution takes place during convalescence, more rarely caseous and calareous degeneration results. The *spleen* is commonly hypertrophied, sometimes being two or three times its normal size, the Malpighian corpuscles showing medullary infiltration, and the organ a generally hyperæmic condition. The *liver* in

severe cases presents the appearance, which is also seen in other diseases, and which Woodhead describes as "a peculiar inflammatory change due to septic embolism in the venules of the intermediate zone of the lobules." The organ generally presents the characteristic appearance of cloudy swelling. The morbid appearances of *bronchial catarrh*, generally limited to the larger tubes, with congestion (hypostatic) of the bases, are generally present. The *heart* in common with the other muscles is often pale and flabby, and shows signs of degeneration of muscle structure.

DIAGNOSIS.—In typical cases the disease is a characteristic one, and its recognition is easy. The type of pyrexia, the eruption, enlarged spleen and bronchial catarrh, and enteric symptoms, if present, will render clear the nature of the case. The etiology of the disease must be taken into account when the symptoms are not well marked, the hygienic condition of the house and district, and the occurrence of other cases, will aid us in deciding the nature of the ailment.

Tuberculosis often simulates typhoid very closely, and it is only after careful observation for a time that we can arrive at a definite conclusion. In tuberculosis the temperature chart shows greater variations, and except in very acute cases not such a high average range. *Tache cerebrale* is distinct—rarely so in typhoid. Ophthalmoscopic examination of the fundus of the eye should always be made in doubtful cases. The presence of tubercle in the choroid will clear up the diagnosis. Signs of bronchitis may be present in either condition. Enlarged spleen and the eruption, when distinct, are sufficiently characteristic of typhoid. In some tubercular cases, I have noticed rose-coloured blotches (rather than spots) which may give rise to suspicion of typhoid, but a few days' careful observation will generally clear the matter up. Some cases of typhoid have little or no eruption. In both diseases we may have diarrhoea. The pea-soup stools of typhoid are very characteristic. In tuberculous diarrhoea the evacuations rarely present the same homogeneous appearance, being more of a mixed character,

and the fæces partly solid and partly liquid, often mixed with mucus, sometimes streaked with blood. The belly in typhoid is generally more or less tense, in tuberculosis it is often retracted and scaphoid. Tubercular cases complicated with meningitis, often simulate typhoid with cerebral symptoms. A consideration of the history of the case, the previous ill health in tuberculosis contrasting with the more sudden invasion and previous good health in typhoid, will help us. Vomiting is generally present in meningitis, more rare in typhoid; delirium is present in both; headache much more severe in meningitis; epistaxis rare in meningitis, common in typhoid.

Gastro-intestinal Catarrh may be differentiated from typhoid by the history of the case and the character of the fever, which is not so high and remittent, with absence of eruption, enlarged spleen, or bronchial catarrh.

Latent Pneumonia sometimes simulates for a time typhoid. In all doubtful cases, with any sign of bronchial catarrh and absence of positive symptoms of typhoid, minute and frequent examination of the lungs should be made, and the detection of a small pneumonic area often clears up the diagnosis.

Septicæmia.—I have seen one case where a small chronic abscess gave rise to fever closely resembling typhoid, also a case of acute necrosis of the femur, in which, until the local signs in the thigh, which were not well marked and undetected at first, made their appearance, typhoid was suspected.

PROGNOSIS AND MORTALITY.—The average mortality given by Murchison in the London Fever Hospital was about fifteen per cent. Dr. Cayley of London gives seventeen per cent. as the average in his cases. In the American Hospitals the mortality seems to be higher, about nineteen per cent. These statistics include adults as well as children. All physicians agree that in children the mortality is lower. In the Edinburgh Royal Hospital for Sick Children the mortality during five years was eleven per cent. This accords with the general average noticed in other children's hospitals at home and abroad. In America and Germany, since the introduction of systematic antipyretic

treatment, the mortality has been lowered at least five per cent. The prognosis should always be guarded, for even in mild cases unforeseen accidents may occur at any time. As a rule the higher the temperature the more grave the case. A continuous high temperature is of more serious import than one in which the remissions are great. A higher morning than evening temperature is often noted in bad cases. Violent delirium, subsultus tendinum, incontinence of urine or fæces, or hæmorrhage, add to the gravity of the prognosis. In favourable cases there is a gradual defervescence of the fever during the third week, with an improvement in all the symptoms.

TREATMENT.—*Prophylactic.*—Other children should be removed from the house, if possible, when a case of typhoid exists. The sanitary condition of the dwelling ought to be investigated as to drainage, water, and milk supply. The excreta of the patient should be disinfected, and if possible, not put down the water-closet, but buried outside one or two feet under the soil. All body clothes should be disinfected, and thorough ventilation and fumigation of the house enforced.

Curative.—The child should be kept in bed in a well ventilated room of mean temperature. During the first week, especially when there is nausea, headache, and loaded tongue, a purgative of castor-oil, grey powder, rhubarb or calomel (much used in America and Germany), will do good. The mercurial purge is supposed to be beneficial, both on account of its aperient and antiseptic properties. The systematic treatment of the case must now be commenced, and for this purpose an experienced nurse should always be procured, if possible. The diet should be prescribed, and the quantity of each ingredient given, recorded on the chart. In no fever is careful attention to diet more necessary than in this. Ordinary uncomplicated cases of this disease, as a rule, require no other than careful dietetic treatment and attention to the bowels. My experience leads me to the conviction that not only is it necessary to feed the patient

with nourishment of a quality which he is best able to digest and which will provide him with the maximum of nutriment, with the minimum amount of work to the digestive organs, but that it is of equal importance to regulate with the utmost nicety the *quantity*, giving only as much as can be fully and completely digested. To this end the patient must be watched after feeding, and if any symptoms indicating indigestion, such as nausea or headache, griping pain or diarrhœa, come on, the amount of nourishment must be reduced. The surest indication of excessive quantity of food is obtained by an examination of the stools. It should be a routine practice on the part of the medical attendant to see the evacuation each day at visit. Such an examination, I hold, is as necessary in this disease as feeling the pulse or looking at the tongue. The smallest amount of undigested food in the stools indicates the necessity of diminishing the amount, until no undigested matter appear in the evacuations. By following out this practice, I rarely meet with diarrhœa in children, unless ulceration of the intestine is present, and even then it is reduced to a minimum by careful attention to quality and quantity of food. Milk, chicken tea, thin barley or oat decoction, Valentine's extract of beef, and such-like prepared foods, are the best forms of nourishment. When milk agrees with the patient no other form of food is required during the fever. I always require the milk to be cooked, and generally diluted with one-third to one-half of water, lime water, or barley water. It should be given "little and often," in quantities suited to the digestive power of the patient. A child of from five to eight years will take from two to three pints in twenty-four hours. When milk is not well digested the other foods already mentioned may be given alternately with it, whichever agrees best. In this respect each case must be treated on its own merits. I rarely find milk cannot be taken if carefully given. As a rule all that is necessary is a careful regulation, according to the rules laid down of the quantity and quality of food.

Hyperpyrexia.—Typhoid being a milder disease in children than in adults, continuous antipyretic treatment is rarely required. Nevertheless cases are occasionally met with in which treatment directed to reduce the temperature is indicated and beneficial. When the temperature goes up above 103° in the evening, and the patient is restless, tepid sponging should be first tried, and is always grateful. It seldom reduces the temperature very much, but still sufficiently to give great relief. If this fails, an ice-cap to the head and abdomen alternately for an hour at a time may be tried. Tepid baths, when these means fail, may be resorted to; but the patient should not be kept in the bath more than four or five minutes, and previous to immersion should get a little brandy and water, or wine, as recommended by Hensch of Berlin. If hydrotherapy fails, quinine may be given in three to five grain doses. Antifebrine suits equally well. Phenacetine is also a useful drug and agrees well with children.

Diarrhœa is best treated by careful regulation of diet, as regards quality and quantity, and I rarely find it necessary to use drugs. If any are required, five grains of each of carbonate of bismuth and precipitated chalk with two grains of pulv. acaciæ, given every four hours, will do good. If this fail, two grains of pulv. ipecac. c. opio may be added to each powder. Salol in one grain doses every two hours, till ten powders have been taken, is often very useful, especially when there is much flatulence. In similar cases, two or three drop doses of turpentine will do good. In other cases, gr. $\frac{1}{2}$ of hydrarg. c. creta, with gr. $1\frac{1}{2}$ of pulv. ipecac. c. opio, will be beneficial, especially when there is evidence of a more than usual amount of enteric catarrh. When diarrhœa is persistent and intractable, and does not yield to the above treatment, ulceration of the Peyerian patches may be suspected, and greater care than ever is needful in regard to feeding. Opium in one or other form is generally indicated, in dose and frequency suited to the age of the patient and the exigency of the case.

Constipation.—When this exists, I am in the habit of

ordering the nurse to procure a gentle evacuation of the lower bowel once a day, or at all events every alternate day, by a simple warm-water enema. This always relieves the patient, and has a good effect in keeping down the temperature.

Hæmorrhage and Perforation of the Bowel.—When bleeding takes place to any amount, food must be reduced and given only in small quantities at a time. Milk often requires to be stopped, and Brand or Valentine's beef extract given instead, or white of egg and brandy. At the same time opium must be regularly given, either with acetate of lead or gallic acid. Ergot is, in my opinion, useless. I have sometimes prescribed it with dilute sulphuric acid and opium with apparent benefit, which does not accrue when it is given alone, leading to the belief that the other remedies must get the credit of the cure. When perforation takes place opium must be given freely, and also stimulants and nutrients in small quantity. An ice-bag should be kept on the abdomen.

Bronchitis rarely requires treatment.

Heart weakness must be treated by appropriate and regular doses of alcoholic stimulants, with digitalis in small doses. As a rule, ordinary typhoid cases require little alcoholic stimulation in children, but each case must be studied by itself. The pulse and the first sound of the heart will give sure indication for their administration.

Convalescence.—There is generally much emaciation and feebleness in children during this period. In private practice the patient must be "saved from his friends" by the physician carefully guarding against over-feeding. A too early return to solid food may be followed by a relapse, or diarrhoea, or even perforation of the bowel. It is not possible to lay down any fixed rule as to when solid food may be resumed. The judgment of the physician in each case must be the guide, and the diet altered and increased gradually in accordance with the digestive powers of the patient. Quinine, in small tonic doses, followed by arsenic, and this again by iron or cod-liver

oil, are often useful when ordinary diet is resumed. The patient should not be allowed to get up too soon.

TYPHUS.

Typhus fever requires nothing more than a mere allusion in a work on disease in children. It is characterised by the same clinical features in the child as in the adult. From experience of epidemics during the years 1864 and 1865 in this city, when acting as resident physician in the fever wards, I agree with almost all observers that the disease

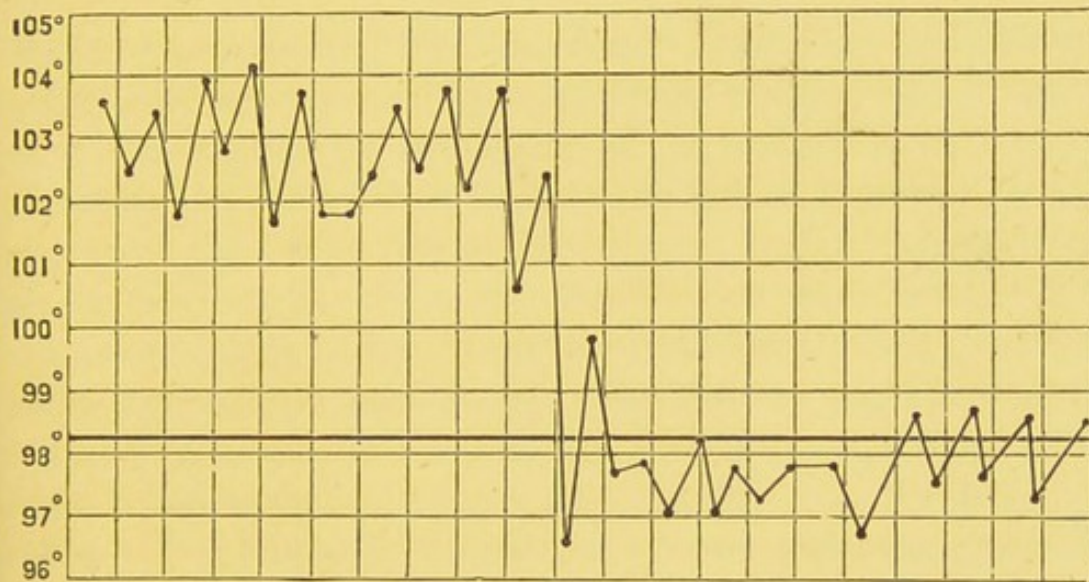


Chart 7.—Typhus Fever—Recovered.

runs a favourable and mild course in children. It is readily communicable from one person to another through the atmosphere, from the breath and exhalations of the body. The course of the fever is generally regular and well determined. After a probable period of incubation, varying from ten to fourteen days, the patient sickens, with lassitude, headache, and pain in the limbs, sometimes sickness, the eruption appearing chiefly on the body about the fourth day. The temperature range is from 103° to 104°, of a regular character, showing a tendency to fall about the twelfth day. On the thirteenth or fourteenth there is a sudden fall to nearly

normal, and during the third week convalescence is usually established, and goes on steadily, forming a marked contrast to the typhoid convalescence. Typhus patients are usually deaf during the fever and early convalescence. This disease rarely shows any sequelæ; on the contrary, patients who may have been in comparatively ailing health previously are often reinvigorated after an attack. In children the diseases most likely to be mistaken for typhus in the early stages are meningitis, cerebro-spinal fever, or pneumonia. A few days' close observation readily clears up the diagnosis in most cases.

CHAPTER VI.

FEVERS—*continued.*

MEASLES.

MEASLES is an acute, infectious disease, running a well-defined course, and accompanied by a maculated and papular eruption of a crimson colour, consisting of stigmatised dots, slightly elevated, and arranged in irregular circles or crescents, which appear on the fourth day of the disease, and come out from above downwards, beginning on the face and neck. The eruption remains in full bloom for from twenty-four to forty-eight hours, and then fades. The febrile stage is over in ordinary cases on the seventh day, and is succeeded by a fine branny desquamation, more or less marked, over the body and limbs. In addition to the skin, the mucous surfaces generally are affected by the poison.

The severity of the disease varies in different epidemics. Sometimes it assumes a malignant form, and is rapidly fatal. It is highly infectious, the contagion being volatile but not so persistent as that of scarlatina, as a rule one attack affords immunity from a second, but the exceptions to this are frequent. I have seen three attacks in the same person, and not unfrequently two. So far as is known, measles never arise *de novo*, but is propagated by contagion from a previously affected individual. Persons of all ages are liable to be attacked. In countries or islands which have been visited for the first time, adults as well as children become affected with the disease. In those places where for ages there have

been epidemic visitations, it is chiefly children who are attacked, the adult population possessing immunity, presumably because most of the individuals have passed through the disease during childhood. It is specially fatal among savage people. When first imported from Australia to the Fiji Islands, it killed off about one-fifth of the population.

The exact nature of the poison is unknown. In this, as in all septic diseases, numerous micro-organisms are found; but bacteriologists have not as yet demonstrated a specific organism which, by cultivation and subsequent inoculation, can reproduce the disease. Felz describes bacteria in the blood and secretions. Klebs also has found numerous cocci, which changed quickly into bacteria. Braidwood and Vacher instituted a series of experiments, by which they sought to prove that the contagion was chiefly exhaled from the pulmonary mucous membrane in the breath of the patients, and, by collecting the breath in tubes coated with glycerine, they showed the presence of sparkling spherical bodies, present in largest quantity on the second and third days of the eruption.

According to M. le Bel, who describes a bacillus, which he considers distinctive of this disease, the organism is found in the urine in the early stages, and disappears with the fever. It is slightly curved in shape, highly refractive, and moving slowly. It contains, he says, oval spores, one-third of its length, in a bag of dead protoplasm, which gradually disappears, the spores showing a surrounding zone of mucilage. In the later stages the bacillus is found in the skin. On cultivation, the organism, on experimentation with guinea-pigs, showed negative results. M. le Bel says the bacillus is quite distinct from the micro-bacteria of scarlatina and diphtheria.

Dr. Henry F. Formad, under the direction of Dr. William Keating, of Philadelphia, examined the blood in a malignant epidemic of measles, and found it invariably invaded by cocci, which, in the most malignant cases, had penetrated and caused disintegration of the white corpuscles. He also found the blood hyperinotic, and in those cases there was great dyspnoea

of a gasping character, "chicken-fat" clots obstructing the venous circulation, and causing death.

It has been shown by Mayr that inoculation of nasal mucus propagates the disease in a healthy person. Long ago Home, and many years subsequently Speranza, showed similar results by blood inoculation from infected patients. Whatever the nature of the contagion may be, it is very active and volatile, and present in the air of infected localities. It is also spread by fomites, but its persistency is not of so long duration as many others of the infectious diseases, such as scarlatina. The disease is infectious, not only during the febrile and desquamating stages, but before the eruption comes out, which accounts for the extraordinary rapidity of its spread in congregations of children.

SYMPTOMS AND COURSE.—The incubating period has been demonstrated both by inoculation and clinical experience. Ten days is the usual time, but it may be as short as six or seven days, or as long as fourteen, but exceptionally so. The initial symptoms are those of coryza and catarrh. Sometimes a rigor is present, occasionally a convulsion takes its place. The prodromal stage lasts from three to four days, during which the coryzal symptoms become developed. The eyes are suffused, the mouth and fauces congested. The mucous surfaces of the nostrils, trachea, and bronchi are in a similar condition. The cough is dry and harsh, sometimes of a laryngeal character. When the child is old enough to tell, it complains of headache, languor, and sense of oppression over the sternum. Pyrexia is gradually developed, and the temperature rises up to 102° or 104° . Vomiting sometimes occurs, but not so often as in scarlatina. It may come on at any time during the first three or four days, and not, as in scarlatina, just before the eruption comes out. The eruption appears first on the face, which is swollen and congested and characteristic in appearance, the eyes being "ferrety looking" and the conjunctivæ much congested. The eruption is generally seen at the same time on the neck and behind the ears, in the

shape of minute red spots, which soon enlarge into small blotches, with irregular and crenated margins and general crescentic shape. The spots may be isolated or confluent, forming a continuous blotching over portions of the skin, somewhat resembling in places the scarlatinal eruption. The spots are somewhat elevated to touch. During the first day of the eruption the symptoms are generally aggravated and the temperature high, the tongue coated, bowels constipated, and urine scanty; in the second and third days, when the

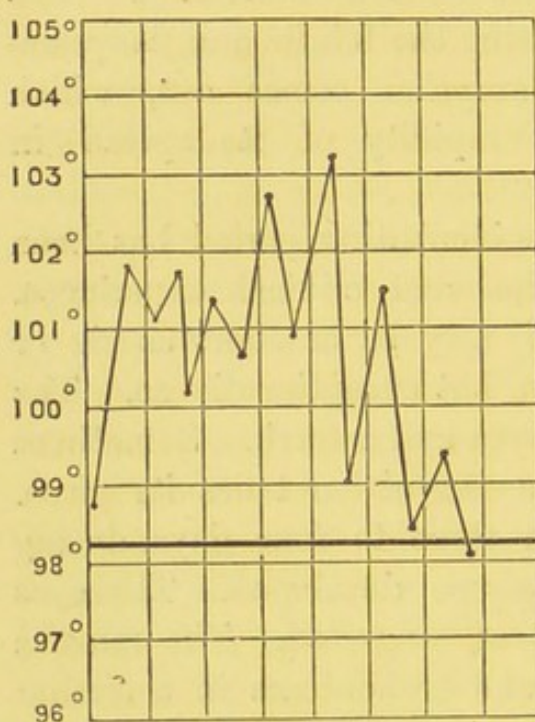


Chart 8.—Measles.

eruption has come out all over the cutaneous surface, the severity of the symptoms abates, and the patient feels greatly relieved, the fever and eruption soon disappear, the temperature generally being normal or subnormal by the sixth or seventh day or third day of eruption. During the week after the eruption there is a furfuraceous or branny desquamation of the skin over the body and limbs, and unless some complication arises the patient is quite well, although weak and sensitive to

cold. Such are the clinical features of the regular form of the disease, but variations occur in its character and course in different epidemics. The season of the year, state of the atmosphere, and climate of the locality, as well as the general hygienic condition of the patient and his surroundings, and the state of his health previously, may modify the type and course of the disease. The chief varieties met with are:—

1. *A highly inflammatory and severe form* in which all the symptoms are of great severity. The disease is ushered in with delirium or convulsions, the eruption comes out in extra-

ordinary amount, the fever is very high, and continues so after the eruption is well out. In my experience this form of the disease occurs in children of irritable and plethoric habit, or in those who have been exposed to cold after the reception of the poison, or in teething children, or those who have been improperly or over fed. This form is frequently complicated with bronchitis, pleuro-pneumonia, or croup.

2. *Gastro-intestinal form* has long been known and was first described by Stoll. Cases are seen often in summer or autumn epidemics, with warm and moist weather, and in children during the first or second dentition who have been subject to gastro-intestinal disorder. The symptoms are characterised by pain and tenderness of the belly, loaded tongue, and bilious offensive evacuations, some cough, general depression, slow development of eruption and feeble pulse, gastric irritability, disorder of liver with diarrhœa, often of a dysenteric nature.

3. *Nervous type* is associated with nervous depression, delirium, somnolency; eruption comes out late and often disappears soon, the symptoms all the while becoming more grave and assuming a typhoid character. There is a great tendency to cerebral complication.

4. *Malignant form*.—This presents some similarity to the nervous form, with certain superadded symptoms. Thus the eruption is of a bluish, or livid and petechial character. The throat is likewise livid and much congested. There is a tendency to hæmorrhage from nostrils, mouth, and throat, and there is often diarrhœa, dysenteric or otherwise. This variety is very common in hot miasmatic climates, and in delicate children. In temperate climates it is met with in children imperfectly fed and living under unhealthy hygienic conditions. As contrasted with the nervous type, which is met with in isolated cases and depends more on the individual peculiarity of the child, it occurs epidemically, or, in a large number of cases, in a given district, and is no doubt closely associated with conditions of the patient's surroundings.

Certain other irregular forms have been described, but none so distinctive as those just referred to. Thus the eruption may come out irregularly, and may present variations in colour. In some cases there is an absence of the usual catarrhal symptoms, and in others no eruption and the presence of catarrhal symptoms, the diagnosis of the disease in an undeveloped form being rendered probable by the existence of other cases in the same house.

COMPLICATIONS AND SEQUELÆ. — The most important of these are referable to the mucous surfaces, particularly the eye and respiratory passages. The gastro-intestinal mucous membrane is less frequently affected, so also the mucous lining of the middle ear.

Bronchitis.—Specific laryngeal and bronchial catarrh in a mild degree is probably present in all cases of measles. It can only be called a complication when extension takes place in the medium and smaller tubes (capillary bronchitis). This is greatly to be dreaded, as it is apt to give rise to disseminated catarrhal pneumonia and atelectasis, complications which are the more serious the younger the child. The symptoms are the usual ones present under such conditions—sibilant rhonchi and crackling râles diffused generally over the chest, and continued elevation of temperature. When the chart does not show a fall about the sixth day, pulmonary complication may be suspected.

Pneumonia generally of the catarrhal form is a common complication. It is always dangerous in proportion to the constitutional weakness of the child. It is apt to remain in a chronic form and to develop tuberculosis. Croupous pneumonia is rarer, but when present is often more serious than the catarrhal form.

Laryngitis.—Diphtheria is not so common as in scarlatina. The laryngeal complication generally exists in the simple form, merely an exaggeration of mild laryngeal catarrh, which accompanies most cases as an ordinary symptom.

Inflammation of the Eyes and Nose probably occur next in

frequency to chest complications. Conjunctivitis, often accompanied by phlyctenulæ, is most common; keratitis and more rarely iritis may be met with. Affection of the *nasal membrane* may be simply catarrhal or accompanied by epistaxis. When nose bleeding comes on early in the disease, during the febrile stage, it is generally of little account, but later on it is apt to be more profuse and sometimes causes great prostration.

Otitis is not such a serious complication as in scarlatina. It is generally of a milder type. It may come on as a complication, or later as a sequela.

Enteritis and Enterocolitis.—There is a constant liability to diarrhœa during and after measles. In the first week it is usually less serious and severe. Coming on at a later period, it is apt to develop into a more aggravated form. It often supervenes about the period of subsidence of the eruption, and may assume either a dysenteric or follicular character.

Skin Affections.—Miliaria, often developing pustules, may follow measles, so also herpes and various erythematous rashes. Pemphigus is a rarer complication, and has been noted specially by Henoch, Steiner, and Klüppel. Henoch thinks it does not result from specific rubeolar dermatitis, but is an independent complication, a contagious pemphigus.

Gangrenous Complications.—The vitality of the tissues is very much lowered by the rubeolar poison. As evidence of this we meet with sequelæ of this nature. Thus cancrum oris follows measles more frequently than any other disease. Gangrenous vulvitis is not uncommon. Less frequently do we meet with cutaneous gangrene of the body surface, or of the cartilages of the ear or nose. I have known severe gangrene come on after the application of a too hot poultice during the febrile stage.

Tuberculosis is one of the most serious and frequent, though often remote sequela of this complaint. Probably no disease of childhood is regarded by the public with more indifference than measles. Yet it is undoubtedly the ailment of all others

that is apt to lead to ultimate serious results. The child is always debilitated and the nutrition depraved, often for a considerable time, especially in delicate children, such as those who are strumous or rachitic. In inquiring into the previous history of cases of tuberculosis, a very large proportion will be found to have suffered lately or more remotely from measles, and the general health never thoroughly re-established after the attack. In this way the system seems to be specially prone to the reception and development of the tubercular poison, and it is probable that the virus enters most frequently through the bronchial mucous surface, and undergoes development specially in the lymphatic glandular system connected with the lungs. The tracheo-bronchial catarrh accompanying this disease is associated with bronchial glandular hyperplasia, which doubtless persists for a time during the debility of convalescence, the glands becoming favourable receptacles for the tubercular virus. In children dying from acute catarrhal pneumonia as a complication, the bronchial glands will be often found in a caseous and tubercular condition when little or no tubercle is found on the lung. If it be present it is generally in a less advanced stage than that of the glands, demonstrating the probability that in them the disease has first developed itself.

Whooping-Cough.—The frequency with which this disease follows measles entitles it to be alluded to in connection with sequelæ. Certainly it would appear that the effect of measles virus in the system of the child is to render it more than usually liable to attacks of this disease. When it occurs as a sequela it must be regarded as a dangerous complication, on account of the frequency of bronchial catarrh, collapse of the lung, and catarrhal pneumonia as accompaniments.

TREATMENT.—In treating the regular form of measles little drugging is needed. A few simple rules require attention. The temperature of the room, which should not be below 65°, ought to be carefully regulated, and the air kept moist, so as to soothe the bronchial mucous surface and ward off pulmonary

complications. The patient should be fed on beef-tea and milk, with simple mucilaginous drinks to quench the thirst, and sponged as often as need be with tepid water and toilet or plain vinegar. The cough is always troublesome, and some treatment is desirable. Inhalation of steam, if the child is old enough, seldom fails to give relief. Emollient poultices over the sternum are also of service. Effervescing citrate of potash may be given in twenty to thirty grain doses every three or four hours, or the following mixture:—

R liq. acet. ammoniæ ʒi, vin. ipecac. ʒijss, syrup codeiæ ʒss, aquam ad ʒvj.—Dessert-spoonful every three or four hours.

Great relief to the general and laryngeal irritation is often given by brushing the fauces with a 15 per cent. solution of menthol. Glycerine of tannin sometimes is useful in the same way. In hyperpyrexia I have always found tepid sponging, or a bath about ordinary blood temperature, most effectual. The child should not be kept in the bath more than five minutes. When taken out it should be quickly dried, rolled up in a sheet, and then well packed in blankets. When kept too long in the bath, depression is much more apt to occur than in scarlatina. The patient should therefore be carefully watched and the temperature noted, and the child taken out as soon as a decided fall takes place. In ordinary cases the patient should be kept in bed for ten days and confined to the bedroom for a week longer. According to the season of the year, he should not be allowed out of doors for two or three weeks. A gradual return to ordinary diet may be allowed, care being taken not to give more food than the stomach is well able to digest, especially if there are any signs of enteric catarrh. In these cases, saccharine or starchy foods should be given in limited quantity or stopped altogether, chicken or veal tea, milk peptonised or guarded by barley decoction, or raw white of egg given instead. Whatever food is chosen it should be given in limited

quantity, and at proper intervals. Quinine or cinchona fluid extract should be commenced during the second week, and iron added at the end of three weeks to a month. Cod-liver oil should now be commenced in small doses. As a routine practice I generally give cod-liver oil for several months after measles. It is one of the most valuable nutrient tonics in such cases. Convalescence should be carefully watched. In no disease is it more necessary that the physician should have a supervision over his patient for some time than in this. The public still require education in this respect, for such ailments as measles and whooping-cough are regarded as trivial, and requiring little after-care and attention.

The treatment of the various complications does not require special note here, but must be conducted on the special principles laid down elsewhere for each particular condition. In malignant cases, alcoholic stimulation, freely administered, offers the best chance of cure. Alcohol in these cases acts as a powerful antiseptic, and seems to prevent the rapid multiplication of the vegetable organisms in the blood.

EPIDEMIC ROSEOLA, OR RÖTHELN.

Epidemic Roseola, or *Rötheln*, is usually a mild disease, often accompanied by little or no fever, with an eruption more like measles than scarlatina. Few or no symptoms are noticed till the eruption comes out. It generally appears all over the body about the same time; sometimes spots are noticed on the legs, about the ankles, or on the face, shortly before it becomes general. It varies in appearance, but most commonly consists of red spots, from one line to one line and a half in diameter, with irregular margins, and without the crescentic appearance of the measles rash. At times the spots are about the size of millet seeds, with no distinct margins, becoming paler from the centre to the circumference. In mild cases the eruption is discrete. Sometimes the spots are bigger and more confluent, so as to cover the whole sur-

face with a deep red rash, very much resembling scarlatina. The conjunctivæ are generally injected, but there is no coryza or cough as in measles. The fauces are more or less red, and the tonsils sometimes swollen. The lymphatic glands at the angle of the jaw may be enlarged and tender, but more frequently those between the posterior border of the sterno-mastoid and the occiput are markedly swollen. By many physicians this is considered a characteristic of this disease. This sign is well marked in some epidemics, less so in others. The eruption remains out three or four days. Eustace Smith describes a secondary sore throat as occurring from the third to the seventh day, accompanied by swelling and increased mucous discharge. I have not observed this as distinctly of a secondary nature, that is to say, commencing when the rash begins to fade, but I have often noticed the faucial redness and swelling, which is sufficiently distinct at first, become more marked, and persist after the rash has disappeared. The tongue is generally furred to a slight extent, with a white coating. The temperature seldom rises above 102° to 103° , and may only remain above normal for a few hours. Exceptionally there is an elevation during the continuance of the rash. Complications are rarely present, but occasionally bronchitis, pneumonia, or otorrhœa have been observed. Drs. Liveing and Duckworth have also noted the exceptional occurrence of albuminuria.

DIAGNOSIS of the disease is decided by its mild character and the absence of prodromata, its epidemic nature, and the absence of the special signs of scarlatina or measles, combined with the fact that it does not protect from attacks of either of these diseases. The incubating period is less certain than in either measles or scarlatina, and is variously fixed at from twelve to twenty-one days. The treatment is unimportant. Isolation of the patient in schools, confinement to bed for a short period, if the temperature is pyrexial, otherwise he may be allowed out of bed, but confined to his room while the eruption is out.

CHAPTER VII.

FEVERS—*continued.*

DIPHTHERIA.

DIPHTHERIA, as one of the commonest and most fatal of the diseases of early life—a scourge not only in large centres of population but likewise in country districts—deserves most attentive study from all practitioners. In recent years the returns of the Registrar-General in this country show that the disease, contrary to preconceived ideas and the facts adduced from other countries in Europe and America, is even more prevalent and fatal in some of the rural districts of England, and under varied conditions of climate and soil, than in large towns. As yet no tangible explanation has been offered to account for this, but yet the fact remains that in isolated dwellings on small farm townships, far removed from large cities, most serious epidemics occur.

NATURE AND PATHOLOGICAL ANATOMY.—It is a specific contagious constitutional disease, attended by characteristic exudations on the mucous surfaces or skin. Children are more liable to be attacked than adults. Unlike other infectious fevers, one attack gives no immunity from a second or subsequent one. The disease has probably been known in all ages of the world, but it was only as lately as the year 1821 that Bretonneau first crystallised the experience of past centuries, and gave a good clinical description of it. In 1856 it began to be recognised and known clinically in this country, and since then has been

endemic in most large towns, and epidemic from time to time, particularly in the autumn among our urban and rural populations. The poison may be inhaled, ingested, or communicated by direct contact on an unhealthy mucous surface or abraded portion of skin. In whichever way it is received, the characteristic membrane or patch makes its appearance in a short time, varying from one or two days to a week. The constitutional effects of the disease will be hereafter alluded to, but it may be here stated that they vary infinitely, from the most profound blood-poisoning to the slightest constitutional disturbance, hardly recognisable at all unless looked for on account of the discovery of a local lesion. The disease may be of a primary or secondary nature. The secondary form occurs as a complication, generally communicated by other cases pre-existing in the house or ward or locality in which the patient resides. The primary diseases which are liable to be complicated by it are catarrhal conditions of the pharyngo-laryngeal mucous surface, either of a simple nature, or during the course of acute infectious disease, notably scarlatina, but also measles, variola, typhoid, or pertussis. Scarlatina is a disease in which secondary diphtheritic pharyngitis is very frequently met with. All that is required for the grafting of diphtheritic disease is an unhealthy mucous surface, even of the slightest catarrhal nature. An important question, which has undergone much discussion, as to whether this disease is at first purely local, receives a fairly distinct answer from clinical experience. On the one hand, a certain period of incubation most probably points to primary constitutional infection, and so does the fact that in many cases constitutional disturbance distinctly precedes the appearance of the local affection; on the other hand, in a large proportion of cases, there is no evidence of constitutional symptoms before the appearance of the local affection. The fact that no local lesion is observable by the naked eye on a mucous surface, does not prove that there may not have been reception of the poison on some particular part of the membrane, with

subsequent systemic infection. The theory at present in most favour is that the disease in most cases is primarily a local one, and that septic poisoning takes place from the development of a highly virulent poison in the tissues of the false membrane.

The local effects of the poison on a mucous surface, such as the pharynx, its most common seat, are first of all a congested state of the membrane, which is of a dark or purplish red colour, with some slight swelling. The colour of the surface as described is, I think, specially characteristic of the disease. It is of a darker colour, and appears to indicate a condition of more passive congestion than the bright red colour of simple acute inflammation. The mucous surface so affected secretes an unhealthy sticky mucus, the epithelial cells are enlarged and cloudy, and become rapidly degenerated into a necrotic mass embedded in a reticulated tissue. The process may be limited to the mucous surface (superficial diphtheritis), or may invade the entire membrane and submucous tissue, in which case an essentially similar process goes on, characterised by a fibrinous exudation, which has no power of organisation, and proceeds to rapid necrosis of tissue. The diseased membrane soon becomes loaded with lower organisms, chiefly schizophytes of the class sphero-bacteria. The relation of these organisms to the morbid process is probably a very intimate one in connection with the elaboration of the specific poison peculiar to the disease. The tendency of the membrane is to rapid extension by the margin. The process ends in gangrene and separation of the slough, or more rarely a suppurative process in the deeper layers which separates the diseased from the healthy tissues. The exact relation of micro-organisms to the disease has received much attention. Many pathologists, notably Oertel, have described a micrococcus or spherical bacterium as characteristic of the disease, but Klebs, Eberth, and others consider it not characteristic but identical with septic micrococci. The latest researches of Oertel show that he considers the exact nature of the

virus uncertain, but that the organisms are probably the cause of the disease, and that their effects are produced by the formation or elaboration of poisonous ptomaines. Löffler¹ has succeeded in artificially producing the characteristic membrane on mucous surfaces by the application of pure cultures of the bacillus described by Klebs, with rounded and clear spaces in its substance. He noted that the organisms did not find their way beyond the mucous surface, and were not met with in the blood or organs, a fact which ought to have important bearings on the effects of local treatment. At present pathologists seem to be directing their attention mainly in the direction of a study of the true nature and chemical relations of the poison supposed to be elaborated along with the growth of the micro-organisms. Roux and Yersin state they obtained the virus in a liquid form, and have been able to produce the disease by injection in rabbits, as well with it as with bacillary cultivations.

The morbid anatomy of the blood and organs in diphtheria is generally similar to that met with in malignant fevers. The *blood* is of a dark fluid character, showing either a very soft clot or little tendency to coagulation, presumably owing to diminution of fibrinous element. This condition of the blood, according to Sanné, is the result of the presence of a large amount of the débris of red corpuscles, which, in fatal cases, have undergone destruction in large numbers. The altered blood condition leads to minute extravasations, which are commonly met with in the organs and tissues, such as the kidneys, spleen, lungs, heart, or nervous system. The *heart* is, as regards its muscular substance, pale and friable, and the pericardium shows ecchymosed spots. Endocarditis is not uncommon, and often of an ulcerative nature. The *spleen* is large, congested, and softened, often showing capillary hæmorrhages. The *lymphatic glands* connected with the part locally affected are swollen and tense, the lymph vessels connected with them being distended and crowded with micrococci.

¹ *Mittheilungen aus dem Kaiserlich Gesundheitsamte*, vol. ii., 1884.

The *kidneys* are more or less affected in all severe cases. Parenchymatous nephritis of various degrees may be present, or glomerulo nephritis undistinguishable from that met with in scarlatina. Hæmorrhagic spots are common under the capsule. The tubular epithelium is often in a condition of cloudy swelling, and the cells in a state of disintegration. The *brain and spinal cord* are sometimes affected with degenerative changes, hæmorrhagic spots being often met with in the meninges, and punctate hæmorrhages in the nerve substance. The morbid anatomy of diphtheritic paralysis will be considered under that heading.

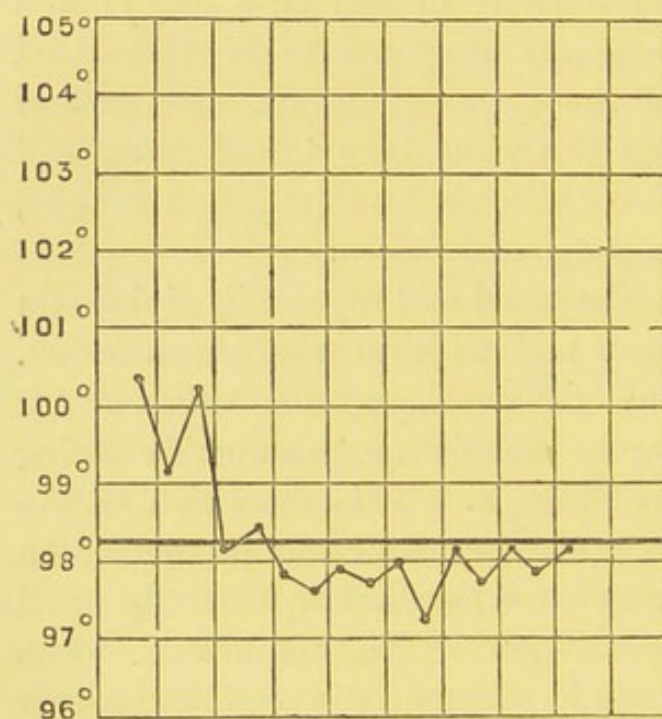


Chart 9.—Diphtheria (mild), æt. 4—
Recovery.

ETIOLOGY.—Some points in this connection have been already touched on. The disease is essentially a miasmatic one, and bears a striking resemblance to typhoid fever in its causal relations. Miasmatic effluvia from bad drainage, filth of any kind, and unfavourable hygienic conditions generally, favour the development and spread of the poison.

It has been asserted that it may arise *de novo* under such conditions, but this is unproved, and does not obtain credence from most physicians.

SYMPTOMS AND COURSE.—No disease of this class has a less typical course than diphtheria. The symptoms are constitutional and local. The former may precede, succeed, or accompany the latter. It would be easy, did our space permit, to occupy a large portion of it by the record of cases of vary-

ing degrees of severity, both in regard to the local and constitutional symptoms. Clinically, it may be said that the cases roughly divide themselves into three classes—the mild, severe, and malignant. In either case the onset of the disease may be very insidious and without any marked symptoms. There are few physicians who will not tell you that they have been thrown off their guard in the commencement of this disease, and often for days, through neglect of examining the fauces, been “at sea” in regard to diagnosis, mayhap having already incautiously given the opinion that the child was suffering from a trivial ailment, all the while the fauces being covered with membranous exudation.

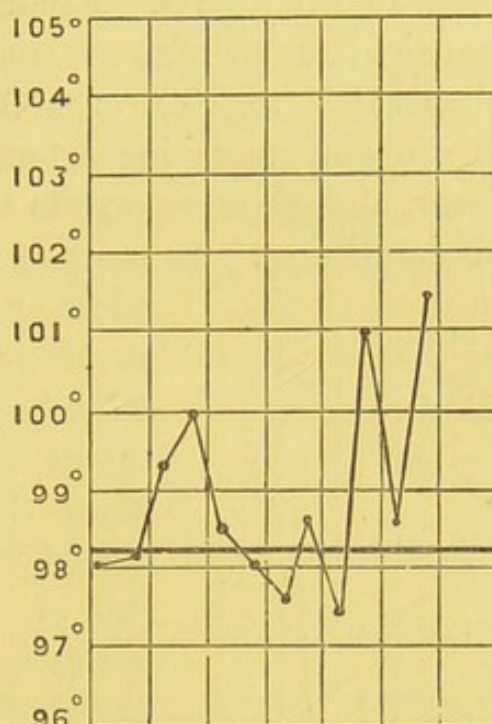


Chart 10.—Diphtheria (mild), æt. 6½—Syncope—Sudden Death.

Mild Cases.—The symptoms are of a trivial nature. The child is more or less languid, and often complains of head or limb aching, and may or may not give evidence of sore throat. It may be quite able to go about, and is even playful. There is generally a mild degree of pyrexia, with slightly furred tongue. On examining the fauces, the characteristic exudation is noticed most commonly on the tonsils, or uvula, and edge of the soft palate. This spreads to a greater or less extent, and in the course of four or five days the patches begin to separate and leave a red surface denuded of epithelium. The child rapidly improves, and the mucous membrane soon regains its normal appearance.

Severe Cases.—The constitutional symptoms show pyrexia of indefinite type. The symptoms begin early, often without any distinct prodromal stage. Sometimes vomiting is an early symptom. The tongue is moist and furred. The

appetite is lost. The condition of the bowels, as a rule, shows nothing abnormal. The state of the urine is noteworthy. As in most fevers, its quantity is diminished, and this holds good in diphtheria. Albuminuria is generally present as a transient or persistent condition. The temperature ranges about 101° to 102° or 103° , with inconstant variations. It is probably more inconstant and variable than in any other fever, and offers no certain indication of the gravity or extent of the disease. In some of the most serious cases it presents

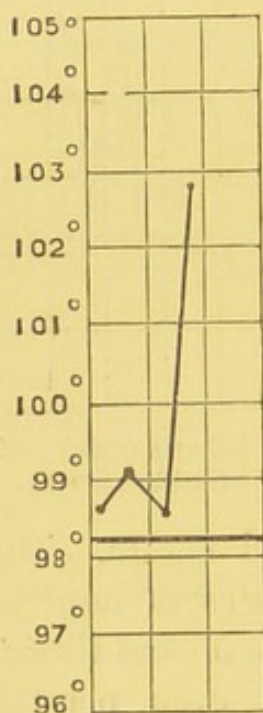


Chart 11.—Diphtheria (malignant)—æt. 5—Death.

a low or even normal range, with perhaps, at times, a slight subnormal dip. In secondary diphtheria, as a rule, the chart shows a steady rise. Thus, in scarlatina, when there is a steady rise during the second week after the normal fall at the end of the first week, if there are no indications of nephritis or adenitis, faucial diphtheria may be looked for. The state of *the skin*, as regards perspiration, presents nothing noteworthy. It may be dry, but is often normally soft and moist. An eruption is occasionally noticed. It is either of an erythematous character, and of transient duration, or of a roseolar appearance not unlike a measly rash, appearing in the form of red spots, with surrounding patches of congestion, and is more frequently met with in malignant cases. Occasionally petechial spots show themselves, indicating grave blood deterioration. The pulse is accelerated, and generally small and feeble. Certain other variations will be again noticed.

Malignant cases present all the symptoms of toxæmia. The pulse is generally rapid, sometimes variable in frequency, often irregular, which is a grave sign. The tongue is either moist and thickly coated, or dry and parched; the bowels may be regular, but more frequently there is a tendency to

diarrhœa. The temperature, although it may be low in exceptional cases, ranges from 101° to 104° , the exacerbations and remissions being often considerable. There is a dusky appearance of the face, and often continuous perspiration with low or muttering delirium. In order to complete the clinical description of the disease, some of the symptoms, both constitutional and local, must be specially considered.

Naso-pharyngeal and Buccal Mucous Membrane.—The most common site of local affection is the pharynx, and the

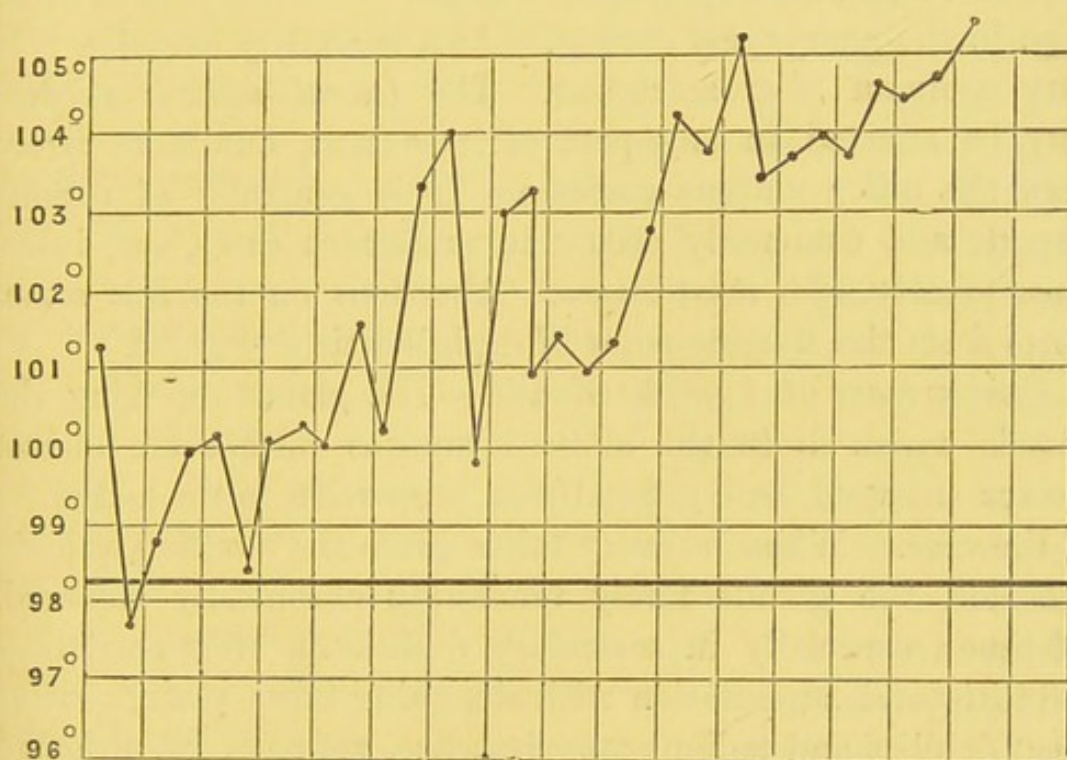


Chart 12.—Diphtheria (severe)—Septicæmia—Pneumonia—Death.

special part, the mucous surface of the tonsils, edges of soft palate, and uvula. In this situation the disease begins in a small patch or patches, which coalesce and spread by continuity of surface, either upwards to the nares, or downwards along the faucial pillars to the epiglottis and larynx. The membrane is of a greyish colour, and in superficial cases can be scraped off, leaving a denuded bleeding surface beneath. When the entire mucous membrane and the submucous tissues are involved, it cannot be detached.

Nasal Diphtheria is almost always the result of extension of the disease from the pharynx. The mucous membrane becomes swollen, and stenosis results, impeding the respiration entirely or to a great extent. It is accompanied by a sanious and irritating discharge. In young children, especially sucklings, the mechanical danger from nasal stenosis is serious, as it interferes with feeding, and often gives rise to collapse of the lung. The extensive lymphatic connection of the nasal mucous surface favours lymphatic glandular swelling and blood-poisoning. Septicæmia, in my experience, is rather more common in nasal than in the pharyngeal disease. As a secondary affection it is very common after scarlatina. The *buccal mucous surface* may be affected in any part of its extent, but more rarely than the other mucous surfaces. It is generally of serious import, and commonly occurs in malignant cases, and interferes greatly with mastication. Abrasions on the lips sometimes form the starting-point of diphtheritic stomatitis.

Enlargement of Lymph Glands.—The glands receiving the vessels which drain the affected mucous surface are almost always enlarged, and generally in proportion to the malignity of the case. When recovery takes place the swelling quickly subsides, the glands rarely remaining chronically enlarged. Ofttimes, especially in secondary diphtheria after scarlatina, cellulitis and suppuration with sloughing takes place, causing great debility and tedious convalescence, yet recovery, although long delayed, usually takes place.

The Conjunctiva is more rarely affected and generally in a secondary manner. A little girl, aged four, was lately under my care in hospital, suffering from vulvar diphtheria, and contracted well-marked diphtheritic conjunctivitis, communicated, I believe, from the vulva by the fingers. The palpebral conjunctivæ were totally covered with the membrane, which separated in about ten days, and the child recovered completely. In some recorded cases the disease has spread from the nares along the tear duct. In the same way it may extend along the Eustachian tube to the middle ear.

Diphtheria Vulvæ is a well-known affection in little girls. It readily yields to local and constitutional treatment.

Scrotal or Præputial Diphtheria sometimes complicates wounds or abraded surfaces on these parts in boys, often after circumcision.

Œsophageal Diphtheria may be the direct result of the extension of the disease from the pharynx.

Diphtheritic Gastro-Enteritis is occasionally met with. It is attended by the usual constitutional symptoms of the disease, local sign of tenderness in the abdomen, and constipation. Sloughs or casts of the intestinal tube are sometimes passed per anum.

Kidney Affection.—The occurrence of albuminuria is so frequent that it is now considered a more or less constant sign. It may be transient or persistent, and is usually met with early in the disease, even at the very commencement, but certainly during the first week it may always be looked for. Statistics show that it is present in at least fifty per cent. of the cases. The amount of albumen varies from a trace to a large amount in many cases; not only so, but in a given case the quantity shows infinite variation, or may disappear altogether for a day or two, and then return. The urine is generally clear, and does not, as a rule, contain blood, unless nephritis is present, which is unusual. As a rule, albuminuria, occurring during the acute stage of the disease, is recovered from. When it comes on later, rather as a sequela than a complication, it is more apt to persist, and the patient may develop chronic Bright's disease. Kidney affection rarely is the direct cause of death in any case. When the urine is very scanty, and the amount of albumen large, the danger is great, but this usually occurs in malignant cases, and the uræmia only adds to the already poisoned condition of the blood, and may not be the sole cause of the fatal termination. The occurrence of albuminuria in this disease is directly favoured by the morbid condition of the blood, and in many cases is due to passive

congestion and simple transudation, the result of septic irritation. The fact that it is so readily recovered from, in most cases, shows that the kidney condition has not passed the congestive stage; yet not unfrequently parenchymatous nephritis results, as evidenced by the presence of altered epithelial cells, blood elements, and tube-casts in the urine.

Nervous System.—The action of the diphtheritic poison on the nervous system is evidenced in many ways, and should never be lost sight of by the physician who hopes successfully to pilot his patient to recovery. The toxic effects of the poison on the nervous system are manifested by the profound depression of vital power which exists in most cases. This is especially evident in the *circulatory and respiratory systems*. The heart's action is often laboured and irregular, and there is a tendency to syncope. Similar effects may be observed in the respiratory system, in varying degrees of weakness or paresis of the respiratory muscles, as evidenced by irregular or shallow breathing, and inequality in the action of the muscles in different sides of the chest, or of the diaphragm. The symptoms of cardio-pulmonary paresis may manifest themselves at any period of the fever, more commonly, especially in the case of the heart, at an advanced stage of the disease, when convalescence is apparently beginning. In such circumstances, the symptoms may come in a sudden and acute manner, the pulse becoming either slow or abnormally quick, and the respiration feeble, with more or less cyanosis. In many cases a speedily fatal result ensues. In no other fever is cardio-pulmonary paralysis so apt to occur as in this, and the possibility should never be absent from the mind of the watchful physician. The cause of the paralysis has been much discussed. The question at issue is whether the poison itself, acting directly on the central nervous system and on the cardiac plexuses, is sufficient to cause paresis, or whether its long-continued effect on the blood and heart muscle produces, either such grave blood changes as to interfere with the central circulation, or acute degenerative changes in the myocardium. The results of post mortem

examination show that, in some cases, acute degenerative changes in the heart muscle are observed, and in others acute endocarditis. In like manner, gross changes have been found in the central nervous system and roots of the spinal nerves. The anterior roots of the spinal nerves were found, in three cases examined by Gombault, in a state of granular degeneration and the cylinder of the nerves unduly swollen. The pneumogastrics were found healthy, and also the heart. Dr. J. L. Smith, in quoting this, remarks:—"The points of special interest in these (Gombault's) cases were the apparently healthy pneumogastrics, myocardium, and medulla, while the grey matter of the cord, which has no immediate nerve connection with the heart, showed marked degenerative changes." In a large proportion of cases an apparently healthy condition of the heart muscle, and nervous arrangements connected with it, is found, and serious symptoms referable to the nervous system, or even death, may ensue before any apparent change takes place in the heart or its nervous arrangements.

Muscular Paralysis, or *Diphtheritic Paralysis* ordinarily called, is usually a sequela rather than a complication of this disease, coming in, as a rule, during convalescence and often several weeks after the primary disease. The symptoms are usually observed in the palato-pharyngeal muscles, and are characterised by difficulty of swallowing and articulating. On examination, the soft palate, and sometimes to a greater or less extent the pharyngeal muscles, are found paralysed and irresponsive to reflex stimuli and insensitive to pain. The soft palate hangs as a motionless curtain, and allows the fluids during deglutition to regurgitate through the nose. The voice has a peculiar hushed and nasal twang. As a rule, the paralysis is limited as above noted, but any or many of the voluntary muscles of the body or limbs may be affected by motor and sensory paresis. This multiple paralysis may affect a hand or foot, or hands and feet, simultaneously or successively. The paralysis is often accompanied or pre-

ceded by prickling or numbness in the affected limb. The respiratory muscles, not unfrequently the diaphragm, may suffer. The muscles of the neck, and in some cases those of the eyeballs, may also be affected, causing strabismus and diplopia. Diphtheritic paralysis almost invariably gets well in periods varying from two or three weeks to several months, or even longer. The *reflexes* are always more or less affected, particularly the knee-jerk, which is diminished or abolished. The cutaneous reflexes are either normal or diminished, sometimes lost. The organic reflexes, other than the pharyngeal, are more rarely affected, yet incontinence of urine and fæces is sometimes present. The cause of muscular paralysis has received much attention at the hands of various pathologists. Trousseau, more of a clinician than a pathologist, believed the paralysis to be due to poisoning of the system. Charcot, Vulpian, Dejerine, and many other pathologists, have made careful examination, not only of the brain and spinal, but of the peripheral nerves supplying the affected muscles, with the result that in some cases degenerative changes have been found in the nerves (peripheral neuritis), and also in the grey substance of the cord, the white substance being almost invariably found healthy. Dr. Greaves, of Liverpool, made careful examination of the cord in a well-marked case of paralysis in a child, and found extensive softening of the grey matter. The present state of pathological opinion seems to show that the paralysis is associated in many cases with central degenerative lesions or peripheral affections of nerves, but in others no such diseased condition can be made out, showing apparently that paralysis can and does occur independently of central or peripheral lesion, the belief being that the poison produced by microbic action is sufficient, by its toxic effects, directly to cause functional muscular paralysis.

PROGNOSIS AND MODE OF TERMINATION.—From what has been said regarding the clinical features and their variations, and the differences in type and severity of the disease, it is

evident that the prognosis must depend on the nature and extent of the disease in any given case. In mild cases, where the local affection is limited to the pharynx and does not extend to the larynx and bronchi or nares, the prognosis is favourable. In any case it should be guarded, until all the membrane has cleared off. The possible supervention of paralysis in mild cases should be borne in mind, although the ultimate prognosis is generally favourable. In severe malignant cases the future is always doubtful, and any definite opinion should be delayed until convalescence is well established, and the risks of septic poisoning or local complications have passed. The most dangerous cases in children are those in which the larynx is affected. A large proportion are fatal, not so much on account of the laryngeal affection itself, which may be relieved by intubation, or tracheotomy, but on account of the extension of the disease into the further respiratory tract, causing tracheo-bronchitis or secondary pneumonia. The modes of death in this disease are various. Rarely does a fatal result accrue from asthenia or exhaustion alone.

Heart Failure, due directly to nerve paralysis or from fatty degeneration of the organ, may take place. The intensity of the diphtheritic poison, due to the rapid formation of ptomaines, or whatever the poison may be, is often the cause of death, and in these cases the fatal result occurs early in the disease.

Septic Poisoning from secondary infection of the system—the result of the absorption of putrid material from the sloughs—is a frequent cause of death, and in these cases, associated with it we have pneumonitis, pleuritis, or nephritis.

Laryngo-tracheo Bronchitis is one of the most common causes of death in children; the respiratory tubes becoming gradually blocked, causing pulmonary congestion and death by asphyxia. *Uræmic Poisoning*—the result of nephritis—is more rarely but surely a cause of death in some cases.

DIAGNOSIS is rarely doubtful, except in mild cases, when some difference of opinion may be possible as between the

simple catarrhal or croupous varieties of sore throat. In doubtful cases time alone can enable the physician to give a definite opinion.

TREATMENT.—The disease being eminently contagious, isolation of the patient should always be resorted to if possible. The hygienic condition of the house and its surroundings should be investigated, and the room in which the patient has been attacked thoroughly ventilated, cleaned, and disinfected, the paint and floors being washed with a solution of carbolic acid in water, 1 to 40. Fumigation with sulphur should be carried out, or, better still, the mixture recommended by Dr. Elliot—one part each of carbolic acid and oil of Eucalyptus to eight parts of spirit of turpentine; one ounce of this is added to a quart of water, and kept boiling slowly in a pan by the aid of a spirit lamp in the centre of the room, the window and door being kept shut during the fumigation. The sick-room should be well ventilated, and the temperature maintained at a mean average. I always prefer to treat children in a tent cot in which wet cloths are medicated with Eucalyptus oil or other disinfectants. The steam kettle may be used, if preferred, with medicated vapour.

Constitutional Treatment should be conducted on the principle of giving nourishment freely in proportion to the digestive powers of the patient. Milk should not be given raw or by itself, but sterilised and mixed with one-third of lime water, or peptonised; strong soups and meat extracts are very serviceable, especially those of Brand and Valentine, or bovril. White of egg and brandy mixture is also an excellent nutrient. The various peptonised preparations and pre-digested food of all kinds are equally useful. When the patient is unable to take much food by the mouth, nutrient suppositories or enemata should be had recourse to. Stimulation is necessary in all but the mildest cases. Whisky or brandy well diluted should be given freely and frequently. There is probably no acute disease in which stimulants are more directly

serviceable than in this. Their good effects are probably due to their antiseptic properties and sustaining power on the heart. Caffeine is often a most useful stimulant. Digitalis is frequently required, sometimes at an early period in the case, as a rule later on. The drugs which have been recommended for internal administration are generally those of a tonic and antiseptic nature. The vegetable tonics, such as cinchona and quinine, are valuable as such, but do not seem to have any special controlling power over the disease. Iron has long been a favourite remedy, and still maintains its reputation in this respect. The preparation almost invariably in use is the tinct. ferri perchlor. It may be given alone or with quinine in glycerine and water. Five to ten minims, according to the age of the child, should be administered every hour or two hours. I believe the principle of administering this and other remedies in diphtheria should be by small and frequent doses. By this means the systemic effects of the drugs are more likely to be obtained speedily. Mercurial preparations in tonic and oft-repeated doses are in my opinion remedies on which much reliance may be placed. The liquor of the perchloride may be given itself in ten drop doses with glycerine and water every two hours, or with each dose may be combined three or four drops of dilute hydrochloric acid, and a quarter or half a grain of sulphate of quinine. One of the most useful mixtures I know of is ten drops of liq. hydrarg. perchlor., ten drops of the liq. ferri perchlor., half a drachm of glycerine, with water to two drachms or half an ounce. This should be given every hour or two hours, and continued steadily during the progress of the case, unless diarrhœa comes on, when the mercurial solution may be omitted. There are two other mixtures which are also in my experience most serviceable. Hyposulphite of sodium, three to five grains; solution of sulphurous acid, fifteen to twenty drops; glycerine, half a drachm; water to two or four drachms—given every hour or two hours. Sulpho-carbolate of sodium, three to four grains; glycerine of carbolic acid, five drops; water to two drachms or half an

ounce—every hour or two hours. Potassium chlorate is a remedy which has been long used in this disease almost as a matter of routine. For many years I have quite discarded it, as I have never been able to convince myself of its value. It is depressing and irritating to the kidneys, and its use I believe to be distinctly contra-indicated on this account. However good its effects may be in stomatitis, I have never found any good results from its administration in pharyngitis. Other remedies, such as turpentine and benzoate of sodium, have been strongly recommended. I have found it difficult to get children to take turpentine internally, but benzoate of sodium is well tolerated, and a remedy on which undoubted reliance may be placed. It is powerfully antiseptic, and no doubt exercises a useful local influence, when swallowed, on the false membrane.

Local Treatment is all-important but often difficult to carry out in the young child. In some cases it is necessary to desist altogether from it on account of the struggles of the child. Many children are so upset by the efforts at topical medication, as to refuse to take medicine or food by the mouth. Remedies may be applied by a brush or sponge, by insufflation or with an atomiser, or by gargle. If possible the false membrane should be removed and the application made directly to the diseased surface.

Insufflation.—In this way we may apply calomel one part, dried bicarbonate of soda three parts—an excellent application. Powdered boracic acid may be used alone. One part of iodoform, with four of powdered acacia, is useful when there is much foetor. The applications are readily made by the combined tongue depressor and insufflator.

Spray.—Lime water is a favourite remedy used in this way. I am doubtful of its value, having given it long and repeated trials. In the same way liquor pancreaticus or Condyl's fluid may be used. Hydronaphthol forms a very good antiseptic solution for spraying. A solution of one to two grains to the ounce may be used. Caldwell of Chicago recommends a mixture with papain—two drachms of papain with four grains

of hydronaphthol, and fifteen minims of dilute hydrochloric acid in four ounces of distilled water.

Gargles are not available in young children, but in older ones they should be used. Condyl's fluid, one part to eight, or a solution of sulphurous acid or chlorinated soda; or tinct. of iodine one part, glycerine two parts, water nine parts.

Local Application by Brush and Swabbing.—The most useful are glycerine of carbolic acid applied occasionally, or undiluted Condyl's fluid, or iodo-glycerine, made by dissolving ten grains of iodine and thirty grains of iodide of potassium in one ounce of glycerine. The iodo-glycerine or glycerine of carbolic acid are most useful applications, but can only be used at long intervals. Condyl's fluid should be used frequently. Boroglyceride is another valuable application, which should be used every hour or two. In the same way hyposulphite of soda, ten grains to the ounce, with five drachms of sulphurous acid, or solution of chlorinated soda, one part to fifteen of water. Careful attention to the nares is always necessary in diphtheria, washing out with Condyl's fluid 1 to 30, or saturated solution of boracic acid, or the chlorinated soda solution should be had recourse to, the solution being used warm. In one or other way a thorough antiseptis of the nasopharyngeal cavities should be maintained, the less irritating solution being used very frequently, with occasional application of the stronger remedies as circumstances may require. Such are the principles on which the local treatment must be carried out. In order to be successful it must be persistent and thorough.

CHAPTER VIII.

FEVERS—*continued.*

VARICELLA, OR CHICKEN-POX.

A MILD, febrile, and communicable disease, accompanied by an eruption on the body and scalp, more sparsely on face and limbs, of semi-transparent glabrous vesicles with red margins; seldom passing into suppuration, but bursting on the third day at their tips, and concreting into small puckered scabs, leaving no cicatrices. This disease has been long recognised as distinct, and was so described by Morton, and afterwards more fully by Fuller and Heberden. Some physicians, such as Heberden, considered it to be a mild variola, but few if any great authorities now maintain this view. During epidemics of small-pox the disease is apt to be confounded with varioloid. The evidence of the distinctive nature of the disease is based on the fact, that patients who have passed through the disease have subsequently and within a very short time suffered from variola. It is a non-inoculable disease. It occurs in persons who have not been vaccinated, and who have not had variola; consequently it cannot be considered as varioloid, either modified by vaccination or previous variola. Persons who have passed through the disease can be vaccinated with success soon after an attack, not so with variola. It is essentially a disease of childhood, adults being more rarely attacked.

SYMPTOMS are not well marked. Slight languor, sometimes headache. No, or at all events only slight, rise of temperature

as a rule. After such symptoms have manifested themselves for about twenty-four hours, the eruption appears first on the body and then on the face, scalp, and limbs. The vesicles are not indurated at the base as in variola. They are not umbilicated, and are irregular in shape and size. The inflammation surrounding them is superficial, and does not involve the subcutaneous tissues. The scabs soon become detached, and the little portion of epidermis destroyed is reproduced in a normal manner. When any mark is left after a varicellar spot, it is generally the result of scratching off the scab before healing has taken place. The incubation in this disease is somewhat variable, but usually from fourteen to sixteen days. It may be longer or shorter. Patients as a rule recover perfectly after varicella, but I have sometimes noticed persistent debility in delicate children. One healthy little boy I saw some years ago had a smart attack of this disease, and on the fourteenth day embolism of the common iliac artery on the left side caused the speedy death of the limb, the patient succumbing on the fifth day after its occurrence. Sometimes an irritable condition of the skin remains as a sequela. This has been specially noted by Mr. Hutchinson, who describes various rashes, chiefly of the lichenous and pruriginous varieties. The treatment only requires the patient to be kept in bed during the febrile stage and to the house till the scabs fall off, when all infection is considered at an end.

VARIOLA.

Small-pox in children, in its natural form, requires no special description. It is the same virulent and fatal disease in them as in adults, and they are equally susceptible of it.

Varioloid, or modified small-pox, is generally of a very mild type in children. It may or may not be accompanied by febrile symptoms; if so, the temperature shows a rise for from two to three days, then coming down to a normal level. The chief interest in the condition is its liability to be mistaken for

varicella. During epidemics of small-pox the presumption is in favour of the slight modified eruption being varioloid. In any case a careful scrutiny of the spots aids diagnosis.

In varicella, the spots, when seen at a very early stage, are erythematous, but very soon (within a few hours) become vesiculous, and dry up in three or four days with little crusts. They come out in successive crops, and are met with on head, trunk (more on back), face, limbs, and mucous surface of mouth. The temperature is sometimes hardly elevated, and if it shows any rise its type is indefinite. There are generally no premonitory symptoms. The incubating period is generally over a fortnight, but not so long as three weeks.

In varioloid there may be little or no constitutional symptoms, but as a rule there is more or less head and back ache for two or three days, sometimes vomiting, delirium, or convulsions. The temperature rises suddenly to 103° or 104° , and after the eruption comes fully out there is a sudden fall. There is rarely any secondary fever. The eruption is different from varicella. It is papular from the first, and appears chiefly on the face, arms and legs, body and palate, little or none on the scalp. The papules soon ripen into umbilicated vesicles, and then into pustules at the end of a week. Sometimes they do not reach the pustular stage, but rapidly dry up into scabs. The incubating period is from ten to twelve days. Little treatment is required except isolation of the patient and disinfection.

VACCINIA.

The operation of vaccination is generally performed about the age of three months in England and four or five months in Scotland. The child should be in good health, otherwise it ought to be delayed. Care should be taken in the selection of lymph, whether it be taken from the calf or infant. Antiseptic precautions should be used, as in any other surgical operation, both by cleansing the skin and instruments. The majority of children pass through the disease with mild

constitutional disturbance, in exceptional cases it may be severe. Unfortunately, now and again we meet with troublesome, maybe dangerous, sequelæ after vaccination. Erysipelas is the most serious of these. It may come on about the time of the maturation of the vesicles, or soon after, and may give rise to serious constitutional disturbance, and not unfrequently may end fatally. Erythematous rashes are not uncommon, but generally unattended by danger. *Secondary vesicles* or *pustules* on the affected limb often show themselves, but seldom give rise to much trouble. *Glandular buboes* are sometimes met with in the axilla, neck, or supra-clavicular region. They may suppurate or remain chronically enlarged. Sometimes *superficial abscesses* form over different parts of the body within a few weeks after vaccination, most frequently in scrofulous children.

ERYSIPELAS.

The occurrence of erysipelas after vaccinia, already alluded to, occurs chiefly in infants, more rarely in older children. Infants after birth, exposed to unfavourable hygienic conditions, are liable to be attacked by it, and it is under these circumstances a very fatal disease. Formerly it used to be frequently met with in lying-in hospitals, before antiseptic precautions were adopted, in lying-in women, often during epidemics of puerperal fever. The presence of a wound of however slight a nature renders infants very liable to it, under predisposing causes. Even after burns or the application of blisters, or during the progress of skin eruptions, it may attack the child. Whether the disease arises idiopathically or from traumatic causes the prognosis is always doubtful, frequently grave, and more serious the younger the child.

Treatment must be carried out on general principles. Careful feeding of the child is the main necessity. Iron in the form of the liq. ferri perchlor. may be given in small doses, or sodium sulphr. carbolate.

CHAPTER IX.

FEVERS—*continued*.

EPIDEMIC CEREBRO-SPINAL MENINGITIS.

EPIDEMIC cerebro-spinal meningitis, or cerebro-spinal fever, is a disease sometimes sporadic, generally epidemic, probably of a septic character, and most commonly affecting young children. It belongs to the group of infectious diseases, but is very slightly if at all contagious, and is usually treated in the general wards of a hospital. In my practice I have not known a case of contagion. No doubt more than one case may be met with in the same family, but there is no evidence going to prove that communication takes place from one child to another, all the facts tending to show that when more than one case is met with in a family the disease has been produced, not by contagion, but probably by some common miasmatic cause existing in the house or locality. When the disease appears in a town or district, the cases are generally single and scattered over different parts of the community. Moreover, in cases occurring in the same family, they generally appear at irregular periods, a fact probably inconsistent with communicability. The fact that, as a rule, only single cases occur in a household, although the other children mingle freely with the patient without contracting the disease, points either to non-communicability or very slight contagiousness of the disease.

ETIOLOGY.—It is generally a primary disease, but well-marked cases are noted as having occurred secondarily after pneumonia, typhoid, and other acute febrile diseases. The disease shows

all the clinical features of an acute septic fever, and bears some resemblance, on the one hand, to pneumonia, and on the other to typhus fever. In the blood and tissues are almost invariably found micro-organisms, various forms of cocci and bacteria. Gaucher,¹ Fränkel, Leyden,² Eberth,³ Klebs,⁴ Weichselbaum,⁵ and many others, describe different kinds of organisms. Many of the cocci showed a striking resemblance to Friedlander's pneumo-coccus, and Baginsky of Berlin and other physicians have argued in favour of their probable identity. It has been noticed in certain epidemics that there has been a great prevalence of croupous pneumonia, which, in the light of Friedlander's observations on the microbes found in the blood and tissues, is of considerable interest. It cannot be said, however, that the combined occurrence is the rule, but rather the exception. Pneumonic fever is frequent, and indeed regular, in its visitations to this country. Cerebro-spinal fever, on the other hand, is not always epidemic, and met with at irregular intervals, so that a common epidemic causation cannot yet be said to have been proved. Weichselbaum, by injecting pure cultivations of the organisms found in this disease, produced, according to the place of the injection, in some cases croupous pneumonia, and in others cerebro-spinal meningitis. Like typhus fever, the disease occurs more frequently in the winter months, and would appear to be closely associated with over-crowding and bad hygienic conditions generally. It is thus more common among the families of the poor than the rich, and most frequent in children from one to five years old, but may occur in infants even a few months old. As age advances, susceptibility to the disease diminishes, adults, as compared with children, being rarely affected.

¹ *Gazette Med. de Paris*, No. 10, 1881.

² *Centralblatt f. Klin. Med.* p. 181, 1883.

³ *Deutsches Archiv f. Klin. Med.* xxviii., 1881.

⁴ *Archiv f. Exper. Pathol.* vol. iv., 1875.

⁵ *Fortschritte der Medicin*, 1887.

CLINICAL FEATURES.—The disease begins usually without premonition. Occasionally there is chilliness or slight languor for a day or two. The child is generally in good health before the attack. More frequently the symptoms begin at once with pain in the head, often in the frontal region, vomiting and convulsions, and these are quickly succeeded by painful stiffness of the neck from rigidity of the nuchal muscles, showing conclusively the nature of the disease, which soon undergoes further and well-marked development of symptoms. The headache becomes more severe. The patient cannot bear the slightest movement without pain, and whines and cries

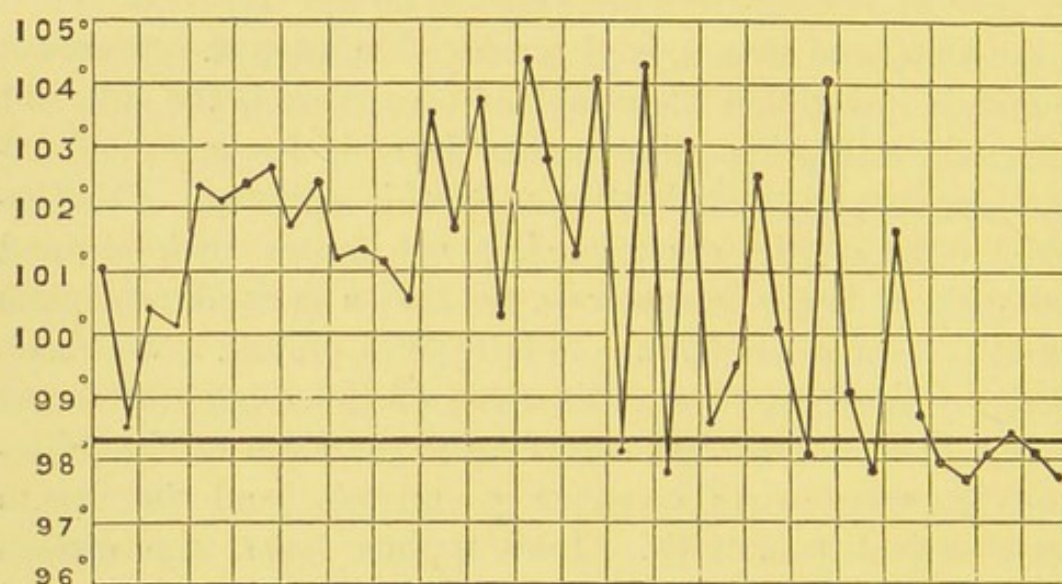


Chart 13.—Cerebro-Spinal Meningitis.

when disturbed, showing its agony by more or less facial distortion. Stupor soon comes on, but the child is sometimes easily roused, and when awakened up feels pain as acutely as ever. The tonic rigidity of the posterior neck muscles becomes more marked and persistent, and is the most characteristic feature of the disease. Besides the pain felt on movement, there is acute hyperæsthesia along the whole of the vertebral column, and often down the lower limbs. It seems probable that the visceral nerves in the abdomen partake of the general hyperæsthetic condition. There is usually photophobia and acute hearing, but it is not known whether the sensations of smell

and taste are affected. The facial muscles often show more or less tonic rigidity, so also those of the eyeballs (strabismus). The pupils are often unequal, generally dilated, and less responsive than natural. Oscillation may be present in some cases. As in other forms of meningitis, conjunctival congestion may be present with sticky secretion. Knapp describes a low form of inflammation of the eye itself. This may show itself as a "purulent form of choroiditis," the retinal appearance showing hyperæmic disc, which often gives rise to atrophy of the nerve and total blindness. In other cases corneal ulceration may occur, and inflammatory exudations take place, causing cloudiness of the deeper structures.

Otitis may occur, producing deafness, and is generally bilateral. There may be inflammatory exudation in the tympanic cavity, but rupture of the tympanic membrane and suppurative otitis is not of common occurrence. The inflammatory exudation is apt to affect the more delicate labyrinthine structures, in which case total or permanent deafness results. *Trismus* has been observed in some cases. The *decubitus* of the patient is highly characteristic. He lies on his back or side, with the head thrown backwards, the spine occasionally being arched forwards, and the thighs and legs flexed. *Motor paralysis* occurs sometimes, and is generally a late symptom, due, no doubt, to inflammation of the anterior cornua of the cord. *Speech* is often abolished. *Convulsions* of a clonic nature occur sometimes, and most frequently at an early period of the disease, and indicate general gravity of the case. Less frequently *choreiform movements* are observed. *Drowsiness* or *semi-coma* are commonly present, as already stated, but the patient can be roused, and in a later stage of the disease he often becomes more sensible. The *psychic condition* is noteworthy. All the grades of altered consciousness are met with, from delirium to coma. The patient is generally apathetic, sometimes irritable or even hysterical, does not distinguish between one person and another, and is often very restless in bed. Apart from

the special neuro-muscular symptoms, the general condition of the child otherwise is noteworthy, the type of the fever being of a low typhoid character. The pulse is usually quick, but its frequency often variable. It may be very rapid, or only slightly increased in frequency. The temperature likewise exhibits great variations. The skin temperature is generally low—either normal or sub-normal; that in the rectum of the same patient often shows a high record. In cases pursuing a rapid course, with very acute inflammatory symptoms, the thermometer shows a persistent high range. In average cases it generally ranges from 100° to 104° during the first week or ten days, tending to drop to normal or sub-normal as the case advances to the stage of emaciation and prostration of vital power. The *digestive system* shows anorexia and vomiting, especially in the earlier periods. Thirst is generally present, and also constipation. The tongue is slightly furred and generally moist. Parched tongue and sordid lips are less common. Deglutition is sometimes difficult. The *respiration* is not, as a rule, specially affected. It may be somewhat accelerated, but is seldom irregular or sighing, except in some cases at an advanced stage.

Some form of *cutaneous eruption* is generally present, especially during the acute stage. It may be of a herpetic character, and if so is generally confined to the lips, face, or neck. The site of the group of vesicles often corresponds to the distribution of branches of the fifth nerve. On the body a faint typhus-like rash is sometimes present, and may be of a petechial character, in which case the spots are often large and patchy. Simple erythematous or urticarious rashes may also be present. They vary very much both in character, time of appearance, and duration, in different epidemics. Dr. Lewis Smith describes "papilliform elevations of the skin, due to contraction of the muscular fibres of the skin," like goose-skin. The general colour of the skin of the face is pale, although occasionally there may be flushing. As

in other cerebral inflammations, the *tache cerebrale* is often well marked.

The *urine* is not diminished,—often increased to such an extent as to constitute polyuria, no doubt due to central nerve irritation. Albuminuria has been noticed in some cases ; also phosphaturia.

Complications. — Arthritic complications are sometimes noticed. In one case under my care some years ago, the child suffered from acute arthritis in both ankles and one wrist, which continued for about three weeks. On the disappearance of the joint affections, multiple areolar abscesses occurred on both arms and on several fingers. The child was ill altogether nearly three months, and was much wasted, but ultimately recovered. Heubner makes special reference to these joint affections. He found in many cases polyarthritis, and that most frequently the wrists were affected with the sero-fibrinous inflammation. Chest complications may be met with, more particularly broncho-pneumonia and pleurisy, more rarely pericarditis or endocarditis. Nephritis is not common, but transient albuminuria may be present. Serious sequelæ often follow this disease. Blindness or deafness have already been alluded to. Diminished intelligence, or even idiocy or general mental feebleness, may occur. Muscular paralysis of certain muscles or groups of muscles are also enumerated, as also local paralysis of nerves.

MORBID ANATOMY.—On account of the large mortality in this disease, the post mortem changes have been carefully noted. The essential lesions are inflammation, more or less marked, of the cerebro-spinal meninges, and, in addition, all those pathological changes may be present in organs and tissues met with in other acute infectious diseases. Both at the base and on the convexity of the *brain* are found evidences of inflammation. The *dura* is often inflamed and shows numerous extravasations. The convolutions are frequently flattened. The *pia* is much congested, often rough and thickened with serous or sero-purulent exudation in its

meshes. The brain substance is generally softened, and on section the puncta cruenta are well marked. The ventricles usually contain similar exudation to that found in the sub-arachnoid space. The *spinal membranes* show the same changes as those in the brain—injection, blood extravasations, and serous or sero-purulent exudations. The fibrinous lymph often forms bands in the meshes of the pia mater. In the blood the fibrin, according to Loomis,¹ is deficient. Lewis Smith says it is increased in cases not speedily fatal. On all hands, and at different periods of the disease, its amount seems to vary. The white corpuscles are somewhat increased, and the red ones irregular in shape and often shrivelled. The blood itself is invariably dark in colour. The *internal organs* show the results of altered blood conditions in congestion of the lungs, or œdema, or a low form of pneumonia. The liver and kidneys are also congested and affected with “cloudy swelling.” The spleen is generally large and softened. The serous membranes show extravasations or inflammatory exudations.

PROGNOSIS.—It is always a serious disease, and the prognosis must be guarded. The mortality in different epidemics seems to vary from seventy-five to eighty per cent., sometimes it may be as low as forty per cent. Of fifty-two cases recorded by Lewis Smith in 1872, one half recovered, but convalescence was very slow and protracted. The most serious symptoms come on during the first week or ten days, and if the case does not assume a grave form during the second week there is a greater likelihood of recovery, most fatal cases occurring during this period. The younger the child, as a rule, the less favourable is the prognosis. The most unfavourable symptoms are—low type of fever with rapid and intermittent pulse, acute hyperæsthesia with immobility of the pupils and general prostration, vomiting of a persistent nature, and interference with the function of deglutition. On the other hand, when from the beginning the symptoms are of a milder type, less hyperæsthesia and muscular spasm and vomiting, and the patient is able to take

¹ *Practice of Medicine*, p. 685.

a fair amount of nourishment, a more favourable view may be taken of the case. The absence of complications will, of course, be of good augury. Should lung or kidney or other secondary affections come on, the prognosis is grave.

DIAGNOSIS.—The sudden onset in a child previously in good health, the disease being generally epidemic, is always sufficient to lead the experienced physician to suspect its presence, even before the more characteristic symptoms have shown themselves. From *tubercular* and *simple meningitis* it may be differentiated by the sudden onset of symptoms, with the absence of primary signs or indications of brain disease, such as pertous caries, or tubercular affection of other organs. In these cases the onset and progress of the disease is much more gradual, and the general course and development of symptoms slower. The hyperæsthesia and nuchal spasm generally appear in cerebro-spinal disease within forty-eight hours. In simple or tubercular meningitis these symptoms are only exceptionally present, and if so, they come on at a later period and are less severe. *Typhus* or other *continued fevers* can only be mistaken for this disease before the characteristic signs of meningeal affection manifest themselves, and in these diseases there is an absence of muscular rigidity. The dull and stupid-looking typhus patient presents a contrast to the hyperæsthetic and sensitive cerebro-spinal sufferer. In typhus there may be headache in the early days, but this soon gives place to delirium. There is rarely vomiting and no photophobia. The eruption in typhus is characteristic and undergoes regular development. *Scarlatina*, from its sudden invasion with vomiting and occasionally convulsions and stupor, has been at first mistaken for this disease; the appearance of rash and sore throat, however, soon render the diagnosis clear. *Pneumonic fever* can rarely be confounded with it, except when ushered in by vomiting, convulsions, or delirium, but the further progress of the case and the development of lung signs soon reveals the true nature of the disease.

TREATMENT.—When the disease breaks out in a locality,

strict attention should be paid to hygienic measures. House-to-house inspection should be ordered, and means adopted to enforce thorough sanitation. As regards the patient, he should either be removed to hospital or placed in a well-ventilated room in a healthy house. Treatment should at once be directed to control, if possible, the inflammation of the cerebro-spinal meninges. The local measures that may be had recourse to are ice-bags to the spine and head, or counter-irritation by blisters. The practice of abstraction of blood by venesection, or locally, is now generally discarded, although in individual cases it may occasionally be of service, especially one or two leeches to the head in the early stage of the disease in cases presenting sthenic symptoms. As the disease is generally of an opposite type, however, even moderate local abstraction is rarely advisable. Sinapisms or terebinthinate epithems along the spine are often of great service, and should generally be tried before vesicants are used. The feeding should be carefully regulated—light, easily-digested nourishment, milk diluted with barley water or peptonised, soups or beef extracts; solid food can rarely be digested. Nutrient enemata should be given if there is any difficulty in feeding by the mouth. Medicinal treatment must be directed to soothe and allay nerve irritation and tendency to convulsions, and diminish the congestion of the spinal meninges. Ergot of rye is a most useful drug in controlling the capillary congestion, and is almost universally approved of by physicians. It should be given persistently during the acute stage. Other drugs are potassium bromide, which is even more serviceable than ergot, on account of its double action in controlling the capillary circulation and irritability of the spinal cord. It should be given in five or six grain doses to a child of four or five, every hour or two hours; and sometimes relieves in a most satisfactory manner muscular spasm and wards off convulsive seizures. Antipyrin is a drug now much recommended. It may be administered alone or with bromide, and is specially useful

when the temperature is high and headache severe in the acute and early stages of the disease. When there is great restlessness an occasional dose of chloral hydrate is often beneficial. Many physicians speak highly of morphia in similar circumstances, and in spite of the theoretical objection to the use of this drug in cerebral inflammation, as tending to produce stupor and increase congestion, I am satisfied of the good effects of it in some cases, however it may be explained. Since the advent of the era of antiseptic treatment, the class of antiseptic remedies have been tried. The sulpho-carbolate of hyposulphite of sodium are both drugs worthy of trial. I have used with apparent benefit in several cases in which recovery took place hourly or two hourly doses of a mixture of liq. ferri perchlor. and liq. hydrarg. perchlor., five minims of each with half a drachm of glycerine to two drachms of water. At a later stage of the disease the cautious use of iodide of potassium, combined with tonics, especially quinine, is indicated. During later convalescence citrate of iron and quinine, or iron wine and cod-liver oil, may be ordered.

CHAPTER X.

FEVERS—*continued.*

PERTUSSIS.

WHOOPING-COUGH is an infectious disease of childhood, sometimes occurring in adult life. The characteristic feature of the disease is paroxysmal and convulsive cough, consisting of a rapid succession of expiratory efforts, succeeded by a long inspiration, which is often accompanied by a sonorous or whooping sound. In mild cases, where the expiratory efforts are neither severe nor prolonged, the succeeding inspiration is unaccompanied by any noise. In young infants, the whoop is seldom met with. Vomiting often occurs at the conclusion of the cough, which is equally troublesome at night and during the day, waking up the patient, who soon falls over to sleep again. The disease is accompanied by more or less catarrh of the respiratory mucous membrane, the secretion of which is increased and loaded with micro-organisms of various kinds. The nasal and conjunctival mucous surfaces are generally in a more or less catarrhal condition. The state of the nasal membrane and pharynx is often overlooked in this disease, although more attention has been directed to them in recent years. The lower portion of the nasal cavity, often called the lower or "respiratory tract," in contradistinction to the upper or olfactory tract, is generally in a state of irritative catarrh. The mucous surface here is the most sensitive in the whole respiratory track, and contains erectile tissue

in the region of the lower turbinated bodies and septum. Any irritation in this situation would seem to be a potent factor in the production of cough, which may often be relieved by remedies applied to this portion of the mucous surface.

The disease is almost invariably epidemic, although sporadic cases occur. The severity of the symptoms vary in individual cases according to the constitutional peculiarities of the child, especially of its nervous system. The *initial symptoms* are essentially those of catarrh, accompanied by more or less languor, the cough gradually assuming its characteristic features. The full development may be rapid, even within a few days, or two or three weeks may elapse before the acme is reached. The disease now enters on what is called the *convulsive or nervous stage*, which varies infinitely in duration, and is followed by the period of *decline*, when the cough becomes less frequent and the secretion of mucus less copious and viscid. In London, according to Dr. West, pertussis ranks fourth among the causes of death in children under five years of age, sixty-eight per cent. of the deaths which it occasions, taking place in those under two years of age. In delicate children it is one of the most serious diseases we can encounter. The younger the child the more grave are likely to be the consequences. It is noted, however, as a not infrequent exception to this rule, that suckling infants before the dentitional period escape with a mild attack. It is during the period of the first dentition, when so much physiological activity especially of the nervous system is manifested, that the disease is apt to be attended with serious complications. It has no pathological anatomy peculiar to itself, apart from those changes which take place in internal organs, the result of complications, which are not an essential part of the disease.

ETIOLOGY.—The exact nature of the morbid poison is not yet known, but it is universally admitted to be highly infectious, and that its energy is concentrated on the respiratory system and the nervous apparatus connected with it.

In its course it obeys the laws of other contagious diseases—such as measles, scarlatina, or splenic fever—in manifesting a period of invasion, of full development and decline, thus running a regular course, though of varying duration. It rarely attacks the individual a second time. The poison may be disseminated by fomites, or directly from patient to patient by the exhalations, or indirectly through the atmosphere in various ways. It seems probable that the expectorated or vomited matters, when allowed to remain about the room or on the street in public places, become dried up, and the poisonous principle, yet retaining its vitality, invades the atmosphere. The infecting area must be large, as it is almost impossible to prevent the spread of the disease in congregations of children. M. Bouchut mentions an instance of the infectious nature of the disease in one family. A child while in the country contracted it by playing in the open air with the gardener's children, and successively transmitted it to his brother and sister. The mother also contracted the disease, and likewise the father and several of the servants in the house. In and around the house those who did not directly communicate with those suffering were exempt. In this era of micro-organisms pathologists are diligently trying to find out a specific microbe in this disease. The older theories in regard to it were numerous. Thus Hoffman, Leberstein, Pinel, Foot, and Gibb considered it a purely nervous affection. Copeland thought the medulla oblongata in connection with the vagi nerves was the seat of the disease. Broussais considered the stomach and lungs chiefly at fault. Lænnec believed it to be a peculiar form of bronchitis, inducing respiratory spasms through the cephalic centres. Linnæus fancied it was caused by insects, and, strange to say, this theory, more closely than any of the others, approaches the views prevalent at present on the subject. The poison attacks the respiratory mucous surface, inducing more or less catarrh of a specific nature, and the secretions form a nidus for various micro-organisms. The poison does not appear

to reside solely in the bronchial secretions, but apparently circulates in the blood, the most convincing proof of this being the fact that children are sometimes born with the disease. Thus Keating relates the case of woman, eight months pregnant, who had two children suffering from it in an acute form. A few weeks before delivery, her foetus became very active and spasmodic in its movements, and after birth the child was found to be suffering from the disease. There can be no doubt, however, that the poison largely resides in the secretions of the respiratory passages. Dolan has produced whooping-cough in the lower animals, by injecting nasal secretions from the human subject, and Letzerich has obtained similar results. Poulet and Letzerich first followed up the theory of Linnæus, who thought the organisms were of animal origin (*infusoria*), and proved them to belong to the vegetable kingdom (*schizomycetes*). Since then, in 1867, numerous observers have described organisms as specially characteristic of the disease. Afanassieff has described a bacillus which he considers specific, so also Burger of Bonn, who says the organisms are small elliptical bodies of unequal length, the smallest being twice as long as broad. They form chains and groups, and bear a resemblance to the spores of the leptothrix buccalis, which are also present in whooping-cough sputa, but are larger and always show the mature filiform leptothrix. The specific bacillus he finds invades the mucous corpuscles. It is easily cultivated, and he believes it to be the specific organism of the disease. Dolan, in experimenting with the fluids and secretions of the body, only got positive results from the respiratory mucous secretions. He failed to find any organisms in the blood. According to the present state of our knowledge of the pathology of this disease, we have to do with two main elements—a specific poison which after a period of incubation, varying from seven to fourteen days, determines to the respiratory mucous membrane, inducing more or less catarrh of a specific nature, associated with which, whether they be the primary cause

or not, are various forms of schizomycetes, which grow rapidly, on the surface and in the epithelium. The other factor is the hyper-sensitiveness of the nerve elements, especially connected with the vagus system.

CLINICAL FEATURES AND COMPLICATIONS.—In auscultating the chest in uncomplicated cases we find all the signs of bronchial catarrh of the larger tubes—scattered, dry, and moist sounds generally over the chest. These vary according to the amount of catarrh and secretion in the tubes. The percussion is everywhere resonant.

Digestive System.—Ulceration of frenum linguæ is present in a large proportion of cases of any degree of severity. It is only met with in children who have cut the lower incisor teeth, and seems to be directly due to the forcible pushing forwards, during the paroxysm of cough, of the tongue, stretching the frenum, or bringing it in contact with the edge of the teeth. The tongue is usually more or less coated with a whitish fur, and the mucous secretions of the buccal cavity are increased and of a glairy character, giving the tongue a slimy appearance. It is probable that this condition of the mouth is not purely local, but that the stomach is in a similar state of more or less irritative catarrh with increased mucous secretion. This may extend to the intestines, giving rise to disordered intestinal secretions. According to Eustace Smith, a chronic derangement of the stomach and bowels often remains, or is set up during convalescence, and to this he has given the name of “mucous disease.” It is associated with languor and debility on the part of the child, fretfulness and irritability, constipation, and the discharge of considerable quantities of mucus along with the excreta.

Debility is often excessive after prolonged attacks, and there is generally considerable emaciation, no doubt the result of mal-nutrition from disturbed sleep, and deficient amount of nutriment from vomiting of the food and gastro-intestinal disorder, accompanied by imperfect digestion and assimilation.

Nervous System.—The chief complications are convulsions and laryngismus stridulus, or severe spasms of the laryngeal and bronchial muscles, sometimes immediately endangering the child's life. Convulsions are generally, although not always, of serious import, and when there is no other complication, either pulmonary or intestinal, and they are caused by defective aeration of the blood, and their occurrence is infrequent and duration short, no evil results ensue. When, on the other hand, they are frequent and of long duration, and pulmonary complication is present, cerebral congestion, with effusion or thrombosis of the sinuses, is apt to occur, and lead to a fatal termination. Glottic and bronchial spasm of a prolonged nature are not usually such a serious complication as general convulsions. In these cases the cough, instead of ending speedily in a whoop, produces tonic spasm of the bronchial and laryngeal muscles, the breathing stops, the patient becomes livid, the eyes stare, and asphyxia seems imminent. When the respiration becomes re-established, the child remains in a state of more or less stupor for a time, but gradually recovers. In rickety children convulsions are common, and are more readily excited by trivial causes.

Pulmonary complications are the most common and important of this disease.

Collapse of the Lung is a condition probably never absent, to a greater or lesser extent. All the conditions necessary for its production are present—bronchial catarrh, excessive force of the expiratory effort, diminished and obstructed inspiratory power. If the atelectic areas are small in number and extent, little inconvenience ensues, but when large portions of the lung are involved, and extensive bronchitis and pneumonia are present, the complication becomes serious.

Bronchitis and Pneumonia.—The extension of the catarrhal condition of the respiratory mucous surface to the smaller tubes and pulmonary alveoli is one of the most frequent and serious results of this disease. It is attended by the usual

physical signs of capillary bronchitis—crackling râles heard all over the chest, especially over the back and at the bases of the lungs. When pneumonia comes on, the character of the cough becomes altered and the whoop ceases. The physical signs of localised pneumonic areas become apparent—altered percussion resonance, with broncho-vesicular breathing and increase of the voice resonance, perverted pulse respiration ratio, and high temperature.

Hæmorrhages.—These may take place as a result of local congestions in various parts of the body, associated with interference with the respiration and circulation during the paroxysms of coughing. Epistaxis is not uncommon. Sub-conjunctival hæmorrhages also occur. Capillary hæmorrhages may take place in the brain, giving rise to localised cerebral symptoms and paralysis. Hæmorrhage from the external auditory meatus has also been known to take place.

Tuberculosis is a common though more remote sequela of pertussis. The general ill-health and depraved nutrition following this disease appears to render children liable to tubercular infection. It seems probable that this is often brought about through the bronchial adenopathy which is so commonly associated with the long-continued irritation of the bronchial mucous surface. The tubercular virus, finding a suitable nidus in the diseased respiratory mucous surface, gains exit to the enlarged lymph glands through their vessels, and there sets up the usual degenerative changes associated with this disease, and sooner or later the child suffers from general tubercular infection, and dies from pulmonary mischief or meningitis. I have rarely, if ever, seen a post mortem examination of a child dying from whooping-cough, without hyperplasia, or caseous degeneration of the bronchial and sometimes of the mesenteric glands.

DIAGNOSIS.—When the spasmodic stage is not well marked, and the whoop indistinct or absent, there may be some difficulty. If the disease is epidemic, and there are other cases in the house or neighbourhood, a positive diagnosis is probable. The

conditions which may simulate it are bronchitis with spasmodic cough, enlarged bronchial glands with spasmodic cough, reflex spasmodic cough during dentition or from worms or gastrointestinal irritation.

TREATMENT.—Pertussis is one of those diseases in which the remedies recommended are so numerous as to perplex the student who for the first time is called upon to treat it. The *à priori* assumption, which is only too well borne out by fact, is, that no remedy has been yet discovered which exercises great control over the course of the disease. In recent years, since some advances have been made in regard to its pathology, there seems to be a more general agreement as to the lines on which we should go in carrying out a rational treatment. It is essential to remember that we are dealing with an acute, specific febrile affection, running a course varying from three or four to six or eight weeks, and that our treatment must be directed in principle to guiding our patient through it as safely as possible, trying to limit its duration and ward off complications. In the light of recent pathology—antisepsis, and the control of nerve irritation, followed by tonics, indicate in a general way what I conceive to be rational principles of treatment.

Prophylaxis is important. When one child in a family is attacked it should be isolated, if possible. The general health of the other children should be looked to, especially as regards hygiene. The house, and specially the bedrooms, should be freely ventilated and fumigated every day with sulphur or eucalyptus. Sulpho-carbolate of sodium, in from five to ten grain doses, may be administered to the other children, freely diluted in water, three or four times a day, for a fortnight, which is probably the longest period of incubation.

Curative treatment must be directed to allaying and modifying the irritability of the respiratory mucous surface, soothing the reflex excitability of the nerve respiratory apparatus, and endeavouring by all possible means to ward off complications. During the catarrhal stage it may be necessary, but not always

desirable, to keep the patient in bed. He may be allowed his liberty in the nursery, unless he has a high temperature and much bronchial catarrh. The room should be well ventilated and of mean temperature, and the vapours of pumiline, eucalyptus, or other antiseptic, should be diffused constantly through it. If it is convenient to take the patient into an adjoining room before bed-time, all the better. This will admit of fumigation with sulphur, and subsequent ventilation. I generally prescribe, if necessary, an aperient, in some cases an emetic if the tongue is loaded and expectoration difficult. A mixture similar to one or other of the following should then be prescribed :—

R Sodæ benzoatis ʒss, succus hyoseyam. ʒij, sodæ bicarbonatis ʒi, glycerini ʒvi, aq. menth. pip. ad ʒiiij.—ʒij every four hours waking.

R Liq. acet. ammon. ʒvi, succus conii ʒij, potass. bicarb. ʒi, glycerini ʒvi, aquam ad ʒiiij.—ʒij every four hours.

R Potass. bromidi ʒi, glycerini boracis ʒss, succus belladonnæ ʒiss, aquam chloroformi ad ʒiiij.—ʒi to ʒij every three or four hours.

When the convulsive stage becomes developed, sedative and antiseptic remedies should be pushed to the full extent. The best sedative is belladonna, given till the full physiological effects are produced, when its administration should be intermitted. This drug has stood the test of time, and is second to none in its sedative effects on the terminal branches of the vagus system. When belladonna fails, opium or morphia should be tried, and their effects carefully watched. Although they are not so generally useful, they seem often to do good in my experience in those cases where belladonna fails. Occasionally, in intractable cases, I have found good effects from the combined administration of the drugs. For a child five years old, eight minims of belladonna juice, with two minims of Battley's sedative liquor, with half a drachm of glycerine and an equal quantity of water, may be given every

four or five hours till the sedative effect is produced. Dr. Eustace Smith recommends strongly the use of atropia and sulphate of zinc, one-sixth of a grain of, along with half a drop of sol. of atropia (B.P.), given at first twice a day and afterwards three times, and the doses gradually increased. Conium is a drug of undoubted service in some cases. It seems most useful in the catarrhal stages, along with alkaline salts or bromide of potassium. In my hands hyoseyamus has not proved of so much service as conium, but some physicians strongly recommend it. Alum is a very old remedy in this disease. It seems to have a useful astringent effect on the respiratory mucous surface, but I have not found it so serviceable as the alkaline carbonates in its effects on the mucous secretions. Chloral hydrate and also Butyl chloral are found to be good in special cases, but in my experience are not generally useful. Sonnenberger strongly recommends antipyrin, in doses of one to three grains every four to six hours. It is decidedly useful in some cases, modifying the severity and reducing the number of the paroxysms, especially at night.

Antiseptic remedies undoubtedly afford great relief in the spasmodic stage, but their use must be persistent and continuous in order to obtain good results. The drugs may be applied in various ways—by irrigation, insufflation, or inhalation. Irrigation is useful when there is much irritative nasal catarrh. It is important in all cases to note the condition of the nares, as often the catarrh seems to concentrate itself more in this situation than in the larynx and larger bronchi. The nasal mucous surface is extremely sensitive, and the reflex irritation produced is often greater than in other parts of the respiratory tract. The effects of local treatment by irrigation are often most satisfactory. The best irrigants are boracic acid in saturated solution, corrosive sublimate 1 in 6000, or sulphate of iron one grain to the ounce. Iodoform, sulphate of quinine, boracic acid, or biborate of soda, or tannin, have all been used by insufflation. Inhalation may be used in steam vapour, or

atomised in a vaporiser, or dropped on a respiratory inhaler (the simple and cheap perforated zinc ones are the best) and worn frequently during the day for half-an-hour at a time. In this way various drugs may be used. I think the sedative and antiseptic effects of eucalyptus are most valuable; five to ten drops should be put in the sponge and inhaled five or six times a day. Pumiline essence I have also used with benefit in the same way. Carbolic acid vaporised in a Savory and Moore's vaporiser is a valuable sedative antiseptic. Creseline used in the little vaporiser, which is sold for the purpose, is another remedy in favour with many physicians. Moncorvo recommends the topical application of sedatives to the larynx. In this way he uses a one per cent. solution of resorcin. The difficulty of using topical remedies to the larynx in young children renders their use in most cases inadvisable. In the form of spray, resorcin is often of service; so also is a one per cent. solution of hydrochlorate of cocaine. Inhalation of coal gas may be tried when other remedies fail. It cannot be used for a long period, but occasional inhalation often affords much relief to the paroxysmal cough. The only other remedy which I shall allude to is peroxide of hydrogen, administered internally. It deserves a more extended trial, as it undoubtedly seems to allay the force and frequency of the paroxysms. The solution (ten vols. strength) may be given in \mathfrak{zss} to \mathfrak{zj} doses, in half an ounce of water with a little glycerine, four to six times in twenty-four hours. The diet in pertussis requires attention. The child should be fed, if possible, after a fit of coughing, and not in too large quantities. Starchy and sweet articles should be avoided. Wheat meal, oat meal, or barley flour are better than arrowroot or corn flour. Milk is invaluable, but should be restricted in quantity according to the capabilities of the digestion. Lime water is always a useful addition. Beef-tea and light animal soups are useful. In older children the lighter animal foods may be given in moderate amount; chicken, fish, or rabbit once a day.

Complications must be treated on general principles, as they arise. Cerebral complications are the most difficult and dangerous to treat. Pulmonary affections are more amenable, and diarrhœa by careful dietetic and remedial agents can generally be controlled when treated early. I have not alluded to the effects of quinine, which is a most valuable drug during the paroxysmal stage and in convalescence. Given in two or three grain doses, morning and evening, especially in those cases where the fits of coughing come on with unvarying periodicity, it often disturbs their regularity and lessens their severity. During convalescence I generally give it in smaller or tonic doses of one half to one grain three or four times a day. Easton's syrup is a good convalescent tonic. Cod-liver oil and maltine, when the digestion allows, should be given regularly for months until the health is restored. When there is suspicion of bronchial glandular adenopathy, iodide of iron or iodide of potassium, given in one-half to one grain doses after food thrice daily, is of great value. For the same purpose the chloride of calcium is useful; in either case the cod-liver oil should be continued. As in measles so in this disease the child requires most watchful care during and after convalescence. Change of air is always beneficial at this time, and in summer at an earlier period of the disease.

CHAPTER XI.

FEVERS—*continued*.

CROUPOUS PNEUMONIA.

SYNONYMS. — *Pneumonic Fever* — *Pneumonia* — *Lobar Pneumonia*. — This disease occurs in children as in adults, and presents no marked difference in its clinical features. It may occur in epidemics or sporadically, and is generally believed to be infectious. It was formerly supposed to be rare in children, but it is now known to occur in early life, probably with as great frequency as in adults. Loomis, from a large number of statistics, concludes that it is "five times more frequent during the first two years of life than in the succeeding eighteen." In my experience it is more common in children, from three years onwards, than in the first two years of life. Of 124 cases given by Henoch, there were nineteen between one and a half and three years, thirty-two between three and six years, and thirty-seven between six and twelve years. It may occur in infants a few months old. I have met with it as early as five months. Clinically, the general features of the disease are those of an acute septic fever—sudden invasion, high fever, rapid crisis, with defervescence at the end of a week. The constitutional symptoms are often disproportionate to the local affection. A boy of six years, lately in hospital, was brought in on the third day of illness with a temperature of 104°, with little variation. Careful physical examination of the lungs on admission revealed nothing abnormal. In the evening an eruption of herpes labialis showed itself.

The following day the vesicles were well developed. His respiration ran up to 56, being only 36 on admission. There was no cough. At the base of the right lung the respiration was somewhat feebler than on the left side, still vesicular in character, and without accompaniment. The percussion note was somewhat high pitched. Next day, in the evening, the temperature fell to 100° , and the following morning was 98° . There was no further development of physical signs, except a few scattered subcrepitant râles heard at the right base, on the sixth and several subsequent days.

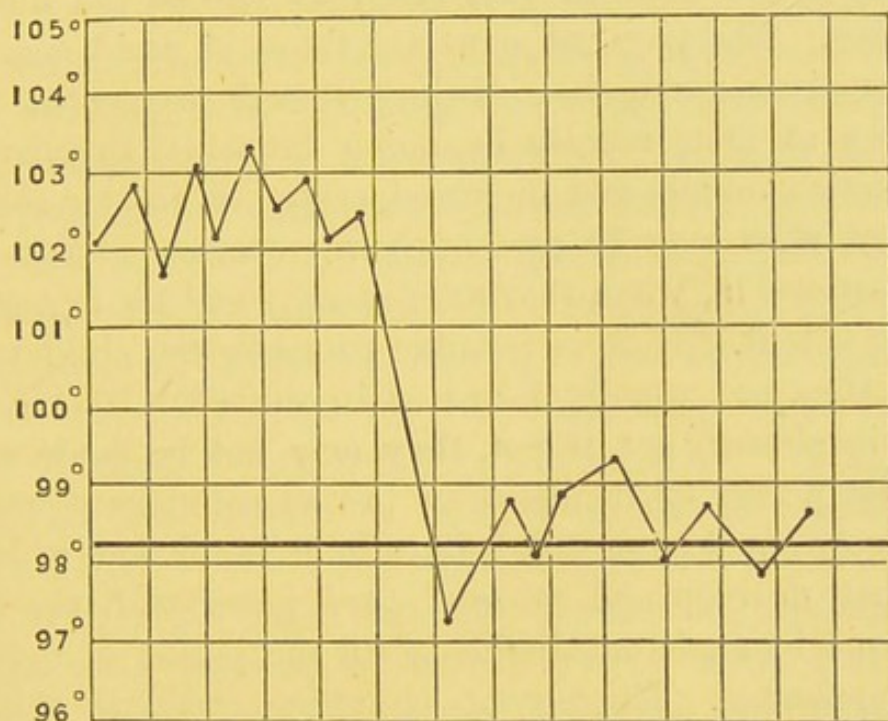


Chart 14.—Croupous Pneumonia—Recovery.

This case showed all the general symptoms of pneumonic fever, with almost entire absence of any lung signs other than those indicating congestion of the right base. In ordinary cases, where physical signs as well as symptoms are well marked, the clinical features are essentially the same as in the adult. The invasion is rapid, without any distinct rigor as in the adult, but more frequently vomiting, or more rarely an initial convulsion. The temperature runs up rapidly to its highest point, seldom less than 103° or 104° , sometimes higher ;

the respirations are much accelerated, out of proportion to the pulse. Cough, when present, is frequent and short, occasionally very infrequent, or almost entirely absent in some cases. Expectoration is seldom seen, except in older children. It is tenacious and not copious; sometimes, not always, rusty. The skin is dry, the face flushed, and the expression anxious. The child either lies on the affected side or more often on its back, and does not cry, being quite tolerant of physical examination. The tongue is coated with a yellowish-white fur; appetite is lost. The crisis takes place, with rapid defervescence, from the fifth to the seventh day, rarely as late as the ninth or tenth day. The physical signs are those of rapid consolidation, impaired percussion, distinct though somewhat harsh breathing at first, rapidly becoming bronchial in character, with friction sounds and increased crying or vocal resonance. Crepitant râles may be present, but are often absent until resolution sets in, when they are generally audible to a greater or lesser extent. If it is possible to make the child respire deeply, they are usually heard as in the adult at the close of the inspiratory act, if not, they may not be made out at all. The period of incidence of the auscultatory signs often varies, very much more so I believe in children than in adults. They may develop and proceed *pari passu* with the fever, or may not be made out distinctly till the period of defervescence approaches. The nervous symptoms, especially delirium, have been much discussed in children. Pain may be present, but delirium, although seldom absent altogether, is by no means a constant symptom. My experience leads me to believe the amount of delirium depends more upon the constitutional peculiarity of the child and the intensity of the blood depravity, than on the extent or locality of the lung lesion. I have not found it more frequent in apical than in basal consolidations. This leads me to refer to the localisation of the disease. Any part of the lung may be affected. The base, as in the adult, is the most frequent site; next, the apex; and, less frequently, mid lung. All statistics bring out

pretty much the same results. Goodhart gives 120 cases, fifty-one of the left base, thirty-four of the right base, seventeen of the left apex, eighteen of the right apex. Henoch's cases show—of 124 cases, forty of right lower lobe, forty-seven of the left lower lobe, twenty-six of the right upper lobe, five of the left upper lobe, three of both lower lobes, three of the whole right lung.

DIAGNOSIS.—In discussing broncho-pneumonia, I have alluded to the difficulty of diagnosis in lobar pneumonia, and also the question of the so-called "mixed forms." All recent writers on the pneumonia of childhood, such as Steiner and Steffen, Ziemssen, Ashby, Goodhart, and others, allude to the clinical difficulty of coming to a decided conclusion in many cases. Henoch¹ says: "Between well-marked cases of croupous lobar pneumonia on the one hand, and broncho-pneumonia on the other, there lies an intermediate form which cannot be diagnosed with certainty, clinically; and the question whether it is possible to differentiate the two forms of pneumonia from one another during life in every single case must therefore, in my opinion, be answered in the negative." Diagnosis is often rendered difficult by lateness or delay in appearance of physical signs. The history of the case and general type of fever, with rapid onset and high regular temperature, generally leads the physician to suspect the case to be of a croupous nature. Pleuritic effusion can rarely be confounded with pneumonic consolidation in the child, pleurisy being rarely an acute, more commonly a subacute or chronic disease. The absence of acute symptoms will generally be sufficient, yet, judging by physical signs alone, there may be an initial difficulty. The comparative loudness of the breathing and its bronchial character at the base of the lung in pleuritic effusions, is apt to mislead those unaccustomed to children, and a point shrewdly insisted on by Goodhart, that in these cases the breath-sounds at the apex are often of a decidedly bronchial character, might lead to the belief that an apex

¹ Sydenham Society's translation, by Dr. John Thomson.

consolidation existed. When seen at an early stage, pneumonic fever may with difficulty be distinguished from other acute diseases, such as scarlatina, typhus, or meningitis. In scarlatina, the appearance of the rash at the end of twenty-four hours, clears up the case. In typhus, the temperature does not rise so rapidly, although its type after it has risen is much the same. The farther progress of the case—the sordid tongue, and heavy look of the child, with suffused conjunctivæ and appearance of the dull measly rash before the end of the first week, will assure diagnosis. In cases where there is an initial convulsion, or well-marked delirium at an early stage, the possibility of meningitis should be borne in mind. The history of the case, the rarity of simple meningitis, the absence of otitis, or any other cause likely to give rise to it, should render the diagnosis of pneumonia more probable. In all cases at an early stage, unless physical signs are present, the expression of any decided opinion should be delayed. On the other hand, it may be laid down as a dictum that in young children, on the sudden onset of febrile symptoms of a certain type, the lungs should be carefully examined and the possibility of pneumonia suspected. Although there may be no physical signs, the general appearance of the child and the rapid, shallow respiration will often lead the experienced physician to feel tolerably certain of his diagnosis, although, at the time, he may not be warranted in expressing it. The diagnosis of croupous consolidation from lobar catarrhal consolidation (coalescence of the patches with splenization of large portions of the lung) cannot, as a rule, be made out physically. When the previous existence of bronchial catarrh is known, and the temperature chart does not show a typically croupous picture, the true nature of the case may be rendered probable. It not unfrequently happens, however, in these cases, that the signs of bronchial catarrh disappear, to a great extent, as the pneumonic consolidation advances, and unless the case has been under observation from an early stage, there is little evidence of the secondary nature of the disease.

PROGNOSIS.—This is generally favourable in uncomplicated cases when one lung is affected. The average mortality in true croupous cases is given by Loomis at about six per cent. in childhood. In infancy it is higher. Any complication—such as pleurisy, meningitis, nephritis, pulmonary abscess, or gangrene of the lungs—renders the prognosis grave.

PATHOLOGY AND MORBID ANATOMY.—The idea that croupous pneumonia is a local inflammatory disease of the lungs is now discarded. The disease is a constitutional one, with a local lung manifestation not always proportionate to the systemic disturbance. In its course it presents all the characteristics of an acute systemic infectious disease—sudden invasion, regular course, and crisis, with rapid defervescence. It is often epidemic and probably infectious. The tissues and fluids of the lung are invaded by micro-organisms. A peculiar coccus has been found by Fränkel and Weichselbaum to be more frequently present (ninety-three per cent.) than any other, and has been thought to be characteristic of the disease, but this is yet hardly proved, as the same organism is found in other diseases, and even in health. Fränkel has found the organism in normal human saliva, and its injection into rabbits caused death in one or two days, showing its rapid multiplication in the blood of these animals. In older children the lung presents the typical adult appearance, which varies according to the period at which it is examined, whether in the congestive stage, that of red, grey hepatization, or resolution. The occurrence of suppuration or gangrene may take place, but this is rare in children. In the first stage there is capillary congestion, causing partial obliteration of the alveoli. This is soon succeeded by an exudation of liquor sanguinis and corpuscular elements, with fibrinous material blocking up the air cells. The stage of grey hepatization is characterised by an increase of the cellular and corpuscular elements, which rapidly undergo fatty degeneration and absorption as resolution proceeds. The pleural surface in true croupous pneumonia almost invariably shows a covering of

coagulable lymph. In infants the typical solidity of croupous consolidation is not so well marked, more commonly the lung presents the appearance known as catarrhal splenization or pneumonic splenization, in which the catarrhal elements predominate over the fibrinous and corpuscular elements, characteristic of the true croupous condition. Woodhead thus describes the appearance of the lung in these cases:—"The lung is not nearly so deeply congested, and in some cases may appear, as a whole, even paler than normal, though this is due to the paths of the more solid patches. In the centre of the solid patches there is frequently a greyish point, or the grey colour may be marked throughout the whole lobule. On palpation the patches feel soft and almost fluid." In the stage of resolution, he adds, "the microscopic appearances are much as in the stage of resolution of true croupous pneumonia; the whole of the catarrhal products are broken down and softened; they form a fatty pultaceous mass," which is ultimately absorbed. I have seen this condition in infants, in which the clinical features during life were essentially like true croupous pneumonia, rapid lobar consolidation, and high fever; yet, on examination after death, the appearances were not typically those of croupous pneumonia, but rather of a croupous condition rapidly supervening or complicating a commencing catarrhal process.

TREATMENT.—In simple uncomplicated cases, in healthy children, the child should be kept in bed and fed with soups, gruels, and milk and warm water. Light poultices are not always necessary, but are often beneficial. In any case, the chest should be encased in a warm flannel or cotton-wool jacket. A mild saline mixture, with liq. acet. ammonia, sp. ether nit., and camphor water, should be given frequently in suitable dose according to age. When there is pain or pleuritic stitch in the side, a drop or two of liq. morphia hydrochlor. should be added to each dose. Aconite in small doses, during the first two or three days, is of service when the temperature is high and the pulse regular and full. It

should be discontinued towards the height of the disease. In hyperpyrexia the methods in favour are the administration of antipyretics, such as antipyrin internally, or the wet pack, cold sponging, or ice-bags externally. I am generally in the habit of trying cold sponging in the first instance, failing relief from which wet packing seldom fails to do good. A wet sheet should be rolled twice round the body, and the child covered closely with blankets. The treatment is safe, and seldom fails to mitigate the severity of the symptoms. I have not seen any bad or depressing effects from the practice. The same cannot be said, in my opinion, of ice applied externally. Young children do not bear well the continuous application of ice over a large surface, serious depression often resulting. In any case in which it is deemed desirable to apply it, the effects should be carefully watched, and the application stopped when any signs of depression come on. Alcoholic stimulants are often required towards the height of the disease, but only in small doses, as the necessity of the case may indicate. Large doses of alcoholics are apt to favour narcosis, and are therefore dangerous. The not infrequent practice of giving digitalis is, I think, of very doubtful propriety. The right heart being embarrassed, the stimulating affect of digitalis on the left heart, which is much greater than that on the right, will only tend to increase the arterial tension and further congest the venous system. I believe it to be distinctly contra-indicated in most cases, owing to the state of the right heart and pulmonary circulation. Caffeine is a much safer remedy than digitalis. During convalescence little medicinal treatment is required. If resolution is delayed, iodide of potassium in small doses, with a bitter infusion, may be given, and small blisters applied externally. As in other diseases of a septic character, antiseptic remedies have been used, such as perchloride of iron or mercury. In the few cases where I have adopted this plan, I have not been so satisfied with the results as to recommend its adoption.

CHAPTER XII.

INFECTIVE DISEASES.

TUBERCULOSIS.

No disease of early life is of more interest and importance than tuberculosis. Its frequency and varying clinical relations, as well as its fatality, are sufficient to indicate the interest attached to its study. No subject in pathology has received greater attention in recent years than tubercle. Its morbid anatomy is well known, and our knowledge of the pathology of the tubercular virus has greatly increased in recent years. Laennec long ago considered the disease infectious, but Klenke was the first to demonstrate, by experiments on the lower animals, its inoculability. In 1864, Villemin¹ made his investigations, and showed by experiment its infectious nature. A host of observers, among whom may be mentioned Rindfleisch, Cohnheim, Klein, Sanderson, and Fox, have added to our knowledge of the subject, and corroborated the results of previous experiments. To Koch is due the credit of having crowned the investigations by demonstrating the important relations of the tubercle bacillus.

Tubercle belongs to the group of granulative growths, as described by Virchow; the leading characteristic of these formations being, that at a certain stage the constructive process of development is arrested and retrogressive changes begin. Another special feature of the formation is infectiveness.

¹ *Etude sur la Tuberculose*, 1868.

Tubercle nodules, when first seen, are about the size of a millet seed, of a grey colour, and translucent. They are formed essentially of cellular elements, derived from connective tissue. The cells are generally of rounded form and various sizes, containing nuclei of different shapes. Between the cells is a finer fibrillar network. As the tubercle nodule proceeds in its development, giant cells make their appearance, and also lymphoid and epitheloid cells, the whole constituting what has been termed the giant cell system. When first discovered it was thought that these giant cells were specially characteristic of tubercle, but this is not so, for they are found in other conditions, such as sarcomata, destructive formations of the osseous tissue, syphilitic growths, and other morbid textures. A tubercle nodule is non-vascular, and tends, as has been already said, to degeneration or caseation, which begins in its centre. More rarely tubercle nodules, instead of caseating, undergo fibrous transformation. Calcification sometimes occurs around the nodule. These anatomical characteristics, although of a pretty constant character, are apparently insufficient in themselves to constitute tuberculosis a specific infectious disease. The specificity of tubercle seems to be derived from the presence of the tubercle bacillus as a causative and irritating element in the evolution of the peculiar changes taking place in the growth.

ETIOLOGY.—Tubercular infection may be caused by the inhalation or ingestion of the poison, from the air, or through the medium of food, or it may be artificially produced by inoculation. The tubercular virus is endowed with great vitality. In order to be present in air it must be dried, the fluids or expectoration containing it becoming pulverised before the bacillus is capable of being volatilised in the atmosphere. We know that this occurs in whooping-cough expectoration, which, being coughed and vomited up by the child, is frequently, among the poorer classes, allowed to fall on the floor of the room or on the street, and afterwards,

becoming dried up, the poison gets into the air. The same thing, doubtless, occurs with tubercular sputa. This points to the necessity of disinfection and destruction of any fluids or expectoration likely to contain the virus. That food may be the medium of transmitting the poison is sufficiently proved. The flesh of the lower animals affected with tubercle will readily infect a person predisposed. Milk is one of the most common vehicles for its transmission. The milk may be primarily infected from the cow, or secondarily, through contamination afterwards. There seems to be little doubt, in view of recent investigations, that children are more often poisoned, than is generally supposed, by infected milk. Some difference of opinion exists as to whether milk from tubercular mothers ever contains the virus. Many physicians hold the opinion that the milk can only be affected when the mamma or teats are diseased. In any case the milk should be carefully sterilised as soon as obtained, and mothers in whom there is a suspicion of tuberculosis should not be allowed to nurse their babies.

Hereditary predisposition to tuberculosis may be transmitted from parents who have been in ill health and have suffered from the disease. In non-tubercular delicate parents, children are born puny and weakly, and readily fall a prey to tuberculosis. The direct transmission of the disease from parent to child is probably exceptional, but proved in some recorded instances. Thus several observers have noted cases of congenital tuberculosis. Tubercular bacilli have been found in the healthy testicles of men dying of tubercular disease of the lungs. A case of the congenital disease in an infant is recorded by Jacobi, who attended, in labour, a patient of tubercular family, who also had the disease herself. The child was born at the seventh month. Miliary tubercles were found in the spleen, liver, peritoneum, and pulmonary pleura. There can be no doubt that the transmission of the disease by tubercular parents does not always hold good, for Epstein, in two hundred infants of tubercular

parents, did not find tubercle in any of the cases. The disease may occur at any age, but is less frequent under the age of one year, than from the second to the fourth year.

As an example of early tuberculosis, the following case of a baby eight months old may be cited. The child was admitted to hospital in a state of partial collapse, dyspnœa, and cyanosis. "He was born healthy, and partly reared on the breast and partly on the bottle. Two months ago he had measles, and has had a cough ever since. Two weeks previous to admission an eruption of varicella appeared." It will be noted that this history showed the child to be in a receptive condition to the tubercular poison. He died the following day with all the signs of catarrhal pneumonia and collapse of the lung. On post mortem examination general tuberculosis was found, as the following appearances demonstrate. The *right lung* was collapsed and attached to the upper and back part of the pleural cavity, which was filled with air (pneumothorax). There was some yellow purulent fluid in the pleura. On section, the lung was collapsed and somewhat fibrous, and some tubercle nodules were scattered through it. At the apex were several small cavities showing continuous communication between bronchi and pleural cavity. *Left lung* was congested with scattered tubercles throughout. The glands at the root of the lung were much enlarged and degenerated. In the abdomen the mesentery was much thickened, and the glands all greatly enlarged and caseous. The peritoneum showed scattered tubercles. Liver, spleen, and kidneys all showed tubercles in the substance and on the peritoneal coating.

Cutaneous infection and inoculability may take place by vaccination when blood is mixed with the lymph; but, as in the case of syphilis, lymph uncontaminated by blood is not believed to be capable of communicating the disease. Infection by skin wounds has been proved in cases recorded by Meyer¹ and

¹ *La France Méd.* 1887, tome ii. No. 101.

Schmidt. One case related by Meyer¹ was that of a child who was infected with localised tuberculosis of the genital organs during the operation of circumcision, the wound having been sucked by a person who was suffering from tuberculosis. Dr. Salamon, at the Medical Society of Copenhagen, related some cases of a similar nature. Steinthal mentions the case of a woman who was inoculated with tubercle on the hand from washing the clothes of her tubercular husband. Pathologists, who are frequently making morbid sections in tubercular bodies, often suffer from tubercular nodules on the hands. As with other kinds of virus, a healthy state of the system and sound tissues are capable of resisting the growth and development of the tubercular poison. On the other hand, a debilitated condition of the patient, and unhealthy tissues, afford a favourable nidus for it. The mucous membranes being the usual channels through which infection takes place, an unhealthy condition of the epithelial surface will render the patient at once liable to invasion. Koch has proved that the bacillus cannot live in a healthy stomach. The ciliated epithelium of the air passages, when in a healthy condition, affords certain protection from the bacilli, but the epithelium of the alveoli being non-ciliated is much less able to resist its inroads. In all catarrhal conditions, when the epithelial coating is in an unhealthy state, or the mucous surface partially denuded, the bacilli find a suitable nidus.

The predisposing causes of tubercular disease are very evident in children. Whatever lowers the vital tone, and causes a depraved state of nutrition, renders the child liable to tubercular infection, and this occurs generally through the medium of some local affection which has been set up in the debilitated state of the system from whatever cause. The acute diseases, specially whooping-cough and measles, are among the most frequent precursors of the disease. Gastro-intestinal catarrh is another common cause, and so is rachitis. In all

¹ *Monat. f. Pract. Dermat.* p. 437, 1888.

such conditions the prime factor in predisposition is an *unhealthy mucous surface*, in the diseased epithelium of which the tubercle bacillus finds a suitable nidus, from which it probably spreads into the lymphatic system.

LOCAL MANIFESTATIONS OF THE DISEASE.—One of the peculiarities of tuberculosis in the child is the readiness with which it spreads through all the organs. It is more frequently generalised than localised, more often acute than chronic. All the organs may be infected with miliary tubercles, and the child steadily wasted with hectic fever long before any physical signs of disease, referable to any particular organ, manifest themselves, until ultimately meningitis, broncho pneumonia, or enteritis sets in and causes death.

Bones and Joints.—Tubercular disease of these tissues is very common in children. It may originate in the bone cartilage or synovial membrane. In the bones it may give rise to tubercular necrosis, or may be localised in small nodules, or a general and progressive caseous infiltration may take place in the spongy texture. The cartilage is also liable to be affected with tubercular degeneration. The general term “gelatinous degeneration” has been applied to tubercular disease of the synovial membrane, but it cannot strictly be considered to have any special pathological significance, as the serous membrane may show the disease under different forms, as shown by König and Alexis Thomson,¹ whose excellent monograph corroborates in the main the observations of König, and is well worthy of careful study by those specially interested in these diseases.

Tubercular Disease of Skin may occur as a secondary condition during the progress of tubercular disease of deeper textures, by contiguous infection. Thus, when tubercular glands are not removed, the skin gives way and tubercular ulceration may go on in the cutaneous surface. Abscesses in other parts, occurring in tubercular subjects, often affect the skin. Ulcerations are sometimes met with at the mucous

¹ *Laboratory Reports, Roy. Coll. Phys. Edin.* vol. ii.

orifices of mouth, anus, or vulva. Fistulous openings into the pleura or peritoneum often take on tubercular infection, and will not heal. The tubercular nature of lupus exedens is generally acknowledged by all the leading dermatologists except Kaposi. It is not common in young children, being more frequently met with during the second dentition and towards puberty. It generally occurs on the face, but may be met with also on limbs or body. It commences as small red papules, which gradually enlarge and deepen in colour. The papules tend to coalesce and form small masses which become more and more indurated from infiltration. Ulceration either takes place on the surface, or cicatricial atrophy results. Anatomically these tubercular formations are composed of masses of cells formed in the corium and numerous giant cell systems, undistinguishable from any other tubercular formation. Tubercle bacilli can generally be detected, although they are seldom numerous. The disease is of a primary nature and not usually associated with general tuberculosis. Being purely localised, it remains so, and does not tend to affect the system as other localised tubercular affections do.

Mouth and Pharynx.—Tubercular ulcerations are met with on these parts in older children, and are liable to be confounded with syphilitic formations. The soft palate, tonsils, and posterior pharyngeal wall are the most common situations. The diagnosis from syphilis is often very difficult unless there is a clear history and signs of syphilis in other parts. The results of treatment are often the only means of clearing up the true nature of the case, the syphilitic cases generally yielding to the ordinary anti-syphilitic remedies, tubercular ones remaining intractable.

Laryngeal Affections are rarer in children than adults, and are referred to under the head of *Laryngitis*.

Thymus Gland is, according to Jacobi and Koplik, frequently affected with tubercle, but its clinical relations are unimportant. Demme has recorded a case of primary localised

tuberculosis of this gland in an infant born of non-tubercular parents. At the end of a month he began to emaciate and suffer from diarrhoea, and died in a few weeks. There was no symptom of disease of the gland, but some dulness behind the sternum. On post mortem examination the gland was found enlarged, and three or four tubercles, in size from that of a pea to a hazel nut, were found. They all contained bacilli. No tubercle was found in any other organ. In general tuberculosis the disease is met with in various forms, as in other parts. Jacobi notes that in almost all cases the blood-vessels are seen to be undergoing tubercular changes, some of the larger arteries exhibiting appearances of typical tubercular endarteritis.

Tubercular Meningitis.—The *brain* is very frequently the seat of tubercular disease in the child. Under brain tumours reference has already been made to tubercular disease of the brain substance. Here it remains for us to allude to the more frequent disease termed *tubercular meningitis*, or *tuberculosis of the pia mater*, for it is in relation to the blood-vessels that the disease first shows itself. Although it affects mainly, and as a rule primarily, the vessels of the pia mater proper, it may and often does extend into the deeper vessels of the convolutions, causing cerebritis as well as meningitis. The *pathological appearances* in children dying from tubercular meningitis are those of general tuberculosis, the meningitis being a cerebral expression of the general infection. Hensch states he has seen one case of primary meningeal tuberculosis, and Bouchut has also published cases; but Hensch, in regard to these cases, throws doubt on the correctness of his own observations and those of others, by saying that the post mortem examinations were not so exhaustive as they might have been, thereby indicating doubts as to the correctness of his original statement. I myself made a post mortem examination of a child who died of tubercular meningitis, and failed at first to find tubercle in any other situation, until, after careful searching, two tubercular glands, the result of an old stomatitis, were

found in the submaxillary region, which had probably set up the infection. The child is emaciated in proportion to the duration of the tubercular disease. On removing the skull-cap the convolutions are generally characteristically flattened from the intra-cranial pressure and distension of the cavities with fluid, and the surface of the arachnoid opaque looking. The veins are congested. Purulent lymph may be noticed on the vertex, but more rarely than at the base or lateral portions of the surface. The most characteristic appearances are situated at the base of the brain in the interpeduncular space and along the Sylvian fissures. In these situations we find appearances varying according to the intensity of the inflammation which is set up. There may be simple opacity of the serous surface or effusion of purulent lymph, matting together the adjacent surfaces of the Sylvian fissures, and covering over the basal surface from the optic commissures in front to the pons varolii behind, and pressing on the cranial nerves. Similar appearances may be found on the under surface of the pons and cerebellum. On closer examination minute miliary tubercles are found scattered over the surface of the arachnoid in close relation to the blood-vessels. The tubercle originates in the peri vascular sheaths of the lymphatics and smaller vessels. The cells of the sheath proliferate and tend to obliterate the vessels. There is generally more or less serous effusion in the subarachnoid space, a larger quantity being observed when there is simple cloudiness and opacity of the membrane than when there is effusion of purulent lymph. Passing to the central portions of the brain, we find tubercles along the course of the blood-vessels and in the choroid plexuses, which often have a cloudy appearance from serous infiltration. The corpus callosum and septum lucidum are often very much softened, and sometimes of creamy consistence. The ventricles are more or less distended with fluid, and the cavities often greatly enlarged; which has given rise to the term *acute hydrocephalus* in this disease. Inasmuch as there is not invariably, although generally, dropsy of the

ventricles, this term can hardly be considered as universally applicable.

Tubercular affection of the choroid is sometimes met with, and when present affords positive evidence in cases of meningitis of its tubercular nature. As it is rather the exception than the rule to find these choroidal tubercles, their absence in any case does not disprove the existence of tubercular meningeal disease.

Optic neuritis may or may not be present, the usual appearance of the discs blurred and indistinct, with distended and tortuous veins, being seldom so well marked as in other kinds of cerebral disease.

CLINICAL FEATURES.—*Premonitory Symptoms.*—These point to a condition of general ill health, the result of tubercular infection. Some time before the child betrays any special cerebral symptoms he becomes languid and irritable, looks pallid, and loses flesh; the muscular system becomes flabby; he is fretful and listless, drowsy and restless, and the sleep disturbed. There is a disinclination to play, the toys being thrown away soon after they are taken up. At this stage he often shows signs of slight headache and intolerance of light and noise. The digestive functions are disturbed; the appetite capricious; the bowels irregular, generally constipated, more rarely loose; stools offensive. Such symptoms, although not distinctive, are always regarded with anxiety by the experienced physician. Under such conditions a careful inquiry into the previous history is always helpful. If the child has previously been debilitated

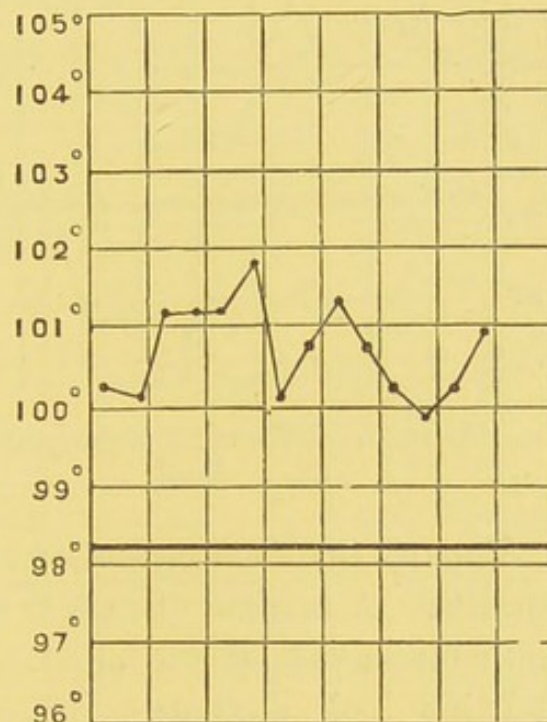


Chart 15.—Tubercular Meningitis,
æ. 2—Death on seventh day.

by any of the acute diseases, such as measles or whooping-cough, such a train of symptoms points almost with certainty

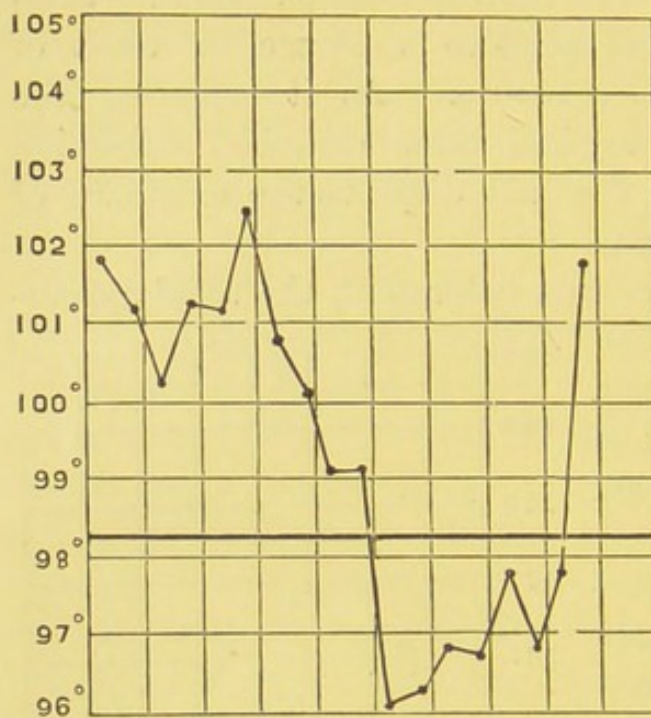


Chart 16.—Tubercular Meningitis—
æt. 7—Died.

to commencement of meningitis, and before long, in all probability, special symptoms indicating cerebral involvement, present themselves. One of the earliest is *vomiting* at irregular intervals, and without reference to the ingestion of food or special gastric disturbance. It may come on when the child is moved, or put about by anything, and is quite as common on an empty as a full stomach.

Stage of Development.—Constipation is generally present and persists. A marked change is now apparent in the expression and countenance of the child. His features become pinched and his look anxious. His temper is changed, and there is great intolerance of light and sound; sleep is disturbed and dreamy, and he wakes up with a sudden shriek or cry, termed “hydrocephalic.” The appetite is lost. The tongue may be furred, but sometimes is dry and parched. As the case goes on a further development of special symptoms show themselves. This is often called the *convulsive* or *paretic* stage, sometimes that of *transition*. The child suffers from increased headache, and gradually gets more drowsy; convulsions may come on, the spasms being of a clonic character; or there may be tonic rigidity of the muscles of the neck and limbs, with clonic spasms of the facial muscles. Subsultus tendinum and carpo-pedal contrac-

tions are often present, the thumb being rigidly flexed on the palm. Signs of paresis of the cranial nerves are generally a prominent feature. There may be strabismus or facial paralysis. The eye signs are important. The conjunctivæ become suffused, secreting sticky mucus, which glues together the palpebral margins. The cornea often looks cloudy, especially at its lower margin when the eyelids are not closed during sleep. The condition of the pupils is very characteristic. They are sluggish and unequal, generally more or less dilated.

Intolerance of light is less marked as the case advances. The general facial expression at this stage is well worthy of note. There is often knitting of the brows, and the expression is vacant and stupid looking; the face is often flushed, at other times pallid, or one cheek may be pale and the other flushed; in any case there are generally sudden

flushings at intervals. The vaso-motor disturbance is further indicated by the readiness with which the tache cerebrale is elicited, the finger being drawn along any part of the cutaneous surface, a reddish blush soon follows its track. This sign is more distinctly made out in this disease than in any other, but is not specially characteristic of it, as it is met with in other affections of the central nervous system. Kernig's symptom is also frequently present—spasm of the hamstring muscles, when the knee is suddenly extended and then flexed. The skin and deep reflexes are generally altered, sometimes abolished.

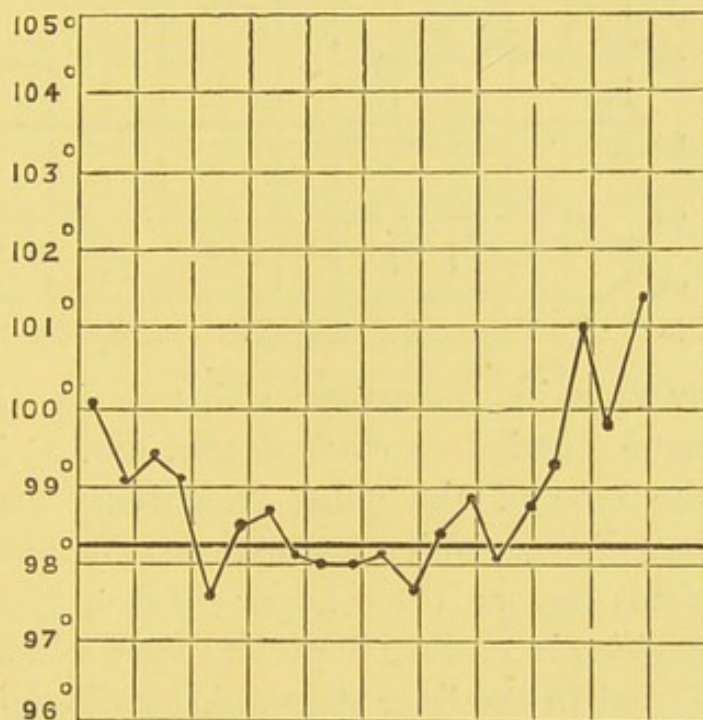


Chart 17.—Tubercular Meningitis—
æ. 8½—Died.

The *pulse* is a sign of great importance and sometimes one

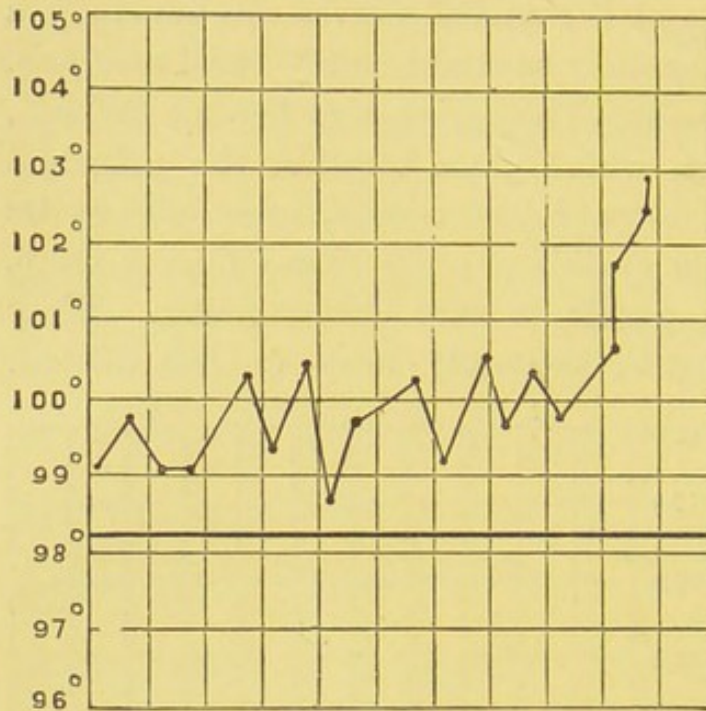


Chart 18.—Tubercular Meningitis—æt. $4\frac{1}{2}$ —Died.

of the earliest which may give rise to suspicion of the onset of cerebral disease. Irregularity both in regard to frequency and rhythm, due to vagus inhibition, is its characteristic. It may become very slow, going down to sixty or seventy, and in a short time rises to 120 or more.

average in frequency, although in some more hurried or even slower, but, as in the case of the pulse, irregularity may be a distinguishing feature. It may sometimes assume the Cheyne-Stokes type. *Sighing* is another important sign, seldom absent in the later stages of this disease.

The *temperature* is very variable in tubercular meningitis, so much so that no characteristic type can be described. Its general average range may be said to be from 101° to 102°, with nocturnal rise and diurnal fall, or in exceptional cases the reverse. Sometimes I have seen the temperature maintain about a normal average with occasional sub-normal dips. It almost invariably rises before death, sometimes suddenly going up to 104° or 105°. The further pro-

The *respiration* is generally about

is generally about

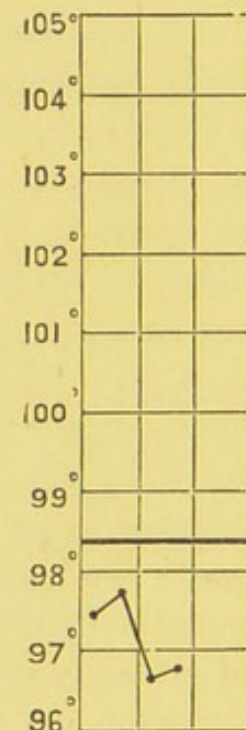


Chart 19.—Tubercular Meningitis—æt. 1 year. Death two days after admission—Ill twelve days.

gress of the case is characterised by increasing emaciation, and inability to take food, the belly becomes retracted or "boat shaped" (scaphoid), and the child more and more insensible and generally bathed in perspiration, the symptoms of paresis and exalted sensibility giving place to paralysis and coma. Before the comatose stage is reached an apparent waking up to consciousness sometimes takes place, deluding the friends but never the experienced physician, the child opening his eyes and looking as if conscious of the anxious inquiring look of the mother. The duration of these cases varies from one to three weeks, a fortnight being perhaps about the average time.

Diagnosis.—Simple meningitis, cerebral tumour or abscess, hydrocephaloid disease, apical or cerebral pneumonia, or acute gastric catarrh, are the conditions liable to be confounded

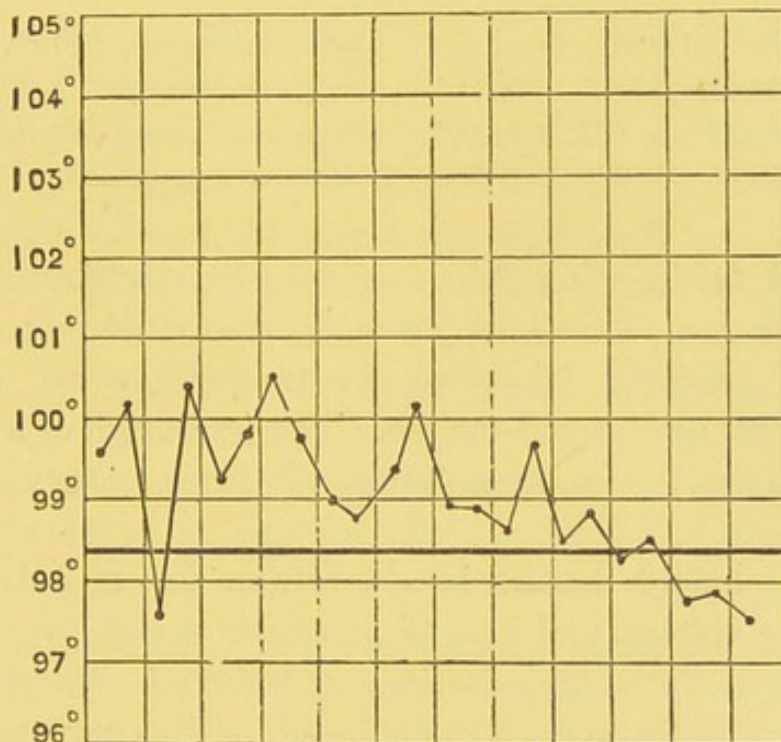


Chart 20.—Tubercular Meningitis—æt. 7 years—Death on fifteenth day.
with tubercular meningitis. A few days will generally suffice to assure the diagnosis, a careful inquiry into the history of the case being the most important help in clearing it up. A previous history of ill-health or acute disease, such as measles or whooping-cough, is a valuable index in diagnosis.

Yet it is not always easy at first to come to a conclusion. Rilliet lays down the following rules for differential diagnosis from simple meningitis :—

Simple Meningitis.

Comparatively rare.
Met with in previously healthy children.

Often epidemic.
No prodromata.

Often begins with convulsions.
Headache more intense.
Vomiting urgent.
Constipation less marked.
Fever higher and of more regular type.
Temperature pyrexial.
Progress more rapid.
More ataxic from the first and symptoms more continuously progressive.

Tubercular Meningitis.

Common.
Occurs in weak, precocious children, and in those subject to glandular enlargements and skin diseases.
Always sporadic.
Symptoms of ill-health and emaciation.
Rarely begins with convulsions.
Headache less marked.
Vomiting less urgent.
Constipation the rule.
Fever of irregular type.
Temperature may be low.
Progress slower.
Symptoms more variable and less continuously progressive.

Typhoid fever, with delirium, may be mistaken for it in the early stages. It generally attacks older children; vomiting is rarely present. Diarrhoea is frequent, with a tumid abdomen and dry, glazed tongue. The pyrexia is of a different type. There is no irregularity of pulse, convulsions, or paralysis.

Hydrocephaloid disease is a condition due to a debilitated state of the system, and in a certain type of child, with highly developed nervous organisation, a train of symptoms not unlike meningitis may be developed. Thus you may have occasionally great nervous sensitiveness, starting and screaming during sleep, offensive stools or diarrhoea, delirium, and other symptoms of nerve exhaustion. Previously existing chronic diarrhoea is one of the most frequent antecedents. A close examination of the case and attention to the history will generally suffice to distinguish it. In most cases, there is

less fever—a pallid face, regular pulse, and depressed fontanelle. Treatment very soon begins to tell in hydrocephaloid, and enables us to establish a diagnosis.

Apical or cerebral pneumonia often gives rise to much delirium and nervous excitement, and may commence with a convulsion. The diagnosis of apical consolidation, and the further progress of the case, very soon enables us to distinguish it.

Encephalitis—Cerebral tumours or abscess.—The general course of such cases is different. Intense headache, convulsions, paralysis, age of patient, existence of otorrhœa, or history of blow on the head, absence of symptoms of acute tuberculosis, will assist the diagnosis, as contrasted with the insidious but steadily progressive nature of the symptoms in tubercular meningitis.

Acute gastric catarrh, especially if it occur in a strumous child, may give rise to some anxiety. Constipation may be present, with fever, delirium, and vomiting, and even some irregularity of pulse. The child in these cases has not a “cerebral look,” and the symptoms yield readily to treatment, yet at first it is necessary to be cautious in giving a diagnosis.

PROGNOSIS is very hopeless when the disease is fully confirmed. Cures are reported, but it is always doubtful whether the diagnosis in such cases has been correct.

TREATMENT.—The diet should be as nutritious as the child is able to take; feeding should be frequent and in small quantities—milk, beef-juice, egg flip, and light custards are generally well taken; mild mercurial purgatives, occasionally given, afford relief. The head should be shaved and evaporating lotions applied. In some cases I have found continuous warm irrigation with Leiter’s tubes gives more relief. Ice-bags are of doubtful service, being often too depressing. Mercurial inunction should be tried, the ungt. hydrargyri being rubbed into both axillæ and groins, or grey powder or calomel may be given in one grain doses every two or three hours till purgation is effected, when it must be discon-

tinued. Iodine in various forms has found favour, internally in the shape of iodoform in half grain doses every two or three hours, or iodide of potassium in one grain doses every three hours. Iodoform to the scalp, one part to three of lanolin, I have tried extensively without any good result. Counter-irritation to the scalp or nape of the neck should not be too extensive, but small blisters may be used at intervals, or limited portions of the scalp may be irritated by lint. of iodine. These are in a general way the means adopted with a view to arrest the progress of this disease, and they must be carried out in deference to the anxiety of the friends, rather than from any belief in their efficacy on the part of the physician.

PULMONARY TUBERCULOSIS.

Tuberculosis of the lung is usually a local expression of general tuberculosis. The primary infection may take place in the pulmonary apparatus, or it may be carried from other organs, or from the bronchial glands, to be distributed throughout the lungs. It may be grafted on to a simple bronchial catarrh, or more frequently it follows a specific catarrh, such as in pertussis or measles. Catarrhal pneumonia is often complicated by secondary tubercular infection, and so also, but less frequently, croupous pneumonia. From whatever cause, given an unhealthy condition of the pulmonary mucous surface, the denuded or altered epithelial coating of the bronchial tubes affords a favourable nidus for the reception of the tubercle bacillus. The infective material passes readily into the lymph vessels and glands, in many cases becoming localised in them for a time, and sooner or later infecting the lungs or other organs through the lymphatic system. It is not an uncommon occurrence, on examining the body of a child who has died of tubercular meningitis, after measles or whooping-cough, to find little or no tubercular infection of the lung, but extensive caseous and tubercular disease of the bronchial glands; for some reason the tubercular

infection through the lymphatic system has determined to the brain instead of the lung. In whatever way the infection takes place, the clinical features of the lung disease may assume the form of chronic disease of the same nature as *chronic phthisis* in the adult, or of *acute phthisis* (acute miliary tuberculosis), *catarrhal phthisis*, or *caseous broncho-pneumonia*. The distribution of tubercular disease throughout the lungs, in chronic cases, in children is more irregular and diffused than in adults, the base or mid portions of lung near the root being more commonly affected than the apex, which in the adult is the seat of election for the commencement of tubercular disease. Certain other peculiarities are noteworthy in comparing the phthisis of childhood with that of adult life. Hæmoptysis is rare in children, and there is a comparative absence of sputa. Young children with localised pulmonary catarrhs, in which all the general symptoms point to the presumption of the tubercular nature of the disease, frequently recover. Pulmonary cavities are also rarer than in adults, no doubt partly due to the fact that in young children the disease seldom runs such a prolonged course, the child perhaps succumbing meanwhile to meningeal or abdominal tuberculosis. The general latency of lung tuberculosis is another prominent fact in early life. In children dying of tubercular meningitis, which is one of the commonest and most rapidly fatal terminations of tubercular disease, the lungs are often found literally stuffed with tubercle, may be, even small cavities which have been unsuspected and undiagnosed during life. Not only does this obtain with regard to the lungs, but also the lymphatic glands and all the other organs. In such cases the presumptive evidence of tuberculosis is mainly based upon the general "falling off" in the health of the child, with progressive wasting, and if along with this there is a tubercular febrile movement, with temperature of the usual irregular type, the diagnosis may be given with probable certainty. In very young children the absence of a typical tubercular temperature, however, is not necessarily inconsistent with the presence

of tubercular disease. In infants who become infected during the progress of chronic gastro-intestinal catarrh, which has dated either from the period of weaning or come on during bottle-feeding, we often have the usual normal or subnormal temperature, which is the rule in wasting diseases generally at this time of life, and yet on post mortem examination we find general tubercular infection. In older children this rule does not usually obtain, the same physical signs as in adults being more frequently present.

PATHOLOGY. — Biedert¹ and Dittweiler² consider that tubercular catarrh is the "residue" of previously existing simple processes. Dr. Sims Woodhead, while pathologist to the Edinburgh Royal Hospital for Sick Children, made some valuable observations in the laboratory of the Royal College of Physicians, mainly based on post mortem examinations made on children dying in the hospital. He also brought out the fact that pulmonary tuberculosis in children is invariably associated with one or more antecedent conditions. He noted the early appearance of tubercle bacilli in the terminal bronchi and air-cells, and also in the surrounding lymph vessels and glands, as well as in the bronchi leading to collapsed bits of lung, the secretions in which being blocked up, form an excellent cultivation medium for the bacilli. The most common antecedent condition was *bronchial* and *pulmonary catarrh*, more especially after measles and whooping-cough or other acute diseases. The weakened state of the system, along with disease of the epithelial lining of the tubes and alveoli, affords conditions the most favourable for the reception and growth of the tubercle bacilli. During the natural process of cure in catarrhal pneumonia, when the catarrhal products are undergoing degeneration and absorption, tubercular infection is likely to take place. Clinically we often meet with cases of catarrhal pneumonia which for a time run a favourable course, the physical signs and general condition of the child showing

¹ Virchow's *Archiv*, Bd. 98, 1884.

² *Centralbl. f. Bact.* i. p. 545.

marked improvement, when a sudden arrestment takes place, presumably owing to tubercular infection; the temperature rises; physical signs reappear; the child emaciates and dies, worn out with cough and inability to take or assimilate nourishment from the gastro-intestinal catarrh which so generally complicates these cases. In the lung the tubercular infection may take place or be determined in various situations, such as the epitheliæ covering of the tubes and alveoli, or the cells lining the lymph and smaller blood-vessels. From the mucous surface and alveoli the surrounding lymph spaces become infected, then the lymphatics in the interstitial and interlobular spaces, and the peribronchial and perivascular lymphatics and bronchial glands. The irritation produced by the tubercular virus in the interstitial tissues often causes excessive formation of fibrous tissue. General tuberculosis in the lung may be set up by *direct infection* from a *localised caseous or tubercular mass* in the neighbourhood. Thus Woodhead notes two cases in which this had happened by softening of large caseous glands, at the bifurcation of the trachea, causing ulceration and opening into bronchus, general tubercular catarrhal pneumonia being the result. Tubercular disease at the *base of the lung* often takes place in collapsed portions of lung and the blocked up tubes leading to the alveoli of these portions, or in the interstitial tissue in the neighbourhood. Phthisis at the base is frequently met with as a result of previously existing pleurisy in this situation, or where there is peritonitis on the under surface of the diaphragm owing to the immobility of the lung from adhesion, and the consequent interference with the lymphatic circulation which favours the growth of the bacilli. Klein has shown the direct anatomical continuity of circulation between the pleural and peritoneal lymphatics, which explains the frequency with which tubercular infection is set up from the one to the other of these lymphatic spaces; and Woodhead lays great stress on the fact that adhesion of the opposed serous surfaces favours greatly

the growth of tubercle. In acute miliary tuberculosis the tubercular virus has been shown by Weigert¹ to be diffused by the blood-vessels, and Ponfick believes that it probably gains access to the venous system from the lymphatics through the thoracic duct.

CLINICAL FEATURES.—Allusion has already been made to some of the features of lung tuberculosis in the child. After the age of seven years the general symptoms and course of the disease so closely resemble those met with in adults that it is unnecessary to describe them here. In infants and younger

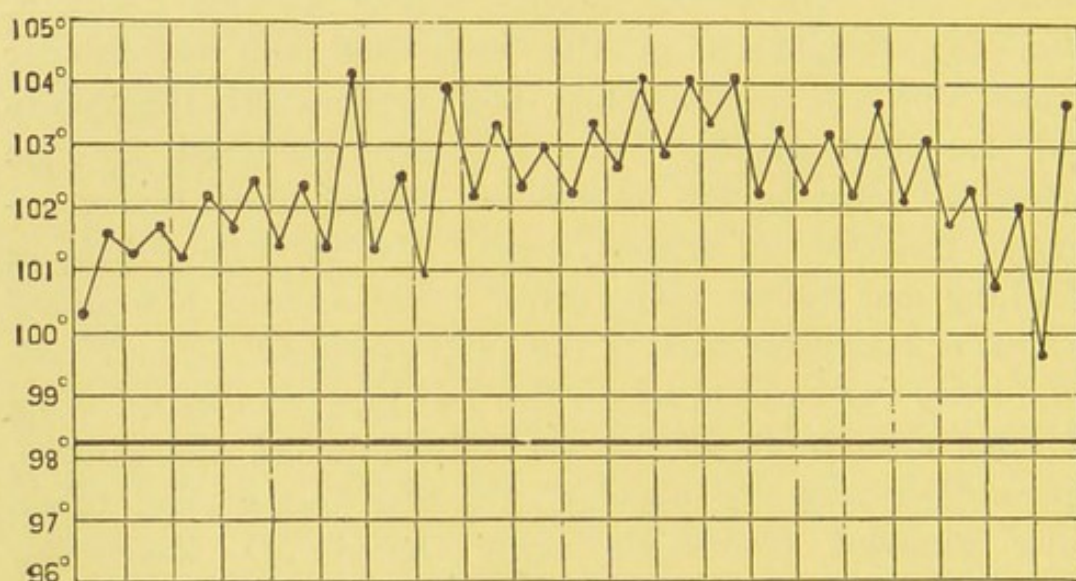


Chart 21.—Acute Phthisis—æt. 10—Death on sixty-second day.

children the general symptoms are those ordinarily associated with tuberculosis—emaciation, fever of a hectic type, well marked, generally in proportion to the acuteness of the disease, and diarrhœa. Sweating is rare in the child compared with the adult. Anorexia and dyspeptic symptoms are almost invariably present.

In *Acute Phthisis* febrile symptoms are of an active nature, the temperature ranging in a pretty regular manner between 101° and 103°; the pulse is rapid, running up to 150 or 160 in young children, the respiration also being much accelerated. The cough is very variable, sometimes almost

¹ Virchow's *Archiv*, Bd. 104, 1886.

absent, seldom very troublesome. It is generally of a harsh bronchial character. Diarrhœa may or may not be present. Such cases are apt to be confounded with typhoid, complicated with severe bronchial catarrh. The differential diagnosis may be established by the absence of eruption and enlarged spleen and the general character of the febrile movement, which is more persistently high and regular than in typhoid. The physical signs are those of diffused and general bronchial catarrh, accompanied by harsh breathing and copious moist

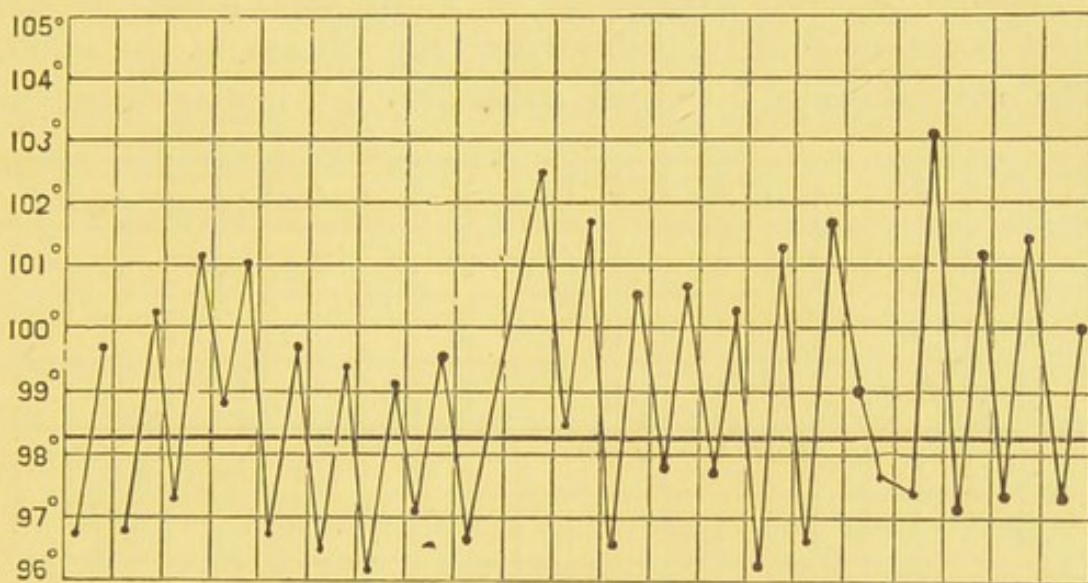


Chart 22.—Chronic Phthisis—æt. 7—Death.

râles of varying quality all over the chest. The percussion of the two lungs seldom shows any relative difference, although there may be an absolutely high-pitched note all over on both sides.

In *Chronic Phthisis* the symptoms and physical signs bear a close resemblance, although often of a less marked character, to those met with in adults. Percussion shows a dull note over the localised areas of consolidation. Vocal resonance is increased, often bronchophonic, and various grades of moist sounds are heard, from crepitant to coarse or bubbling râles. The diagnosis of lung cavities in the young child is admittedly difficult. They are often of small size, and the physical signs less distinct than in the adult. Cracked-pot sound may

be elicited in large cavities, but as a rule they are not of sufficient size to give rise to this sign. On the other hand, it must be noted as one of the peculiarities of physical lung signs in the child, that a note undistinguishable from cracked-pot sound is sometimes elicited when no cavity exists at all. I have met with this in caseous broncho-pneumonia at different parts of the lung, sometimes at the apex or upper axillary region, and post mortem examination has negatived the existence of a cavity.

Caseous Broncho-Pneumonia or *Catarrhal Phthisis* is the most common form of tubercular lung disease in the child. The several ways in which pulmonary tubercular infection

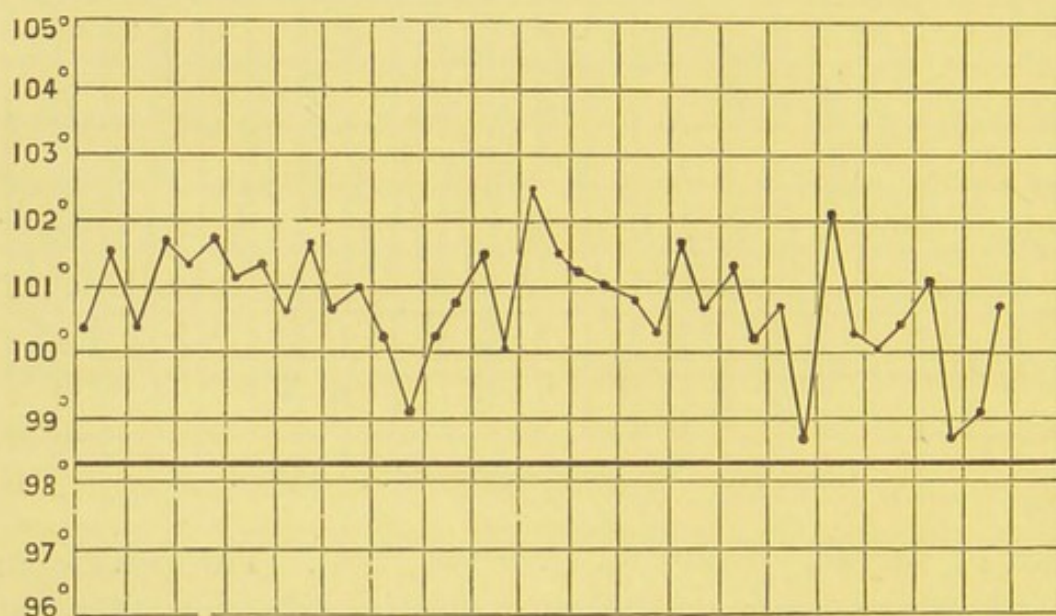


Chart 23.—Catarrhal Phthisis or Caseous Broncho-Pneumonia—
æt. 1 year 10 months—Death.

takes place have already been mentioned. The disease may be grafted upon a simple primary catarrh, or more frequently a secondary one, associated with measles, pertussis, or other acute disease. After such ailments the general tone of nutrition is lowered, the bronchial epithelial lining is in an unhealthy state, and the lymph vessels and glands functionally overtaxed, from the large amount of work thrown upon them in the absorption of catarrhal products, and the conditions, both local and general, are such as to favour the reception and

development of the tubercular virus. The typical clinical history of this disease is generally that of a child who has suffered from measles or whooping-cough. The bronchial catarrh accompanying the disease may have persisted during convalescence, or disappeared almost entirely, returning after a time, the general symptoms and signs of tubercular catarrh becoming steadily developed after its recurrence. The child now presents symptoms of tubercular fever, with progressive emaciation, the temperature chart exhibiting often great variations of an irregular and remittent type. The digestive system usually shows signs of disturbance, as evidenced by anorexia, nausea, vomiting, or diarrhoea, with either a furred or red and irritable looking tongue. Physical examination of the lungs reveals crepitant râles more or less numerous in different situations over both lungs, with localised areas of consolidation, as evidenced by impaired percussion, or at all events increased vocal resonance and broncho-vesicular breathing. The following cases are ordinary examples of this form of lung disease :—

Measles—Caseous Broncho-Pneumonia—Meningitis—Death.

—A. M., æt. two and a half years, was a very healthy child until he had measles a year ago. He has never been quite well since. His mother brought him to hospital on account of wasting and vomiting, with slight cough, which, however, was never a prominent symptom. On examination the child was emaciated and feverish, temperature of an irregular character, ranging with great variations from 99° to 103°. There was impaired percussion over the bases of both lungs posteriorly, especially the left, with coarse râles and increased crying resonance. He never vomited after admission to hospital, but symptoms of intestinal catarrh were present during most of the period, as evidenced by frequent stools with undigested food and mucus. He remained three months in hospital, and ultimately died comatose, after having shown cerebral symptoms for three days. On post mortem examination the *left lung* showed gelatinous tubercles throughout, with

a large catarrhal consolidation at the base. The *right lung* was in a similar condition, with two small cavities in the lower lobe, and several caseous masses in mid-lung. The bronchial glands were caseous. The liver showed tubercle throughout its substance, and on the peritoneal surface. The brain was voluminous, and the cerebral substance soft. The sub-arachnoid space contained fluid. The ventricles were also filled with fluid, and their cavities enlarged. At the base, the pia mater was covered with sero-purulent lymph. Two tubercular tumours, about the size of a bean, were found in the cerebellum, which was adherent in this situation to the tentorium. This case was pathologically a typical one of this form of lung disease. The latent character of the lung symptoms, with comparative absence of cough, were noteworthy. The sudden death of the child from meningitis is a very ordinary mode of termination in such cases.

Whooping-Cough—Tubercular Catarrhal Pneumonia—Death.
—Kate M., æt. one year and three months, was a stout, healthy child until three months ago, when she took whooping-cough. The attack was of moderate severity, and the cough had almost disappeared, when three weeks before admission she became worse, with increased cough of an altered character, quick breathing, and fever. On admission the child was much emaciated and feverish, the temperature chart showing great variations, ranging from 99° to 103°·6. Examination of the lungs revealed impaired percussion at right apex, with coarse, moist râles and bronchophonic resonance; over the rest of the lung the breathing was vesicular, with scattered moist sounds. The left lung showed no impairment of percussion, but a somewhat hyper-resonant note anteriorly. Numerous crepitant râles were heard all over. She died ten days after admission. On post mortem examination the morbid appearances of tuberculosis were well marked, and the lungs showed advanced caseous pneumonia on the right side. The appearances were as follows:—The omentum was studded with gelatinous tubercles. The spleen was adherent to the parietal peritoneum by lymph,

its surface and substance containing several tubercular masses commencing to soften. The mesenteric glands were enlarged, and several showed advanced caseation. The right lung was voluminous and firmly adherent at the apex, the free pleural surface over the rest of the lung was coated with lymph in an early stage of organisation; numerous tubercles were seen on the surface. On section was found a large cavity, with rugged walls at the apex, and the rest of the lung was more or less consolidated with catarrhal pneumonia. The left lung was paler than the right, and somewhat retracted. Its substance was soft and natural, except here and there, where little tubercular nodules could be felt just under the pleura. Its anterior border was emphysematous. On section the substance was generally natural in appearance, except the few tubercular caseating nodules already noted near the pleural surface. The bronchial glands were caseous. This case also showed the ordinary clinical features and pathological appearance of this form of disease, death taking place directly from the lung affection.

TREATMENT.—In dealing with tubercular disease in children the principles of treatment should be grounded on a broad basis, remembering that prophylaxis is all-important, and that, even after tubercular infection has taken place, there is a possibility that the battle between the bacilli and the weakened tissues may under improved conditions turn out to be one-sided, and, in the end, result favourably to the child. Happily the day is past when the existence of tuberculosis need be considered a death sentence, for we now have abundant evidence of the curability of tubercular disease, at all events, when it has not advanced to the stage of ulceration and destruction of organs. In children hereditarily predisposed to it, the greatest care should be exercised in rearing, and the mother rarely permitted to nurse her baby. A healthy wet-nurse ought to be procured, it being remembered that, although such children may rear on the bottle, there is always a possible risk of the milk being

infected from bovine tuberculosis. With a healthy wet-nurse the child has little risk of suffering from gastro-intestinal catarrh, so rarely absent in bottle babies, the avoidance of catarrhal complaints being one of the most important indications in rearing such children. The same objection obtains, although in a lesser degree, to artificial food as to cow's milk — which being exposed to atmospheric influences may be infected with the germs of disease. The question of feeding being settled, hygienic conditions generally must be attended to. The child should be warmly clothed and kept in a well-ventilated room with sunny exposure. It should be taken out regularly in fine weather. A dry, bracing, country climate should be always preferred to that of a town. Damp and low-lying situations ought to be avoided. The house should be in a good sanitary state, and great care taken that the child be not exposed to the infection of any acute or other disease. In older children, regular exercise short of fatigue will be beneficial. When the child is very delicate, and not able to get out much, regular massage of the limbs will be of service. The diet in tuberculosis requires careful attention. The most nourishing mixed diet, with a proper proportion of fat if it can be digested, is indicated. Digestion should be aided, if need be, by the administration of alkalies and bitter tonics, such as bicarbonate of potash with gentian, before food. *Nux vomica* is often a most useful addition. *Pepsine* or *lactopeptine* are often of value in aiding digestion. In some cases the mineral acids, nitric being the more suitable, may be given with advantage after food. A mixture of nitric acid, glycerine, and infusion of *calumba* often forms a useful combination. *Perchloride of mercury* in small doses, with *cinchona* and glycerine, has proved a useful tonic in my hands; ten drops of each of the liquor of the *perchloride* and tincture of *cinchona*, with half a drachm of glycerine and peppermint water to two drachms, thrice daily after meals. Cod-liver oil, in doses suited to the digestive capability of the child, is a well-tried and valuable alterative nutrient. It is best given alone, or with fluid

extract of malt, but in my experience patients sooner tire of medicines or emulsions than of the oil itself. Fresh cream often forms a pleasant substitute for the oil. Chloride of calcium is of undoubted service in many cases, especially in tubercular gland disease. It may be given in four or five grain doses, three or four times a day in milk. The lactophosphate of lime is another useful preparation. The glycerite preparation is, I think, the best in teaspoonful doses after food. In anæmic cases arsenic often gives good results. It should be given in small doses. Jacobi has found it useful to combine digitalis with it. Iron is best given as one of the neutral soluble preparations, ammonio-citrate or tartrate, with some fluid extract of liquorice and water. Medicated vapours and sprays are of service, especially in laryngeal cases; of these muriate of ammonia or lactic acid spray is the best. In ordinary bronchial cases the vapour of eucalyptus or pumiline is useful. Cough should not as a rule be treated by opiate mixtures, if it can be relieved by other means. It is very often kept up by nasal or pharyngeal irritation, and local treatment suitable to the relaxed mucous surface will give most relief. A nasal douche of peppermint water with glycerine of borax, one drachm to the ounce, or sodium bicarbonate ten grains to the ounce of water, may be used. The throat may be brushed with tannin and glycerine, or glycerine and tincture of the perchloride of iron, one part of the former to two of the latter. Night sweats are best treated by oxide of zinc and hyoscyamus or atropine ($\frac{1}{100}$ of a grain of the sulphate). Diarrhœa must be checked by careful regulation of the diet, milk being either stopped or peptonised, white of egg mixture, with bismuth, or opium in suitable doses. An occasional small dose of castor-oil is often useful. Hæmoptysis must be treated on the usual principles—perfect quiet and rest, ice, ergot of rye, or small doses of turpentine. The question of counter-irritation is important. There can be no doubt when carefully carried out it is of service. Large blisters or emplastr. cantharidis

should never be used ; but small blisters, frequently repeated, with liq. epispasticus, one and a half to two inches square, over different parts of the chest, seem to be serviceable. Antiseptic treatment by iodoform has been in fashion of late years, but after an extended trial of this remedy I cannot recommend it ; on the contrary, I have often seen irritation produced, such as vomiting or diarrhœa, sometimes depression, and a tendency to collapse.

CHAPTER XIII.

INFECTIVE DISEASES—*continued.*

SYPHILIS.

THE subject is too wide a one in all its bearings for full discussion in such a work as this, but the leading facts and clinical features of the disease, as manifested in children, demand our attention. The disease may be congenital, that is to say, acquired *in utero* by the foetus. More rarely it is met with as a primary disease, running through the usual stages, as seen in adult life.

ACQUIRED SYPHILIS. — The disease may be communicated to the child from the mother in various ways. During labour the factors for its production are diseased secretions on the part of the mother, and an abrasion on the body of the child. Gertanner, Nisbet, and Bertin adduce evidence in favour of direct infection in this way. Bosquillon disbelieves the probability of its occurrence. Diday and Ricord consider it "without doubt rare, but not impossible."

During lactation, infection may take place from the nipple of the mother to the mouth of the child by direct chancreous infection. The question whether the milk of the mother, uncontaminated by blood or other secretions, can convey infection is still debated. The balance of opinion favours the negative view, which favours the theory that physiological secretions do not convey morbid poisons. In cases where the disease has originated during lactation, without any chancreous affection of the nipple, it seems likely that the

milk has been contaminated during suckling by blood or other secretions.

Instances showing the improbability of milk *per se* conveying infection are constantly recorded; thus Mr. Clement Lucas exhibited a child, three months old, at the Medical Society of London, which had been nursed by the mother, who was suffering from the primary disease. The child was in perfect health, and up to that time had shown no signs of the disease.

In Accidental Ways—Vaccination.—The same principle holds good with regard to vaccine lymph. Uncontaminated by blood or in other ways, it is not generally believed that this disease can be communicated. In whatever way it occurs, there can be no doubt that not unfrequently the mother accidentally conveys infection to the child, producing a primary sore. By touching her own vulva and thereafter applying the dirty fingers to the mouth or some other part of the child's body, the mother may communicate the disease. Sometimes a dirty sponge has been known to be the medium of contagion. In Jewish communities the disease is sometimes communicated by circumcision. Sturgis, Ricord, and others have recorded instances of this. It is often impossible to discover the exact way in which infection is conveyed. Two cases have lately been treated under my care in hospital, one a child of three years, the other five years old. Both mothers were passing through the primary disease, and presumably had given it to their children. The younger child had a chancre on the vulva; the older girl did not display any primary sore, but suffered from roseola, specific sore throat, and condylomata.

Congenital Syphilis.—By this we understand the disease acquired by the child *in utero*, and manifested at or soon after birth, or at a later period. It may be acquired from a diseased father or mother. The many interesting questions in connection with this subject cannot be entered on here, but the student is referred to the works of Ricord, Hutchinson,

Kassowitz, Diday, and more recently the excellent monograph of Dr. Sturgis of New York on the subject.

When the disease begins *in utero*, the child often dies, and abortion takes place. So frequently is syphilis a cause of abortion, that we are always led to suspect its occurrence when frequent miscarriages occur. The child when still-born is generally shrivelled and putrid. When the disease comes on at a later period of utero-gestation the child may be born alive, and if so, presents unmistakeable signs of the disease. It is generally emaciated and often covered over with an eruption of vesicles or bullæ. It snuffles and cries hoarsely. The internal organs are generally diseased, and the child does not long survive.

After birth, signs show themselves in from two to four weeks. The child may be, in fact often is, born plump and healthy-looking to all appearance, yet to the experienced eye it presents certain signs indicative of constitutional depravity, which when well marked are highly characteristic. The colour of the skin is dusky, the face old-looking. The child is fractious and wakeful at night, and is not easily pacified. The cry is hoarse. Before long other signs become apparent. Specific coryza commences, causing what is popularly called "snuffles," a roseolar rash appears on the body, specially on the buttocks, mucous patches are seen on the mouth, and cracks or fissures at its angles. The discharge from the nares produces irritation of the upper lip, thickening and discoloration of the skin. Further developments of cutaneous eruptions often show themselves, such as ecthyma or pemphigus; the latter is highly characteristic, the bullæ generally appearing on the hands or feet.

SYMPTOMS.—*Coryza* is one of the most prominent signs, and of great significance and often danger. The mucous membrane is in a hyperæmic condition and hypertrophied with papillary infiltration. The condition is serious in proportion as it interferes with suckling. When, in addition, there are mucous patches in the mouth, the difficulty of taking the

breast is often very great, and the child may gradually die of inanition.

Cutaneous Eruptions and Mucous Patches.—The earliest skin eruptions are generally of the nature of erythema or roseola. They appear on the body on its anterior surface, and on the buttocks. Later on, the eruptions are apt to assume a pustular form, such as ecthyma, impetigo, or acne. Ecthyma occurs chiefly on the buttocks and hips, with scattered pustules here and there on the body. Impetigo shows itself on the face, chest, axillæ, or groin, and the eruption may be distinguished from the simple variety by a surrounding copper-coloured areola. Acne occurs on the dorsal surface of the body, and sometimes on the chest.

Pemphigus is chiefly met with on the palms of the hands and soles of the feet, often comes out early, and is frequently a fatal sign. Cornil considers pemphigus should be classed with roseolar and papular rashes of the early period, the elevation of the epidermic layer, which constitutes its characteristic feature, being simply due to the natural delicacy of the child's skin.

Mucous Patches appear in the usual situations on the skin and mucous membranes. In the mouth they are a source of danger, in so far as they interfere with suckling. On account of the delicacy of the child's skin they are found in various situations, by preference at the flexure of the limbs, where opposed surfaces of the skin touch one another. They are slightly elevated, and of a reddish grey colour, and often moist on the surface. On the mucous surfaces they are only very slightly elevated, and of a pale colour.

Syphilitic Bone Disease.—Much has been done in recent years to clear up the pathology of these affections, and differentiate them from rachitic disease. Wegner was one of the first to point out the special characteristics of syphilitic bone disease, and, since his observations in 1870, Waldeyer, Parrot, Taylor, and many others have added to our knowledge of the subject. Wegner considers the disease essentially an osteo-chon-

dritis. A spongeo-calcareous layer, measuring two millimètres in thickness, is interposed between the bone and cartilage, thus forming a calcifying cartilaginous zone, much larger and more distinct than in normal bone. This gives rise to an arrest in the formation of new bone and a proliferation of the cartilaginous trabeculæ. Along with these changes there is a process of thickening of the periosteum and perichondrium. As a result of this depraved process of nutrition, the cartilage cells atrophy or undergo fatty degeneration, irritation being set up between the diaphysis and epiphysis, causing osteo-myelitis, often accompanied by suppuration. Parrot and Taylor, in elaborating these researches, indicate the essence of the process to be "a hyperplasia of cells, with irregular deposition of lime salts; secondly, an intensification of these conditions, and thereafter an abnormal proliferation of all the elements of the tissues, with an infiltration of granulation tissue into the medullary spaces following the vessels;" clinically, the effects of these pathological changes give rise to the development of swelling at the junction of the diaphysis and epiphysis of the long bones. Thus the bones of the arm or the forearm, thigh or leg, are liable to be affected. The changes are often very well marked in still-born babies. Children suffering from these bone affections present peculiar signs. A condition of pseudo-paralysis—syphilitic dystrophia—is seen. The limbs are motionless, and when the child is lifted they sway loosely about. The diseased ends of the bones, besides being swollen and tender, often crepitate to the touch. It will be at once seen that in many respects the naked eye clinical appearances of the bones bear resemblance to the conditions met with in rickets, and much discussion has arisen as to the relation and identity or non-identity of the two diseases, as manifested in the bones. Parrot considers the bone lesions in rickets due to syphilis. The co-existence of the two diseases is admitted, but, excluding such cases, a careful study of the two diseases, from a pathological and clinical standpoint, is sufficient to disprove their identity. Syphilis appears soon after

birth, rickets rarely before the sixth month, generally later. In syphilis there is usually a history of disease in the parents, and the child itself presents the other clinical features of the disease, such as snuffles and cutaneous eruptions. In rickets we have the characteristic signs of this disease also present, such as sweating, diarrhoea, or bronchial catarrh, pallor of the skin, and absence of eruptions, or the characteristic parchment appearance of the skin, as in syphilis. The characters of the cranium are distinct in the two diseases. In syphilis we have circumscribed swellings in the frontal and parietal bones, and in rickets the widely open fontanelles, which in syphilis close at the usual time. In rickets we meet with craniotabes, chiefly confined to the occipital bone. Many physicians, however, believe that craniotabes only occurs in rachitic children with syphilitic taint. Rachitic rosary appears coincidently with or immediately before enlargement of the distal radial epiphyses. Syphilitic bone disease yields to mercurial treatment, not so rachitic osteitis. The epiphyseal disease in syphilis may end in suppuration and separation of the epiphyses, not so in rickets. Syphilitic dactylitis is a condition never met with in rickets. The disease generally affects the shaft of one or other of the phalanges, producing uniform thickening of the bone. Syphilitic disease may be met with in any of the bones—the femora, humeri, tibiæ, radii, ulnæ, fibulæ, ribs, ilia, scapulæ, clavicles, or the bones of feet or hands, and lastly the cranial bones.

Mr. Hutchinson has described the peculiarities of syphilis of the teeth. The changes manifest themselves specially in the permanent upper median incisors, which are notched in a peculiar way, and very characteristic. The notch is a single one in the centre, and presents an appearance quite different from the serrated margins of normal teeth.

Eye Affections.—Interstitial keratitis, a form of diffuse inflammation of the cornea, is met with as a late or tertiary sign. It differs from ordinary corneal inflammation in the fact that there is little or no congestion or ulceration. It

begins as a diffused haziness in the centre of the cornea, which gradually spreads all over, giving the cornea a ground-glass appearance. It generally commences in one eye, and persists for two or three months, before the end of which term the other eye becomes similarly affected. The ground-glass appearance and deep character of the congestion of a dull pink colour contrasts with the more active and superficial character of the congestion with larger vessels in simple corneitis. The diagnosis is assured by the co-existence of other signs of syphilis which are generally present. According to Mr. Hutchinson, the majority of cases of interstitial keratitis occur between the ages of eight and fifteen. It has been argued that this form of eye affection is not a direct result of syphilis, and cannot be considered one of the tertiary symptoms, but that it is rather an indirect result of the disease, due to mal-nutrition, etc., acting on a constitution otherwise delicate, often scrofulous. Whatever be the theory, the fact remains that, clinically, interstitial keratitis is always associated directly or remotely with syphilitic taint. Iritis is a rare symptom of the secondary period. In children the sclerotic zone, which is generally so well marked in the adult, is sometimes absent altogether, or scarcely observable. The pupil is irregular. There is generally dulness and change of colour of the iris, with streaks of lymph—the pink zone, if present, is usually faint. The conjunctivæ and corneæ are generally clear.

Syphilis of the Nervous System.—No organ or tissue is exempt from the ravages of this disease, and the nervous system forms no exception. Pathologically the lesions are frequently due to endarteritis, giving rise to thrombosis or embolism, gummatous tumours, periosteal or neuroglial thickenings. The lesion may exist in any part of the central nervous system, and the symptoms resulting therefrom will vary according to the extent and seat of the disease. Sometimes there is no cerebral lesion, but the cranial nerves are affected, giving rise to various forms of paralysis, such as ptosis,

nystagmus, or paresis of facial muscles. Epileptiform convulsions are often met with as a result of central nervous lesions.

Visceral Lesions.—These are gummata and fibroid changes in various organs, most frequently liver and lungs or spleen, more rarely in the heart and subcutaneous cellular tissue. The liver lesions are of a cirrhotic nature. Perihepatitis is common. Suppuration of the thymus gland is occasionally met with. Waxy degeneration sometimes occurs in the liver, spleen, or kidneys.

The only other results of syphilis deserving of notice are the various forms of glossitis, of laryngitis, and disease of the testes in boys. Laryngitis is not uncommon. It is often due, according to Hensch, to mucous tubercles in the larynx, or thickening of the epiglottis. Goodhart mentions laryngeal ulceration in a child four months old.

PROGNOSIS, must have reference to indications on the part of the mother as well as the child. Children of each succeeding pregnancy are less liable to be affected seriously than those of previous ones, the poison tending apparently to wear itself out. As a rule, the longer the symptoms are of appearing after birth, the less likelihood is there of a severe case, or fatal termination. On the part of the child, our opinion must be based more on the severity of the cachexia than on individual symptoms. Complications, especially diarrhoea and vomiting, are serious in young children, also severe coryza and stenosis of the nares, causing interference with the respiration and suckling. The nasal secretions may become foetid and produce septicæmia, which is often fatal.

TREATMENT.—When a child shows signs of the disease we must carefully investigate the condition of the parents, and put the one or the other or both under treatment, so as to prevent the recurrence of the disease in future offspring.

The main indications in the child are to arrest, by suitable means, the local manifestation of the constitutional taint. Great attention must be paid to feeding and the establishment of a healthy nutrition. Tonics are useful as well as nutrients,

to assist in passing the child through the secondary stage as favourably as possible, and prevent the development of later or tertiary symptoms. The effect of mercurial treatment, in arresting the manifestations of the disease in children, is even more marked than in adults, and the earlier it is commenced the better. In cases where the mother is suffering from the disease, or has previously borne syphilitic children, the remedy should be given during utero-gestation. When the child is born, it should be put under treatment without delay. If the mother is able to nurse her baby it will suffice to administer the remedy to her, and treat the symptoms as they arise in the child by local means. As to lactation in syphilitic mothers, each case must be judged on its own merits. Very frequently the milk is so deficient in quantity and quality, and the health of the mother in such a cachectic condition, as to leave no doubt in regard to the propriety of either bringing up the child by hand, or getting a wet-nurse. In the latter case the woman must always be warned of the possible risk she may run during suckling. In practice it is rarely possible to persuade a healthy wet-nurse to rear a syphilitic child, and the propriety of proposing such a course to a healthy young woman must always be doubtful. Many mothers who bear syphilitic children present no cachexia or other signs of the disease, and if the milk supply is good and of proper quality, lactation should be recommended. According to Colles's law, a mother may nurse her own child without risk, even although she has cracks on the nipple and the child mucous patches or other local signs in the mouth; whereas a healthy wet-nurse would almost certainly contract the disease under similar circumstances. The application of Colles's law has generally been believed to be universal, but of late years cases have been recorded which throw some doubts on its universality. Thus Behrend¹ mentions a case in point, where a mother, who presented no signs of the disease, gave birth to a

¹ *Tageblatt der 51 versammlung der Deutscher Naturforscher und Aertze in Cassel, 1878.*

syphilitic child which got well under treatment. A second child was born, and during lactation she contracted a hard chancre on the nipple, and passed through the disease with well-marked secondary symptoms. The results of the examination of the milk of syphilitic mothers shows that it is almost invariably deficient in quality, the caseine and fatty matter being much below average. Mercury may be given in various ways. As already stated, when the mother nurses her baby, it may be administered through her. To the child it may be given by inunction, or the mouth. Inunction is generally preferable, as the therapeutic results are excellent, and there is no likelihood of gastro-intestinal disturbance, which is often produced when the remedy is given by the mouth. The best way to apply it is either to rub a piece of mercurial ointment, the size of a pea, into the axillæ daily, till the physiological or therapeutic effect is produced, or to mix one drachm of the ointment with half an ounce of lard, and spread it on lint or fine flannel, retaining it on the abdomen with a flannel bandage. When administered by the mouth it is best given in the form of grey powder, either alone or guarded by a small quantity of pulv. ipecac. c. opio, one-half to one grain of the former with one-sixth to one-fourth grain of the latter every six hours. In the liquid form, five to ten minims of liq. hydrarg. perchlor. may be given thrice daily, and continued, unless diarrhœa comes on, till the desired effects are produced. Combined with tinct. of cinchona and a few drops of glycerine, it sometimes agrees better with the stomach and bowels. In older children who can swallow a pilule I am fond of the following recipe:—Hydrarg. iodidi viridis, one-third of a grain; ext. hyoscyami, one-half grain.—Ft. pil.—one night and morning.

Cod-liver oil is an excellent remedy given in small doses. Iodide of potassium may also be administered, and is best combined with cinchona as follows:—

R Iodidi potassii gr. xij, tinct. cinchonæ ℥iss, syrupi limonis ℥i, infus. cinchonæ ad ℥iij.—℥i to ℥ij three times daily.

Quinine is very beneficial in some cases, and iron should always be administered later on in the course of the disease when there is evidence of anæmia. In all syphilitic children great attention to cleanliness is necessary. The child should be bathed at least twice daily, and thoroughly dried. It is also necessary to keep such infants very warm by suitable clothing, avoiding extremes of temperature. Mucous patches on the skin are best treated with iodoform or calomel; and on the mouth—sulphate of copper or nitrate of silver applied occasionally, the mouth being washed out frequently with boracic lotion. Coryza and stenosis of anterior nares is best treated by frequent washing and removal of scabs, and the application of ungt. hydrarg. nitratis mitius. The nares may be washed out with hydrarg. bichlor. lotion, 1 to 4000, or sulphate of copper, one grain to the ounce.

CHAPTER XIV.

GENERAL DISEASES.

SCROFULOSIS.

THE word scrofula so long in use is not a satisfactory one, as it has no definite meaning in a pathological sense. Scrofulosis is in all respects a more correct term. It indicates a disposition or tendency to certain definite pathological evolutions, a diathesis in which, under varying conditions, certain tissues become affected with diseased processes of a peculiar type, constituting the scrofulous cachexia. It is often called, and may be truly considered to be, a peculiar "habit of body," a nutritional disorder, in which the skin, mucous membranes, lymphatic tissues, bones and joints, show a special liability to disease. It may be either hereditary or acquired.

ETIOLOGY.—*Heredity*.—The disposition to scrofula is easily transmitted from parent to child, more readily, it is believed, from the mother than the father. Sir James Clark believed that the transmission might occur as the result, not only of actual scrofulous disease in the parent, but from any diseased condition which lowered the general health and nutrition, such as gout, digestive derangements, chronic skin disease, the abuse of mercury. Alibert, long ago, from a large experience in the St. Louis Hospital, stated his belief that almost all the scrofulous cases he had met with could be traced to a syphilitic taint in one or other parent. Dr. Copland expresses similar views on the subject. Tuberculosis as well as syphilis may transmit a tendency to the disease in the offspring.

Climate and Race.—It is generally agreed that the disease is more prevalent in temperate than tropical countries. The reason adduced to account for this being the fact that in temperate countries the hygienic conditions are less favourable, and there is a greater liability, through the operation of exciting causes, such as catarrhal complaints from vicissitudes of weather. Dr. Lynch has shown that, in the United States, the Irish are more prone to the disease than the Jews. The negroes are, on the other hand, less liable to it than the white races.

Age and Sex.—It is essentially a disease of early life, more frequently manifesting itself in children after the first dentition, onwards to puberty. No period of life, however, is exempt from it. Sir James Paget¹ has described a form occurring in later years. In hereditary cases it may manifest itself at any time, but often at an early period. Acquired cases are often later in their manifestations, owing probably to the time required for the operation of the exciting causes of the disease. Sex does not seem to exert any influence in predisposition.

Conditions of Life.—It is more common in the poorer classes—poverty, with all its associations, predisposing to it. The conditions of life obtaining in large towns, congregation, and unfavourable hygienic conditions generally, are therefore favourable to its production, yet in country districts it is also met with.

Improper Feeding.—The quality or quantity of the mother's milk, from unhealthy hygienic or dietetic conditions, or intemperance, or ill-health from whatever cause, will predispose to disease in the infant. Hand rearing as generally carried out, especially among the poorer classes, is a most fruitful cause. The mortality among bottle-fed babies in large towns is great, and the disposition to such diseases as scrofula and rickets proportionately large among the survivors. In children who pass the nursing period, without deterioration of health, there is an equal liability all through childhood to a development of the disease, under unfavourable conditions of feeding and of

¹ *Clinical Lectures and Essays*, 1875.

hygiene. A deficient quantity of fresh animal and fatty food is believed to favour the production of scrofulous disease.

Contaminated states of the Air, such as obtain in the dwelling-houses of the poor, and congregations of children in large schools, with long hours of work and insufficient feeding during the day, operate injuriously on the growth and development of the child, and may induce the disease. Damp and low-lying dwellings with deficient sunlight are also factors which probably act in a similar manner. Such causes as those now enumerated cannot fail to make a large proportion of the children subjected to them delicate and sickly. The natural and healthy development of the bodily structures is interfered with. The blood becomes depraved and deficient in fibrine and red globules, with an excess of the serous and albuminous constituents, and such altered conditions lead to impairment of the tone of the blood-vessels, the venous and lymphatic systems being more developed than the arterial.

Exciting Causes.—These are numerous. Any local disorders of whatever kind, especially catarrhal ailments or skin diseases, are apt to induce local manifestations of scrofula in the individual so disposed. Acute diseases, such as stomatitis, tonsillitis, scarlatina, measles, or pertussis, act in a similar manner. In fact, any disease which alters or disturbs the normal balance of nutrition in the growing and developing child may give rise to it, in one predisposed.

PATHOLOGY.—The older writers generally described scrofula under various types, the most common and characteristic of which was the lymphatic or phlegmatic, in which the child presents the following characteristics:—The face is generally round and plump, the complexion dull and pasty, the skin thick and opaque. The features are generally coarse, the lips and alæ nasi thick, the subcutaneous tissue comparatively rich in fat, the muscles spare. Although children of this type are generally scrofulous, it is only *a* type and not the only one, the fact being that scrofulosis may become developed,

under certain conditions, in any constitution. Thus, other forms have been described, such as the torpid and sanguine forms, the leading factors in all being deficient blood supply and defective nutrition of highly organised tissues. The total quantity of the blood is diminished, qualitatively however its composition is unaltered. There is a special liability to low forms of inflammation of skin, cellular tissue, and mucous surfaces, bone joints, and lymph glands. The general characteristics of the scrofulous inflammation are, that it tends to chronicity, and is not accompanied by the formation of healthy pus, but rather by degenerative and necrotic changes, with chronic and intractable ulcerations and abscesses containing sanious pus and caseous masses. The histological relations of the tissue elements are altered, inasmuch as there is a greater tendency to increased cell growth. The lymph tissues are abnormally developed and hypertrophied, and the formation of lymphoid elements excessive, while the capillary blood-vessels are relatively diminished. As a result there is a lesser activity in all the physiological and pathological nutritive processes. The ultimate result of this disturbance of the nutritive balance is increased cell formation, with abortive results as regards organisation and differentiation of the various elements. In consequence of this, an abnormal amount of work is thrown upon the lymph vessels and venous system, in the endeavour to get rid of the excessive supply of material. The lymph tissues, whether in the glands or cellular tissue, become liable to infiltration, and as a result a low form of inflammation, termed scrofulous, is initiated. In a healthy person acute inflammation, with the rapid formation of healthy pus, would probably occur, but in a strumous subject, fatty degeneration takes place, which is so far a physiological process, but instead of subsequent liquefaction and absorption taking place the process is arrested, the degenerated material becoming hardened, and forming the well-known caseous material so characteristic of strumous disease. The morbid changes

taking place during this process of scrofulosis render the individual especially liable to tubercular infection. The two processes of scrofulosis and tuberculosis are often mixed up and confounded in medical literature. There can be no doubt that the scrofulous diathesis, and all the morbid processes which it gives rise to, render the patient peculiarly susceptible, more so than in any other state, to tuberculosis; but it seems equally probable, in the present state of our knowledge, that scrofula in its inception and progress up to a certain stage has no more to do with tuberculosis than such diseases as measles or whooping-cough, which, it is well known, initiate pathological nutritive changes in the child, which as certainly induce a liability to tubercular disease.

CLINICAL FEATURES AND MANIFESTATIONS OF THE DISEASE.—The clinical features of this disease are typified by the local manifestations which it gives rise to. In a child of characteristic phlegmatic temperament, the inheritance of scrofulous parents, it is easy to recognise the peculiar diathesis, but such features are by no means the rule, probably the exception, and we are therefore generally unable to recognise the constitutional state, until the peculiar type of the local manifestations discloses itself.

The Circulation.—Allusion has already been made to this. The circulation is generally slow and wanting in vigour. The blood tends to stagnate in exposed parts, producing a livid or mottled appearance of the skin. Strumous children are liable in consequence to chilblains. The condition of the pulmonary circulation causes a liability to bronchial catarrh. M. Potain¹ describes the peculiarities of the circulation very fully. He considers the fault lies primarily in the absorbents, and he designates it "lymphatism."

The Temperature.—Dr. Lucian Deligny, from observations made at the l'Hôpital de Berk on a hundred strumous children, found their normal temperature one-half to one degree lower than in health.

¹ *Dict. Encyclopæd. des Sciences Medicales*, vol. iii. 2nd Series, p. 475.

General Intelligence in the typically phlegmatic child is below the average, but in other types this does not hold good.

The Skin, in typical cases, is thick and opaque, and often shows an unusual development of downy hair, especially on the sides of the forehead, arms, and back between the shoulders. As the child grows older this tends to disappear, as first noted in a paper by Dr. Wiltshire.¹ The thick upper lip, so often seen in strumous children, is not always congenital, but may be the result of some irritative skin eruption.

The Teeth.—Mr. Hutchinson says the central upper incisors are large, white, and square shaped. Laycock pointed out that they likewise often showed large milk-white spots, from defects in the enamel.

Skin Affections are of various kinds, but generally assume the eczematous and impetiginous types, and are very intractable, which is their only special characteristic. Probably the only typically scrofulous skin affection is lupus, which we now know to be a local tuberculosis. A form of skin eruption, occurring chiefly in scrofulous children, is the lichen scrofulosus, consisting of small papules, at first red but soon fading, and ultimately becoming brown from pigmentary deposit. The papules are generally arranged in groups in a crescentic form, and are met with on the sides of the chest and neck, and also on the buttocks and limbs. It is an anæsthetic condition, accompanied by little or no itching, and is essentially of a chronic and intractable nature.

Scrofulous Gummata. — Multiple subcutaneous abscesses, cold abscess, strumous ulcer of the skin, *gomme scrofuleuse*² of French authors, are all varieties of the same condition which occurs in young children, generally of scrofulous constitution. They consist of small hard masses, from the size of a pea to a cherry, immediately under the skin, at first moveable, then

¹ *Med. Times and Gazette*, April 10th, 1847.

² Brissaud et Josias, *Revue Mem. de Med. et de Chirurg.*, 1879.

becoming adherent to the surface from gradual softening, which takes place in the centre of the gumma. The skin at this time becomes purplish in colour and ultimately gives way, allowing a sanious pus with curdy masses to escape. M. Lannelongue of Paris has made a series of careful observations regarding these nodules, and has demonstrated them to be of a tuberculous nature. It is from the bursting of these gummata that we so often have a true scrofulous ulcer formed.

Affections of Mucous Surfaces.—Strumous children are specially liable to catarrhal affections, accompanied by copious muco-purulent discharge. In this way, the pharynx, conjunctivæ, auditory meatus, nasal membrane, and genital mucous surfaces are liable to be affected. In the pharynx there is a tendency to catarrhal and follicular glandular disease, and tonsillar disease, and diseases of the lymph glands receiving the drainage from those parts. The conjunctiva is very commonly affected with so-called strumous ophthalmia. The conjunctivitis may be simply catarrhal, generally of a chronic and intractable nature, or phlyctenular, or the deeper structures, particularly the cornea, may become inflamed, and troublesome ulcers formed. Otorrhœa may be due to chronic eczema of the meatus, or the result of otitis media.

Catarrhal Vulvitis, or Infantile Leucorrhœa, is often a strumous affection.

Diseases of Bones and Joints.—These affections are among the most common in scrofulous subjects. The diseases are of a chronic nature, the bones being affected by a low form of inflammation ending in caries. Thus the spine is often diseased, the well-known affection, so well described by Percival Pott, being a common one. Any of the long bones, ribs, or sternum, are liable to disease. The phalanges are often attacked, one of the commonest conditions being strumous dactylitis. The joints most frequently affected are the hip and knee, or the tarsal joints; the synovial membranes being first attacked, and subsequently, in many cases, the bone.

Lymphatic Glands.—From what has been already said regarding the important part played by the lymphatic system in this disease, it will be readily understood how frequently the lymph glands suffer. In the chapter on lymph gland disease the changes taking place in the glands, and their general pathological relations, have been described—chronic enlargement, generally ending in caseous degeneration, being the result. In most cases the lymphatic glandular disease, if not primarily set up, is perpetuated and maintained by peripheral irritation in the skin and mucous surface in which the afferent vessels going to the glands originate.

TREATMENT.—Prophylactic.—All the causes already enumerated, which predispose to the disease, should be avoided. Attention to diet and hygiene are of the first importance. Fresh air, sunlight, protection from cold and damp, and removal of the patient to a suitable locality, if possible, are essential. The improved condition of the dwellings of the poorer classes in large towns is doing a great deal to eradicate the disease. Shorter hours of work and better wages, enabling the people to clothe and feed themselves better, are also having a beneficial effect.

Curative.—When the disease manifests itself, all the measures advocated in regard to prevention must be rigidly adhered to. Probably no means will act with greater certainty in improving the health of a scrofulous child than change of air. Sea-side residence is peculiarly beneficial in such cases. The child should be out in the open air as much as possible in fine weather, and regularly bathed with sea-water brought into the house, being well rubbed down after its bath. The diet should be liberal, with plenty of fresh milk, solid food suitable to its age being ordered and given at regular intervals. Animal food is requisite, and a minimum of farinaceous articles of diet. All scrofulous children should be carefully clad; flannel being essential next the skin, with warm stockings and strong boots, to avoid damp feet. While

improvement of the general health by diet and hygiene is of the first importance, medicinal treatment must not be neglected. Local affections must be met by suitable means. The digestive system requires special attention. Gastro-intestinal catarrh demands the administration of soda and rhubarb, or small doses of grey powder or bismuth with an alkali, followed up by an alkaline mixture with gentian or calumba. Catarrhal respiratory affections must be treated on general principles, and confinement to the nursery or house if need be. The special remedies of service in this disease are nutrients, general and blood tonics. Cod-liver oil, or, if it is not well borne, arachis nut oil or cream may be substituted, due care being exercised to administer it in quantity suited to the gastric digestion. As a rule, the administration of oils should be discontinued during the hot summer months. Iron in various forms is undoubtedly useful, especially the iodide, which may be given as a syrup or glycerite. Calcium salts are highly praised in their effects, especially in cases of glandular enlargement. Calcium chloride given in milk, which covers the taste, is one of the best remedies. Lactophosphate of lime is another excellent preparation, and also calcium sulphide. Iodised mineral waters, if they can be obtained, often produce excellent results in strumous children. In cases where iodides and cod-liver oil do not appear to produce good effects, arsenic is a remedy often giving satisfaction, and should always be tried; strumous children generally bear it well. I have not had any experience of the use of phosphorus in this disease, but some physicians speak highly of it.

Local Treatment.—All local strumous affections require more persistent and careful local treatment, combined with constitutional means, than similar conditions occurring in a healthy child. Affections of skin or mucous membrane must be dealt with by special remedies suited to the part affected, generally those of a soothing and alterative character being most suitable. The glandular affections are most intractable and

troublesome. The first indication is to remove any source of peripheral irritation, without which all other treatment will prove ineffectual. The glands must be protected from local irritation, and the surface kept warm and of uniform temperature. In the neck, a stock may be used; in any case it should be encased in cotton-wool with a soft flannel bandage. Irritating applications to the skin, especially liniment or tincture of iodine, should be avoided, and also all friction. Hot fomentations, when there is a tendency to heat and inflammatory action, are very grateful. Lead and opium lotion or belladonna liniment may be applied. If ointments are used, the iodide of lead or iodide of potassium with soap are the best. Sometimes twenty per cent. of oleate of mercury with three parts of lanolin is useful, the application being stopped whenever cutaneous irritation begins. When the glands resist all such means, constitutional and local, the question of their removal must be entertained. Should suppuration occur, the abscess must be treated by antiseptic incision, and the cavity thoroughly cleared, if necessary, with the help of a Volkmann's spoon. The removal of indolent, caseous, strumous glands is one of the greatest of recent surgical improvements, and one to be commended on every rational principle. Excision is the most perfect and effectual remedy, but unfortunately the practice can only be carried out in some cases where the glands are isolated and non-adherent. As a rule, the only method at our disposal is incision and scraping with Volkmann's spoon. A sufficiently large incision should be made so as to admit the fingers, by which means it is possible to ascertain whether all the necrotic material has been got rid of. This having been done, the cavity should be washed out with a dilute solution of chloride of zinc or carbolic glycerine, or, better still, dusted freely with iodoform. Means having been adopted to secure necessary drainage, the wound should be covered with protective, and any of the antiseptic cotton-wools applied, and the whole retained in position with a gauze or soft flannel bandage. The results of this radical treatment

of enlarged glands is on the whole satisfactory. Local relief is always afforded; but the prognosis should be guarded, it being impossible to say, in any given case, whether the child may not have already been infected with tubercular disease.

CHAPTER XV.

GENERAL DISEASES—*continued*.

RACHITIS.

RACHITIS, or Rickets, is one of the commonest of the constitutional depravities met with in early life. Its occurrence is associated with the mode of living obtaining in large communities. In country districts, under more normal conditions, its existence is, comparatively speaking, rare. In 1645, Dr. David Whistler wrote a dissertation, entitled *De Morbo Puerili Anglorum dicto the Rickets*, and about the same time Dr. Glissons gave an accurate account of it. The disease is essentially one occurring during the period of infancy, and characterised by a general depravity of nutrition. It is generally slow in its progress, extending over months or years, its duration being quite indefinite and its progress capable of being arrested at any time. In the absence of grave visceral disease, or serious bony deformity, complete recovery may take place, and it is well known that, under favourable conditions, perfect health may be afterwards enjoyed in adult life. This fact forms a marked contrast to the morbid state and tendency to evolution of disease in the scrofulous cachexia, in which the nutritional depravity and evolutionary tendencies remain during life. Although rickets usually occurs during the first two years of life, it is occasionally, though in rare instances, met with later, in children as old as seven years. Congenital or foetal rickets is believed to occur, although some physicians dispute its existence.

Kassowitz, Jacobi, and Chiari describe cases where the changes in the osseous system of fœtuses showed a close, if not identical resemblance to those occurring in extra-uterine life. Pathologically speaking, there seems no reason to doubt the possibility of its occurrence.

CLINICAL FEATURES AND COURSE.—The disease may show itself as early as the second or third month, but most commonly not till the sixth month or end of the first year. During early infancy its occurrence is often not recognised, unless medical aid is sought for on account of one or other of the complications to which rickety children are liable. It not unfrequently happens that such children enjoy otherwise good health, are fairly well nourished and often fat, and are considered by parents and friends remarkably fine healthy children. To the eye of the physician, however, certain peculiarities are noticeable. The child, although fat and apparently well nourished, is probably flabby, especially as regards its muscular system, and is inactive, and often anæmic. On examination, the usual characteristic osseous changes can be made out by tactile examination of the ribs and radial epiphyses, although, on account of the large amount of subcutaneous adipose tissue, they may not be apparent to the eye. Cases of this kind are often met with in children of the better classes, who are well taken care of, and in whom digestive and bronchial complications are therefore less likely to occur. The more ordinary type of case is that in which the disease comes on about the sixth month, or between that and the end of the first year. The child has probably been well during early infancy, but about this time develops certain symptoms, and signs of the onset of the disease. The first characteristic I shall refer to is the *attitude*. A healthy child which is able to sit up rarely remains quiet. It is in more or less constant playful movement; a rickety one, on the other hand, will sit quiet for hours, and shows a great disinclination to move. It sits quietly in bed with its legs often crossed in tailor-like fashion. Sometimes it cannot maintain

the sitting posture without using one or both arms as a crutch or support. Many rickety children have a habit, when sitting up, of swaying the body forwards and backwards on the hips, as a pivot. One little boy, lately in hospital, was constantly doing this, and was nicknamed "pendulum" by the students attending the class. In lying, peculiar attitudes are often assumed. A child at present in the ward, eighteen months old, when it lies down, instead of lying back, bends the body forwards flexed on the hips, the head lying just in front of the knees, which are crossed in tailor-like fashion. Infants who are unable to sit up generally prefer the dorsal decubitus, and often roll about the head on the occiput, "boring in the pillow," as it is called. Another baby lately under treatment, who constantly lay in the dorsal position, when not moving its head about, was playing with one or other of its feet, which it could readily flex up to its face. *Peculiar attitudes*, sitting or lying, and *disinclination to move* when sitting up, are characteristic of these children.

SYMPTOMS.—*General Hyperæsthesia* is a frequent although not a constant symptom, as evidenced by the child crying and showing symptoms of pain when touched or moved. This is often associated with *peevishness* and more or less constant *whining* and *crying*.

Restlessness at night is a common symptom in most rickety children, and, associated with this generally, "kicking off the bed-clothes," even in the coldest weather, is a constant habit, showing an involuntary desire on the part of the child to relieve the heat and dryness of the lower limbs.

Sweating of the Head is one of the ordinary signs. The pillow of a rickety child is generally wet in the morning. As soon as it falls over to sleep, the perspiration begins on the head and face, often running down in large drops.

The Temperature.—In the majority of cases, even in the acute stages, there is no pyrexia. The temperature may even show a sub-normal range. Certainly, in the more chronic stages, the average range is generally sub-normal. Inasmuch as

rachitic children seldom pass through the disease without some complication, generally pulmonary or gastro-intestinal, the temperature is often pyrexial, in consequence of the local affection. In such cases it exhibits great mobility and variation.

Frequent Micturition is another symptom. The napkins are always wet, the mothers tell you.

Emaciation is a sign generally present, if not in the early stage, at a later period. The only other group of symptoms demanding reference here is the tendency which all rickety children have to *catarrh* of the *bronchial* and *gastro-intestinal mucous surfaces*. The signs of slight bronchial catarrh, which most rachitic children present, are evidenced by scattered dry râles here and there in the larger tubes, with a few crepitant râles at the posterior and lateral bases, and inequality and feebleness of the respiration over limited areas, due to weak respiration, and portions of collapsed lung. The milder forms of gastro-intestinal catarrh give rise to flatulent distension and slight tendency to diarrhoea.

Local Signs.—These may be only briefly mentioned now, as they will be again referred to under the anatomy of the disease. They are met with in the bony skeleton, tissues of the body, and internal organs. The bones which show the earliest signs of disease are the ribs at the costo-chondral joints, which become enlarged, and the distal epiphyses of the radii, which exhibit similar changes. The skull exhibits signs of slow and defective ossification at an early period, in the large and slowly closing fontanelles. Changes in the other bones follow if the disease is not arrested in its progress. The muscular system is generally flabby, and the ligaments lax. The subcutaneous fat is commonly atrophied, sometimes hypertrophied (adipose rachitis). The internal organs may be affected in a manner hereinafter to be described. In connection with the clinical features of the disease, it is instructive to mention some of the reasons which induce mothers to seek advice from the physician. To those accustomed to treat

children, a glance at a rickety child is often sufficient to establish a probable diagnosis, or if not, the mother's reply to the question, "What does your child appear to suffer from?" will probably afford grounds for a suspicion of rickets. The mother's only complaint may be that "*the child is backward,*" or that it is "*late in teething,*" or that there is "*something wrong with its legs*" (*late walking*), that it "*sweats about the head,*" or is "*restless at night*" and peevish, that it "*often has a cough,*" or that it "*often has croup*" or "*takes fits,*" or is "*always wet*" (*frequent micturition*). Any such replies as these should be sufficient to lead to suspicion of the existence of rickets in an infant suffering from chronic ill-health.

ANATOMY.—A correct appreciation of the true nature of rickets will be best obtained by going over in the usual clinical fashion the various systems, in order to obtain an insight into the extent of the morbid processes:—

LOCOMOTORY SYSTEM—*Bones*.—The changes in the osseous system are the most constant and characteristic of all. The bone is altered both in its anatomical and chemical constitution. The proportion of mineral matter is reduced. In normal bone the amount of organic to mineral matter is about 100 to 563, in rachitical bones the proportion is 100 to 160.

Skull.—The head is relatively or apparently large. The sutures are wide, and the fontanelles large, remaining open long after the normal period. The general shape of the head is more or less square, the forehead and frontal protuberances being large and prominent. The vertex is flattened, the fontanelle depressed, and the antero-posterior diameter of the head increased as measured from the prominence of the occiput to the frontal eminence. A broad median groove is easily noticed in characteristic cases, extending forwards in the median line from the vertex to the edge of the forehead. The superficial veins of the scalp are dilated, the skin warm and perspiring. The secretion of the sebaceous follicles may be abnormal, seborrhœa being often met with. The hair is generally thin and badly nourished, and deficient over the

occiput, from the habit the child has of rubbing or boring in the pillow. Ossification in the cranial bones is defective and irregular, the bones being thicker in some parts, thinner in others. Hypertrophy is often noticed at the edges of the parietal or occipital bones and about the centre, the other portions being often thinned and parchment-like to the touch. Small round spots of thin tissue are sometimes met with in the occipital, and occasionally in the parietal bone, constituting the condition described by Elsässer as *craniotabes*. This peculiarity is invariably noticed in the early months, and is rarely found after the first year. The general shape of the head is *dolichocephalic*, unlike the *hydrocephalic* skull, which is uniformly enlarged and globular in shape, with prominent fontanelles.

The maxillary bones share in the generally depraved state of nutrition of the osseous system. They are usually small, stunted, and softened. The inferior maxilla is flattened in front, short, and the rami are often thickened. The upper maxilla shows similar changes, being, according to Jacobi, "more spherical than normal, the cheek-bones being very prominent."

Spine.—The softening of the vertebral bones is liable to produce various deformities, the most common of which is *kyphosis*, or backward convexity in the dorso-lumbar region. It is the direct result of the superincumbent weight of the head and upper limbs acting on the weak spine when the child is sitting or standing. On extension the spine becomes at once straightened. *Lordosis* is a less common deformity, and results from the spine being thrown forward when the child is in the erect position. It is not uncommon in caries of the cervical and upper dorsal portion of the spine, and is also favoured by deformity of the pelvis and lower limbs. *Scoliosis* is more rarely met with in infancy than in later life.

Thorax—Ribs.—The changes in the ribs are highly characteristic. Besides the general softening of the bones, which leads to deformity and falling in of the chest, the articular ends at their juncture with the cartilages are enlarged, and

form a series of knobs along the antero-lateral surface of the chest on both sides, extending from above downwards and outwards. This constitutes the well-known "rachitic rosary." The thorax as a whole is deformed in a remarkable manner. It projects in front and is flattened laterally, and when the deformity is well marked the ordinary pigeon breast is the result. The ribs from behind are directed horizontally outwards, then at an acute angle turn forwards towards the cartilages, which, being compressed laterally, push the sternum forwards; thus the antero-posterior diameter of the chest is increased. The lateral diameter is greatest behind, where the ribs turn forwards. The peculiar curve of the ribs on the antero-lateral aspects of the chest forms a longitudinal groove, running from above downwards and outwards on each side, just external to the knobs of the costo-chondral joints. Associated with this peculiar thoracic deformity is a marked change in the respiratory movements, which is specially characteristic. In health the diaphragm contracts, and the ribs are elevated along with the sternum during inspiration; air rushing into the lungs fills them, and enables them as it were to follow the chest wall during its expansion, the atmospheric pressure being overcome by the resistance of the osseous and muscular walls and the pressure of the inspired air. In the softened bony framework of the rickety chest these conditions are altered. Thus, in inspiration, instead of the natural expansion we have a recession of the chest walls, except the sternum, which is advanced in the usual manner; the belly expands, and this expansion, contemporaneous with the recession of the thorax, gives rise to the appearance of a horizontal or zonular furrow or groove where the belly joins the thorax.

The *clavicles* are not always, but frequently, affected. Either or both articular ends may be enlarged, but generally the sternal extremity. About the junction of the internal with the middle third the bone is curved with an upward convexity, sometimes there is a callous knob in this situation due to "greenstick fracture."

Pelvis.—In the infant, changes in the ossa innominata are not easily made out. Sometimes the edges of the ilia can be felt to be thickened. The pelvis as a whole may be stunted in appearance, especially in cases where there is much spinal deformity. The pelvic outlet may be very much narrowed. Sir Henry Thompson relates the case of a child on whom he operated for stone, in which it was impossible to extract a calculus $1\frac{1}{8}$ inches long, seven-eighths of an inch broad, and five-eighths of an inch thick.

Femora are exaggerated in the normal curve forwards and outwards. The angle of the neck is often acute, sometimes obtuse. The diaphyses are thickened and the condyles are enlarged, but unequally, in proportion to the amount and direction of pressure upon them, the one condyle enlarging while the other becomes smaller.

Tibiæ generally show early deformity. Before the child walks they are curved with the convexity outwards. When the child begins to walk, the bones bend at the lower third, the convexity being forwards, so that the bone hangs over the foot in front. Sometimes the convexity may be more outwards, projecting over the external malleolus.

Humeri are generally bent at the junction of the upper and middle third.

Radii and Ulnæ.—The most notable changes are in the radius, which is generally enlarged and bulbous at the distal epiphysis. The shaft is bent with an outward convexity. This deformity is aggravated by the habit practised by rachitic children, of supporting the body by the arms when sitting.

Scapulæ are sometimes thickened and deformed so as to interfere with the due movements of the shoulders. The anterior surface is often more concave than natural, and the edges of the bone, especially at the lower part, thickened.

Joints.—Certain changes take place in the structure of the joints. Their enlargement is all the more apparent often from the atrophied condition of the muscles and limbs generally. The ligaments are lax and often stretched, producing greater

mobility in the joints. The relaxation of the ligaments does not always bear due relation or proportion, however, to the osseous changes. In children in whom the disease appears at a later period, the laxity of the joints is often specially marked, the bones at this age retaining their straightness. Only one other peculiarity in the osseous system is deserving of note. Not only are bones altered in structure qualitatively, but their general growth is retarded. As a result of this, rickety children are usually short and stunted in growth.

Muscles.—The muscular system always suffers more or less. The changes, however, are not of a qualitative nature. The muscles being thinned and atrophied, and their functional activity diminished, an additional factor is present contributing to the production of bony deformities.

The Skin and Subcutaneous Textures.—The skin is pallid in severe cases, not so always in slighter ones. Perspiration is frequent on the head, less so on other parts of the body. The cause of excessive head sweating is not well understood. Whether it has any relation to the bone changes going on in the cranium is uncertain. The subcutaneous fat is frequently hypertrophied, most commonly in those cases where the disease comes on at a late period, during the first dentition, and when no wasting complication is present. Atrophy of subcutaneous fat occurs generally in these cases where, all through their progress, there has existed chronic gastro-intestinal catarrh or other complications, giving rise to persistent pyrexia. The usually normal or hypertrophied condition of the subcutaneous fat in uncomplicated cases forms a striking contrast to the general flabbiness and atrophy of the muscles.

DIGESTIVE SYSTEM.—The most constant sign in this system is delayed or irregular teething. The teeth appear late, and often decay early. The process probably does not begin till the ninth or twelfth month, and may not go on to completion until long after the second year. The delay in dentition generally bears a pretty constant relation to the gravity of the case, and the serious nature of the changes in the other parts of the osseous

system. In cases where the rachitic process has not commenced till the end of the first or beginning of the second year, the child has probably cut its first teeth at the normal period, the further progress of the process being delayed as soon as the disease shows itself. Occasionally the eruption of the teeth, in regard to its commencement and progress, is normal, but such cases are quite exceptional.

Gastro-Intestinal Disorder.—Rachitic children are specially prone to catarrhal affections, whether of the digestive or respiratory systems. The abdomen is enlarged and flabby, and the causes of this are not far to seek: (1) Flabbiness of the abdominal muscles; (2) depression of the diaphragm, from diminished size of the thoracic cavity; (3) descent of the liver, spleen, and other abdominal organs, as a consequence of this; (4) increased shallowness of the pelvis; (5) atony of the muscular coat of the bowels and stomach, giving rise to distension, generally accompanied by flatulence; (6) in some cases actual enlargement of the abdominal viscera, particularly liver and spleen. Constipation is very frequently present, especially in young babies where no catarrh exists. It seems to be due to atony of the muscular coat of the bowels, and feeble peristalsis, also to the more or less acholic condition of the stools, which are usually paler than natural. Gastro-intestinal catarrh is usually associated with improper feeding. The stools are deficient in healthy bile, or greenish, foetid, and mixed with more or less clear or frothy mucus and undigested food, and contain an unusual proportion of earthy salts. The tongue is usually somewhat pale, seldom furred to any extent, but often shows denuded patches from an unhealthy condition of the epithelial coating. The *liver* is generally enlarged from congestion, and there may be more or less fatty change. In some cases where there is extreme atrophy of the whole body, it may be small.

Lymph Glands and Spleen.—The spleen may show no change, but is often slightly enlarged, more rarely to a great extent. The changes are usually simply hyperplastic. The

lymph glands are very prone to enlargement and disease in rickety children, but I doubt if this affection can be considered primary in the strict sense of the term, the altered condition of the nutritive fluids passing through the glands necessarily predisposing to pathological changes.

CIRCULATORY SYSTEM.—The condition of the heart and blood-vessels has been studied from the anatomical standpoint by Beneke,¹ and probably less attention has been given to his researches than they deserve, on account of their important bearing on many of the pathological conditions met with in the disease. He found the pulmonary artery larger than in the healthy child, which probably has important bearings on the circulation through the lungs, and its effects in the pulmonary complications. According to Beneke, the arteries generally throughout the body are dilated, in which case the arterial pressure throughout would be lowered, and the circulation generally retarded, which quite accords with clinical experience. On this point Jacobi makes the following suggestive observations:—"A great many more blood-cells are required to fill the arteries when wide than when narrow. Now, the formation of blood-cells is hindered by any disease of the digestive and blood-preparing organs, so that the tissues are liable to show the relative increase in the percentage of water, which is uniformly confirmed for rachitis by the biochemists."

RESPIRATORY SYSTEM.—From what has been said regarding the condition of the bony thorax, and the circulation through the lungs, it is evident that in all cases of rachitis, whether there is much bony deformity or not, the respiratory function must be interfered with to a greater or less extent. Allusion has already been made to the altered movements of the chest in respiration, when there is much deformity. This interferes materially with the expansion of the lungs, and the respiration is therefore always feeble; not only so, the pressure inwards of the lateral parts of the chest during inspiration prevents

¹ *Die Anatomischen Grundlagen der Constitution des Menschen*, 1878.

the access of air to the pulmonary alveoli, and there being no obstacle to the expiration the involved portions of lung soon become atelectic. Associated with this, compensatory emphysema is always present, chiefly in the anterior portions of the lungs. The rickety child, in consequence, is apt to suffer from more or less dyspnoea and cyanosis. The circulation through the lungs is feeble and retarded, tending to more or less blood stasis, and mainly as a result of this there is a great liability to catarrhal affections of the mucous-membrane of the bronchi. Cough of a chronic nature is one of the most common symptoms. Whenever a young infant suffers from chronic cough there is a presumption in favour of rickets. Hypostasis is common at the lung bases, as evidenced by fine moist râles over the lower ribs behind. Further and more serious respiratory complications are frequent—such as alveolar catarrh, and low forms of inflammation in and around the collapsed patches. The unhealthy condition of the bronchial mucous surface and lung tissue generally favours tubercular infection, which is common in rickety children.

HÆMOPOIETIC SYSTEM.—Reference has been made to the condition of the spleen, and nothing further need to be said in regard to it. The thymus gland is often large in rachitic children, so much so, as to give rise to pressure symptoms and the so-called thymic asthma associated with laryngismus stridulus, so common in rachitic babies. Jacobi, in an interesting monograph on the thymus gland, alludes to the subject, which is worthy of further study and attention.¹

The *blood* in rachitis frequently presents marked alteration. I find from a systematic examination of the blood in hospital cases that anæmia is present in about thirty per cent., the relative proportion of corpuscles being diminished, and the hæmoglobin markedly deficient, the leucocytes being quantitatively and qualitatively normal as a rule.

NERVOUS SYSTEM.—The nervous system is rarely if ever in a

¹ *Contribution to the Anatomy and Pathology of the Thymus Gland.*
A. Jacobi.

normal state. In slight cases no symptoms may be observed, but when the disease is fully developed, and the general depravity of nutrition well marked, symptoms of instability and excessive irritability, the product of altered nutrition and lowered tone, show themselves in one way or another. Under the head of Convulsions I have already alluded to this symptom, and pointed out how liable rickety children are to discharges of various kinds. The frequent recurrence of convulsive seizures in infants is, in a large proportion of cases, associated with this disease. In one hundred and two cases of recurring convulsions recorded by Dr. Lee, forty-eight were rickety. Such seizures in infants are often put down to teething, and doubtless the process has much to do with this occurrence as an exciting cause, the rachitic constitution being a predisposition. Any other peripheral irritation may produce similar effects, especially gastro-intestinal disorder, which is so frequently present.

Laryngismus Stridulus, although not invariably, is commonly met with in rickety children. It is characterised by tonic spasms of the respiratory muscles and glottis, and is followed, on the relaxation of the spasm, by a loud crowing inspiration. The limbs may become rigid at the same time, carpopedal contractions being frequently present. In some cases, when the respiratory spasm is very severe, the limbs are flaccid, and dangle loosely when the child is held in the arms.

Tetany.—The relation of this disease to rachitis will hereafter be described. When it occurs during the first dentition, rickets is generally the determining cause. According to Erb, the electrical reaction of nerves is altered. Abnormal sensitiveness to either current is present. The anodal or cathodal opening or closure produces continuous contraction, irritability first showing itself in the closure of the current at the positive pole.

Brain.—The brain participates in the disturbed vascularity of the cranium. In well-marked cases it is in a state of passive

hyperæmia, showing puncta cruenta on section, and this is apt to lead on to a true hypertrophy, which in its turn, from pressure on the vessels, may give rise ultimately to a greater or less amount of anæmia. Under these circumstances, serous effusions are liable to occur, and hydrocephalic conditions develop as a sequence, the altered blood-vascular and physical relations within the cranium producing varying results in different cases. The cerebral substance, especially when effusion has taken place, is often markedly anæmic and white, presenting a peculiarly brilliant and polished appearance, the grey substance looking faded. Sometimes there is no sign of congestion, but the brain may be rather anæmic throughout. According to Rokitansky, the condition of the brain is one of true hypertrophy, the alteration consisting of an "excessive accumulation of the intervening and connecting nucleated substance."

URINARY SYSTEM.—The kidneys are generally normal but sometimes enlarged, without any marked change in structure. The urine, in its qualitative relations, is probably unaltered, certainly contains no excess of earthy salts. The quantity is difficult to estimate, as micturition is frequent and the amount cannot be easily ascertained. The general belief is that it is increased, but from want of accurate observation this is not proved.

HISTOLOGICAL ANATOMY.—The bones exhibit marked pathological changes. Those in which the most marked alteration take place are the long bones, the ribs, skull, and vertebræ. It will suffice if we allude to the changes taking place in the distal end of the radius, or the sternal end of one of the ribs; in either case the morbid changes are alike. The epiphysis will be seen to be much enlarged, and the hypertrophy is observed, not only in the bone itself but also in the cartilage. The periosteum is thickened and highly vascular. The tissue of the bone generally, instead of being dense, is soft and spongy. On section these macroscopic appearances are still better seen. The cartilage between the epiphysis and shaft, instead of being a thin regular layer, is much

hypertrophied, sending shoots into the calcifying layer, in which are noticed islets of calcifying material. There is great vascularity in these tissues, especially around the calcifying centres. The shaft of the bone is also imperfectly ossified, soft, and very vascular. The bone is easily bent, and during life the so-called "greenstick" fracture is readily produced. After hardening with chromic acid, and treating with nitric acid, a microscopic section shows more intimately the peculiar changes taking place in the osseous tissue. The cartilage is seen to be hypertrophied, from increased cell proliferation. The cells, instead of being arranged in a regular manner as in normal cartilage, are irregularly grouped together in little masses, forming distinct opaque points, where calcification is seen to be going on in the matrix and cells. Large blood-vessels are seen here and there ramifying in the cartilage. Around the large spaces, between the groups of cartilage cells, may be seen layers of larger cells (osteoblasts). The process going on in these rachitic bones seems to be rather a calcifying than an ossifying one, the process of true bone formation being to a great extent abortive. Under the periosteum there is seen an increased formation of osteoblasts, in which imperfect ossification is likewise going on. The increased vascularity of rickety bones is a marked feature. As the disease declines, the blood-vascular relations gradually assume normal proportions, and along with this process of involution an increased formation of more normal bony tissue takes place, the spongy tissue becoming firm and condensed, with the result that the bones ultimately become hard and dense, and much thicker and stronger than normal bones.

PATHOLOGY.—Among the most recent and elaborate researches regarding the true nature of the bony changes are those of Kassowitz, who considers the changes to be due to inflammatory action going on in connection with the abnormal vascularisation of the bony tissues. He made some interesting experiments, by putting an elastic band on the limbs of young growing animals, with the result that the increased vascularity

thus produced caused similar changes in the bone to those seen in rickets, viz., increased cartilage formation with absorption of the mineral elements of the normal bone, and an arrest of the formation of new bone; tending to prove, as he holds, that similar altered vascular relations, from whatever cause, may induce the changes characteristic of this disease. Virchow¹ also considers the changes of an inflammatory nature, but is unable to explain how these originate. Various other theories have been brought forward to account for the deficient supply of lime salts and defective ossification in rickety bones. It may be at once stated that the deficiency of inorganic material in the bones is not believed by pathologists to be the "primary factor" in the morbid process. Milne-Edwards, Weiske, and Chossat have all made experiments, which prove that a deficient supply, or a deficient absorption of lime salts and phosphoric acid, will not *per se* induce rickets. The peculiar irritation of the osteoplastic tissue, from whatever cause, accompanied by a diminution in the amount of lime salts in the bones, has led Heitzmann to advance the theory, based upon some experiments made on animals, that lactic acid is the cause or irritant which sets up the changes in the osteoplastic tissues. By giving lactic acid internally and subcutaneously, he produced, in the animals experimented on, a condition exactly similar to true rachitis. These experiments, however, have not stood the test of repetition, either by Kassowitz himself or Korsakow, who tried them with entirely negative results. In corroboration of the clinical theory of the production of rachitis, Wegner has experimentally proved with phosphorus, that the administration of this drug to animals, under certain conditions, produces bony changes analogous to rickets. Gorup-Besanez and others have shown that in a large proportion of rickety children there is an excess of lactic acid in the tissues. In regard to the chemical theories of the production of rickets, the following facts as recorded by Jacobi are of interest:—Benge found that "when potassium

¹ *Archiv f. Pathol. Anat.* Bd. v.

salts, the chloride excepted, meet with chloride of sodium, the two will exchange their acids, chloride of potassium and phosphate of sodium being formed ; the result of these changes being that there is a comparative absence of chloride of sodium in the blood. This diminishes the possibility of a sufficient production of hydrochloric acid, thereby preventing the solution of the lime salts, which are excreted in an insoluble form in the fæces. The correct proportion between chlorine, phosphorus, potassium, and sodium exists in woman's milk, the lime salts existing in sufficient quantity. When, from any cause, indigestion of woman's milk takes place, the absorption of lime will be prevented, when a superabundance of phosphorus and potassium disturbs the formation of hydrochloric acid. Defective nutrition of bone and muscle results, the feebleness of the muscles interfering with the proper circulation of the blood through the smaller blood-vessels. "Hence the reason why I insist," says Jacobi, "upon the addition of chloride of sodium to the food of infants and children." The opinion generally held at present is that the so-called inflammatory changes in the bones, being the primary factor in the disease, may be induced in various ways and by the operation of different etiological factors, acting on the young infant at that period of life when growth and development generally, and specially the osseous tissues, is going on with greatest activity.

ETIOLOGY.—The question whether rickets is hereditary in the same sense as struma or gout has long been debated. There is no evidence to prove that it is so. Heredity, or even a tendency from the father, is not borne out by experience. All observers are agreed, however, that in regard to the mother the case stands in a different light, and maternal influences, in a general way, are potent in so affecting the health and nutrition of the infant as to render it liable to develop rickets during the first two years of life. Women who, during pregnancy, are exposed to unfavourable hygienic and dietetic conditions, and who are either totally unable to nurse their children,

or do so with a milk defective in quality or quantity, frequently rear children who rapidly develop rickets. Pfeiffer has made analyses of women's milk in cases where the infants were becoming rickety, and found in many that it was deficient in mineral elements, particularly phosphates. Parrot believes that rickets is the product of syphilis, and that the disease is directly transmitted from the parent, particularly the mother. His observations were chiefly made in the Paris Foundling Hospitals, where syphilis is undoubtedly common; but in this and other countries there is no evidence to prove the universality of Parrot's assertion—on the contrary, facts go directly to disprove it. It is well known, however, that rickets may complicate syphilis.

Climate appears to have some influence in the production of the disease. It is more common in temperate regions than either very cold or hot countries. Malarial districts are pretty free from it. It is more prevalent in low-lying and damp localities than in dry soils and high altitudes. It is specially the product of large centres of population, being much rarer in country districts.

Bad Air.—The effects of deficient ventilation in lowering the vital tone and nutrition of the growing child is universally admitted. It will generally be found that rickets is most common in families who inhabit a single room, where there is practically little or no ventilation.

Want of Cleanliness, either personal or in the house, cannot fail to exercise a deleterious influence. Children who are not regularly washed, and whose clothes are seldom changed, must necessarily inhale the products of organic decomposition, and be injuriously affected thereby.

Improper or insufficient Clothing and Warmth may act injuriously on the child, by producing chills and interfering with the cutaneous circulation, thereby causing a tendency to passive internal congestion, which in turn favours the production of catarrhal affections of the gastro-intestinal and pulmonary mucous surfaces.

Want of Sunlight is probably one of the most important factors in the chain of causes acting on the growth and development of the infant, and it is generally admitted its absence favours the production of rickets. Light is one of the principal sources of energy and activity, without which neither plants nor animals can grow up in a healthy state. The Romans recognised this in the importance which they attached to the beneficial effects derived from their Solaria.

Food.—Deficiency in quantity or quality of nutriment is generally regarded as one of the most certain causes producing rickets. A healthy baby, suckled by a healthy mother, with a milk supply sufficient in quality and quantity, rarely, if ever, shows signs of rickets. On the contrary, the disease is most frequently developed under opposite conditions. Among the poorer classes children are often breast-fed on poor milk, the mother living under faulty hygienic and dietetic conditions. Children who have not the advantage of a good supply of breast-milk from a healthy mother run two special risks—(1) *Deficient nourishment*—improper quality of food; (2) *Indigestion* resulting therefrom. It is probable in rickets that faulty primary and secondary digestion exists, the former being recognisable clinically, the latter, as a presumption, being present in most cases. Children may be rickety who show no signs of gastro-intestinal disorder whatever, the existence of the ordinary signs of bone disease and delayed dentition being the only facts. Such cases have already been alluded to as being met with frequently in children of well-to-do parents, who have all the advantages of good sanitary conditions, but do not obtain healthy breast-milk and are brought up by hand, the point of interest in such cases undoubtedly being that the food seems to be the only factor apparent in the production of the disease. Experiments have been made with the view of proving that improper food alone may produce the disease. Thus M. Guérin fed puppies on meat alone, with the result

that they became rachitic. Tripier made similar experiments with a negative result, the animals mostly all dying of marasmus. The results of Guérin's experiments, however, have been lately corroborated by Bland Sutton, who undertook some investigations on young animals in the Zoological Gardens, Regent's Park. Lion whelps fed on animal food alone, being deprived of breast-milk, rapidly became rickety. Young monkeys, deprived of their mother's milk and fed on vegetable diet alone, rapidly developed the disease. Another litter of lion cubs were treated in a different manner, with entirely satisfactory results, being fed on meat, with the addition of milk, cod-liver oil, and pounded bones. Cheadle, who strongly believes in the food-factor in the production of rickets, considers that a deficiency in the proteid and fatty elements of nutrition are the chief causes of the disease. It is well known that children fed on cows' milk, simply diluted, readily become rickety, even if the mixture is digested, still more so if the curd (proteid) passes away undigested in the stools. The various infant foods which flood the market are liable to cause rickets, from the fact that they are almost all deficient in fatty and proteid elements, the starchy ingredient largely predominating. From a consideration of the foregoing facts, it may be considered proved that improper feeding alone may produce rickets. It is probably equally certain that it does not do so in all cases, but that various causes may act in producing the general depravity of nutrition which gradually and surely leads to the development of the disease. Certain diseases predispose to rickets, others are antagonistic to it. Thus, of all the predisposing causes, gastro-intestinal indigestion is one of the most frequent. Acute diseases, as measles or whooping-cough, occurring in young infants, also seem to render them liable to it, or at all events, as Barlow well says, aggravate the previously existing predisposition, or favour the further progress of it. Early tuberculosis in the infant seems to render it less liable to the disease, and so also extreme marasmus, produced by

gastro-intestinal catarrh, in which there is much vomiting and diarrhoea.

PROGNOSIS depends very much on the complications which are present, pulmonary or gastro-intestinal being the most common, tuberculosis often following in the wake. In mild, uncomplicated cases, such as those met with in the babies of better-class people, the children often grow up healthy and strong after the first dentition is over. If there is much bony deformity of chest, or signs of visceral enlargement, the prognosis is always more grave.

DIAGNOSIS.—No difficulty presents itself when the disease is fully developed and bony deformities well marked. The only doubt is in the early stages. The early recognition of the disease is of great importance, as under favourable conditions its progress may be arrested, and the development of bony deformities combated with more or less success. The disease is most frequently overlooked in its milder forms, and more particularly in adipose rickety children, who have not suffered from any complication. Delayed dentition, late closure of fontanelles, bulbous radii at their distal ends, and beaded ribs, are the signs to be depended on. General backwardness and late walking are also useful signs. Children with slight rickets, and no obvious bony deformity, are often brought for advice on account of "something wrong with the legs" or the "back," as mothers say. In such cases an examination will reveal signs of rickets in the majority of cases.

TREATMENT.—From all that has been said regarding the disease the principles of treatment may be easily laid down. *Restoration of a healthy nutrition* is the object to be attained, by combating all those conditions regarding diet and hygiene which produce and foster the disease.

Prophylaxis.—In mothers who have borne rickety children, a great deal can be done by attending to the general health before and during future pregnancies. The influence of the maternal health in predisposing to the disease cannot be over-

estimated. The treatment of the mother must be carried out on general principles, which are obvious to any well-informed practitioner. If necessary, in addition to general hygienic means, and change of air or residence, ferruginous tonics may be administered as an adjuvant. Frequently recurring pregnancies often result in the bearing of children specially disposed to the disease. The question of lactation in delicate mothers always comes up, and should be carefully considered. If the mother be deemed unfit for nursing, the child must be most carefully reared by hand or by wet-nurse. The principles which guide us in the artificial rearing of infants having been laid down in another chapter, need not be repeated, suffice to say, all the details of feeding must be carried out with the most scrupulous care and minuteness of detail. Rachitic children neither digest nor assimilate properly, and it requires great judgment on the part of the physician in selecting food which will at the same time be the most nourishing and easily digested. The relative proportion of the various ingredients should be carefully regulated, particularly in regard to the proteid and fatty elements. Starchy foods should be avoided, and only those farinæ allowed—such as barley, oats, and wheat—which contain a suitable quantity of proteid and mineral ingredients. Nourishing soups and raw meat should be given, or chicken, white fish, or lightly cooked eggs for older children. A softly boiled egg mixed with bread crumbs, butter and salt, forms a very nourishing meal for some children. Next to feeding, the general hygienic management must be attended to. The child should be housed in a healthy locality, damp and low-lying places being avoided. The rooms should be well ventilated, and kept at as nearly a uniform temperature, 60°, as possible. He should be warmly clad in light flannel all over, limbs as well as body. No belly-bands should be worn, or anything tight about the child which would tend to impede free respiration. Cleanliness is all-important. A tepid bath, about 99°, should be given at least once a day,

and the child well rubbed over after it, so as to stimulate the cutaneous circulation. Modified massage of body and limbs is very useful. In many cases inunction with oil after the bath is very beneficial. In fine weather the child should be taken out regularly in the open air, if no complication forbids it. Care should be taken, if the weather is not very warm, that he be not kept out too long so as to get chilled. Sunlight is important, and if the child cannot be taken out, it should be exposed to the direct rays of the sun in the room or at the window, if possible.

Medicinal Treatment must not be neglected, although of secondary importance. Medicines may be required to alter or relieve the disposition to digestive derangements. They should be of a simple nature suited to the ailment. In catarrhal affections, alkalies and bismuth, or rhubarb and soda, or small occasional doses of grey powder, may be required. The ordinary slight bronchial catarrh requires no special treatment. Collapse or catarrhal pneumonia must be treated on the principles laid down for these conditions. Three medicines are specially useful as tonics—iron, cod-liver oil, and phosphorus. Iron is clearly indicated in all anæmic cases. The preparation must be chosen which best suits the digestive peculiarity of the child. Dialysed iron, saccharated iron, or ammonio citrate are generally well tolerated. The lactophosphate and the protochloride are specially useful. I generally use the glycerite preparations,¹ which are active, stable, and well tolerated, and preferable, in my experience, to any others. Phosphorus, so strongly recommended by Kassowitz, is a drug of certain value as a tonic and bone alterative. It may be administered as the oleum phosphoratum, in teaspoonful doses, or as phosphorated maltine, or made up as an emulsion with mucilage and ol. amygdalæ, the dose being $\frac{1}{120}$ of a grain. Cod-liver oil itself is a most useful nutrient tonic, but unfortunately all rickety children cannot take it. The dose

¹ Messrs. Duncan, Flockhart, & Co. of Edinburgh have specially prepared them for me.

should be carefully regulated, not more than a teaspoonful being given thrice or four times a day. Some children can only take half or one-third of the quantity. When administration by the mouth is inadmissible, inunction should be tried, and of this method I can speak with favour. It is astonishing how children improve under this plan of administration, and how much the skin will absorb, contrary to the theory of many dermatologists. The treatment of rickety deformities requires the careful attention of the surgeon, and during treatment all the medicinal as well as hygienic and dietetic means should be enforced. Knock-knees and bow-legs should be combated at the earliest stage, and the child prevented from walking; at the same time regular massage should be employed to give passive "exercise" to the muscles. Suitable splints should be applied to the limbs, with extension and manual pressure, or other means to strengthen the limbs. Bow-legs, if treated early, generally get well without special surgical treatment. Knock-knees, when aggravated, require ultimately the performance of osteotomy.

Scurvy and Rickets.—The consideration of rickets would be incomplete without allusion to the not infrequent association of scurvy with the disease. Drs. Barlow and Cheadle were among the first to draw attention to the subject. There can be no doubt that symptoms of scurvy in infants, as indicated by spongy gums and tendency to capillary hæmorrhages, are very frequently met with in association with rickets. In children who have been fed on starchy foods, with little fresh milk and no fresh animal food, the probability of scorbutic complications should be expected. One of the most peculiar signs in these cases is subperiosteal hæmorrhage, giving rise to separation to a greater or less extent of the membrane from the shaft of the bone. It is noticed that the periosteal covering of the epiphyses seldom becomes detached, as in the shaft of the bone. The epiphysis and lower end of the shaft become

separated, giving rise to pseudo-paralysis, often confounded with syphilitic disease of the long bones. In all these cases the limbs are swollen, without redness or fluctuation. Antiscorbutic treatment, with the administration of fresh milk, raw meat or the juice, with potato soup, as recommended by Cheadle, and such-like articles of diet, speedily gives relief to the symptoms.

CHAPTER XVI.

HEART AND CIRCULATION.

CERTAIN peculiarities in the blood and vascular apparatus in children are noteworthy. The blood of the foetus, or newly-born infant, is much richer than that of the mother, containing more hæmoglobin. The fibrin, on the other hand, is notably deficient, but rapidly increases in quantity with the establishment of the respiratory process. In the older infant and child we find the total amount of blood is less in proportion than that of the mother, and contains less fibrin, salts, and hæmoglobin, and more white corpuscles. The specific gravity is also less (Jacobi). Weber and Hewitt, as quoted by Jacobi, explain the occurrence of icterus in the newly-born, by the passively congested state of the liver, associated with the atelectic condition of the lungs and large amount of blood, compressing the biliary ducts. It is interesting to note the relative development of the right and left side of the heart after birth. During foetal life the right side of the heart is functionally more active than the left. After birth the left side gradually increases in size and functional activity, proportionate to its physiological requirements, coincidently with the closure of the ductus arteriosus. The functional activity of the right side of the heart during foetal life predetermines the tendency to pathological conditions at this period, consequently we find that most congenital affections of the heart are met with on the right side. Recent observations go to prove that, physiologically, the heart is relatively larger in the child than the adult. The umbilical

arteries and vein in the infant present peculiarities of structure which are physiologically important. The umbilical arteries show an unusual development of the muscular coat, especially in the immediate neighbourhood of the umbilicus, the circular fibres being largely developed in proportion to the longitudinal. They contain little or no elastic tissue. These peculiarities are physiologically of great importance, the unusual development of the muscular coat serving a useful purpose in preventing hæmorrhage when the cord is torn or roughly severed without being ligatured. The umbilical arteries are not provided with any valves. There are, however, dilatations and longitudinal grooves produced by the unequal amount of muscular elements in local areas of the vessels. The umbilical vein is very closely assimilated in structure to the arteries, containing a large proportion of muscular tissue. The relatively larger size of the child's heart is a physiological necessity, on account of the great activity of all the nutritive and developmental processes going on in early life. As a result of this, we find a great liability to disturbed blood-vascular relations under various diseased conditions—such, for example, as obtains in rickets and scrofula. In the fœtus, before birth, the pulse ranges from 130 to 150. After birth the rate becomes slower. There is a difference of between ten to twelve beats between sleeping and waking. Any temporary excitement raises the pulse considerably. Normally, in the healthy young child, the pulse rhythm is slightly irregular. A correct estimate of the frequency of a young child's pulse can only be obtained satisfactorily during sleep. On waking, the slightest excitement is sufficient to raise it.

ANÆMIA.

Alteration in the quantitative and qualitative relations of the blood-elements in children is of frequent occurrence, from a variety of causes. Anything which interferes with the active nutritional processes going on during

the growth and development of the child may initiate and determine serious blood changes. In considering these, and making clinical observations on the blood, it is necessary to bear in mind the physiological facts already alluded to, and which may be briefly recapitulated. The young child has relatively to the adult, in proportion to its weight, less blood. As given by Jacobi, the figures are 1:19·5 in the child, to 1:13 as in the adult. The corresponding specific gravities of the two fluids being 1047 and 1055. The white corpuscles are somewhat increased in the child, the fibrin, salts, hæmoglobin, and soluble albumen diminished. These facts show that the child, relatively to the adult, is naturally at a greater disadvantage in regard to its blood relations, the system having greater demands requiring fulfilment, with a less adequate supply of material to satisfy them. The balance between supply and demand being more delicate, is therefore more likely to be disturbed from various causes.

ETIOLOGY.—Anæmia may be *congenital*. Children born of delicate mothers are often markedly anæmic. Dr. Henry, of Philadelphia, gives the analysis of blood from a child weighing $6\frac{3}{4}$ lbs. at birth: red corpuscles, 3,625,000; proportion of white to red corpuscles, 1:145. Infants born prematurely of delicate mothers, and those affected with congenital heart disease, or syphilis, are often markedly anæmic. The various forms of hæmorrhages—melæna, hæmophilia, umbilical bleeding, cephalhæmatoma, affecting newly-born babies—often give rise to anæmia, from which the child may never recover.

Idiopathic or *Pernicious Anæmia* is not so common in children as in adults. Cases are now and again recorded. The cause is generally obscure. The symptoms and course of the disease present no contrast to those of adult life. Extreme pallor and progressive weakness, without emaciation, vomiting, slight febrile movement, restlessness and languor, often hæmorrhages on the skin, mucous and serous membranes, and on the surface of the viscera, which are often in a state of

fatty degeneration, constitute the usual clinical features. Kjellberg has described some cases of this kind, the youngest being a child of five years.¹ Quinke reports a case in a girl of eleven, which proved fatal in five weeks, the symptoms being profound anæmia, languor, heart murmurs, venous pulsation, diarrhœa, retinal and other hæmorrhages. On post mortem examination there was found dropsy of serous cavities, hæmorrhages under the epicardium, and in the muscular substance of the heart.

Consecutive or Secondary Anæmia is the usual form met with. It may be produced by any causes which interfere with the due elaboration of the blood, or, on the other hand, any destructive processes which tend to destroy its constituent elements. Probably one of the simplest kinds of anæmia is that due to *insufficient nourishment*. It is met with in babies of the poorer classes, often breast-reared, in which the maternal milk supply is defective in quantity and quality. In these cases, the child, as a rule, gets rapidly well under more favourable dietetic conditions. Over-lactation, or suckling during pregnancy, are often productive of anæmia. In artificially reared children, unsuitable food, which is either not properly assimilated or insufficiently nutritious, will act in the same way. In this connection *gastro-intestinal disorders* of various kinds are common causes, and contribute largely to the production of anæmia, more especially if the children are under unfavourable hygienic conditions as regards ventilation and sunlight. *Chronic Diarrhœa* is probably one of the most frequent causes of ordinary anæmia in young children. In constitutional diseases, such as *syphilis*, *rachitis*, and *tuberculosis*, more rarely in *scrofula*, the blood is apt to become quantitatively and qualitatively altered. In the regular examination of the blood in rachitic children, I have found a large proportion of them anæmic. Diseases of the organs, associated with sanguification, are surely productive of anæmia. Thus, in splenic disease, lymphatic affections, and disease of the bone marrow, we have

¹ *Archiv f. Kinderheilkunde*, Bd. v. heft 5 and 6.

conditions which may prove rapidly destructive to the blood-elements. Keating and Edwards remark, in this connection, that it is a curious fact that "with impaired activity in the blood-making tissues we note an increased size in these structures," showing that enlargement of an organ is not necessarily associated with greater functional activity. Osler classifies these diseases into *leucocytic* (leukæmia), including splenic, lymphatic, and medullary; and *non-leucocytic*, including splenic anæmia, lymphatic anæmia (Hodgkin's disease), and medullary (idiopathic anæmia), in certain cases.

Acute Diseases, such as typhoid fever and rheumatism, often produce anæmia in the child; so also *chronic affections*, such as kidney disease, chronic lung disease, especially of the bronchi (bronchicetasis), purulent discharges from various causes, as empyema, or spinal caries.

Chlorosis is a special form of anæmia, occurring particularly in girls often about the period of puberty. Cases have also been recorded in young children, where the symptoms and character of the blood are identical with those met with in chlorosis.

MORBID ANATOMY.—In *chlorosis* the red corpuscles are reduced in number, but not to a great extent; the hæmoglobin is markedly deficient. Microcytes and large red cells are sometimes observed. Virchow has pointed out that in some cases of chlorosis the heart and blood-vessels are relatively small, remaining in an atrophic or infantile condition. The other organs present no appearances characteristic of the disease.

Pernicious Anæmia.—In this disease the leading feature is the enormous reduction of the number of red corpuscles, sometimes as little as one-tenth, or less, of the normal amount. In addition, the corpuscles themselves are altered, showing great variation in size. Thus they may be increased very much, exhibiting the giant form (megalocytes), or they may be normal in size or very much reduced (microcytes). Alterations in shape of the corpuscles are also a marked feature and specially

peculiar to this disease. Thus the biconcave normal shape may be replaced by flat, oval-tailed, elongated, or even rod-shaped forms. The corpuscles show no tendency to form rouleaux. Ehrlich describes nucleated red corpuscles as often present. Max Schultze's granule masses, composed of blood plates or hæmatoblasts, have been found by Quincke, Leube, and Osler in some cases. The leucocytes are generally normal or slightly increased. Hæmoglobin is deficient, but, according to Osler and Laache, not so markedly so as in chlorosis, "the relative coloration of the corpuscles being generally increased," thus contrasting markedly with the relative reduction in chlorosis, which shows that the anæmia is never so intense as the number of corpuscles would appear to indicate. The heart may be normal, but generally shows signs of fatty degeneration. The blood-vessels often exhibit similar changes, and also the gastric mucous membrane. The spleen and lymph glands are unaffected. The bone marrow is often of a reddish colour, like that of the infant.

Leukæmia essentially consists in enlargement of spleen, lymph tissues, and bone marrow, with increase of colourless corpuscles in the blood. Cases are recorded where changes have been observed also in the thymus and thyroid glands, as well as in the tonsils and lymphatic tissues of the intestines.

SYMPTOMS.—The ordinary signs of anæmia in the child are easily recognised. The skin is clear and transparent, or pasty looking. The pallor is always more distinctly made out on a mucous surface, such as the conjunctiva and gums. The child is generally cold, especially in the extremities. Œdema is not uncommon, especially in the feet and ankles. Breathlessness and palpitation are not so common as in adults. Transient, and sometimes more persistent albuminuria, I have found not infrequent in well-marked anæmia in young children. Dyspepsia is often a prominent symptom, and also anorexia; constipation is present as a rule. Unless any irritative complication, such as gastro-intestinal catarrh, is present, the temperature is normal or subnormal. Palpitation is common.

Basic venous murmurs over the pulmonary artery and in the jugular veins, and also cerebral murmurs, can generally be made out. Hæmorrhages from the mucous surfaces or the skin are often met with. Symptoms referable to the nervous system are present in many cases, such as headaches, irritability, or stupor and drowsiness. One of the most serious complications is thrombosis of the cerebral sinuses, already alluded to in another chapter.

DIAGNOSIS.—From what has been already said regarding the etiology and pathology of the various forms of anæmia, a careful study of the history of the case, and an examination of the organs and blood, will readily clear up the diagnosis.

PROGNOSIS.—This must depend upon the cause. In idiopathic or pernicious anæmia, where the pallor is great and constitutional symptoms grave, the prognosis is very unfavourable. In the primary leucocytic and non-leucocytic anæmia the prognosis is always doubtful. In consecutive anæmia, the result of acute disease or unfavourable dietetic and hygienic conditions, the prognosis is much more favourable under suitable conditions of treatment.

TREATMENT.—The management of cases of anæmia requires great care and therapeutic resource on the part of the physician. A careful and accurate diagnosis is essential to successful treatment. In simple or consecutive anæmia, the result of bad hygiene and feeding, or following acute or chronic disease, the results of treatment are more satisfactory than in splenic anæmia of various kinds. The treatment must be carried out with special reference to hygiene, diet, and medicine. The child should be warmly clothed, and, in severe cases, kept in bed in a well-aired room of mean temperature, to which sunlight has direct access. Cheerful surroundings and freedom from all excitement are necessary. If the child is restless and sleepless, small doses of opium or hydrate of chloral should be carefully given, opium being generally preferable. Tepid sponging of the body surface should be ordered at night, and sometimes a wet pack may be of service. If sponging is

used, it should be followed by friction of the surface for about ten minutes. In many cases modified massage is decidedly beneficial. It should be executed rapidly and concluded within a quarter of an hour, so as not to fatigue or excite the child, the abdomen being specially attended to, so as to favour regular evacuation of the bowels. If it is deemed necessary to keep the patient in bed at first, the time should be limited, and gradually the little patient allowed to be up for a time, upon a sofa or chair at a window, for the sake of cheerfulness and sunlight. The diet in all cases requires careful regulation as to quality and quantity, in order to prevent vomiting. Should there be any catarrh of stomach or bowels, treatment should be adopted at once to remedy this. White bismuth with soda and a grain of powdered rhubarb may be given twice a day before meals, or half-an-ounce or an ounce of Victoria or Hunyadi water, morning and evening. Sometimes one or two grains of grey powder at bedtime, for three or four days, will be of much service. The food should be as nutritious as possible, the nitrogenous element predominating. Milk ought not to be given alone at first, but rather pancreatised or mixed with an equal proportion of oatmeal or barley gruel. White of egg, emulsified with two teaspoonfuls of fresh cream, may be given once or twice a day. Chicken tea or veal broth are generally better taken than other meat soups. As the child improves the more solid diet may be given. Tender chicken, or game lightly cooked, may be tried. Well-cooked porridge, with fresh skimmed milk, at this time will often agree well. Gradually, as the digestion and general condition of the patient improves, ordinary diet may be given. Stimulants are often required, and may prove of decided service. Old brandy, well diluted, may be given along with food, or a few teaspoonfuls of extract of malt, beef, and iron wine. Sometimes claret agrees better than any other stimulant.

Medicinal Treatment, apart from drugs required to correct the digestive functions, is limited to the administration of blood

tonics, such as iron, arsenic, and manganese, and occasionally nux vomica or strychnine. Iron requires great caution in its administration. Its indiscriminate use in too large doses does more harm than good. Before commencing it, gastric catarrh must be got rid of as an essential preliminary. The selection of the preparation is important. I generally order first the protochloride, as infinitely superior to the old perchloride in most cases. The glyceritum ferri protochloridi in ten drop doses at first, gradually increased to half a drachm, is the best preparation I know of in such cases. It is stable and agrees well with the stomach, and does not constipate, which is a great advantage. A pill I find very useful is composed of half a grain of exsiccated sulphate of iron, with half a grain of sulphate of manganese, made up with a quarter of a grain of extract of cascara, given after food three or four times daily. Many cases in which the circulation is feeble and a heart tonic is required, are benefited by small doses of digitalis along with iron, as recommended by Jacobi. When no other preparation of iron is tolerated by the stomach, dialysed iron will often agree. Glycerite of the lactophosphate of iron is another preparation I have found most useful. It may be given in half-drachm doses, to commence with. Ammonio citrate of iron, with an alkali, suits some cases very well.

Arsenic is a remedy of undoubted value in anæmia, in some of its most aggravated forms. The dose should be small to commence with, one drop of Fowler's solution, well diluted, after food, and gradually increased. Nux vomica combined with iron, will, in many cases in which the gastric digestion gives trouble, prove of service. Glycerite of the phosphate of iron, quinine, and strychnia is also a good alternative remedy, in small doses of not more than ten drops, well diluted, to begin with.

Pernicious Anæmia.—The dietetic and hygienic treatment must be carried out mainly on the lines indicated in other forms of anæmia, the patient being confined to bed. Arsenic

in this disease is more useful than iron. In some cases a combination of the two drugs will suit better than arsenic alone. In my hands iron alone has proved of little service in most cases, and in some is positively injurious.

Splenic Leukæmia is a hopeless condition to treat, when the visceral and lymphatic enlargements become confirmed. If the case comes under treatment at an early period, its course may often be arrested for a time by constitutional and medicinal treatment. Iron seems always beneficial, and also arsenic and quinine. Removal of the patient from malarial influences, if such exist, is essential. Angel Money has found inunctions of simple salves, as neat's foot or sweet oil, over the spleen, of some service. He also recommends the cautious inunction of oleate of mercury in some cases. Of this treatment I have had no experience.

CONGENITAL HEART DISEASE.

In the early foetus the heart is a straight tube, which becomes gradually curved, and divided into three cavities, one forming the aorta, a second the auricular cavity, and a third the ventricular. An ultimate subdivision takes place, whereby the aortic bulb divides into aorta and pulmonary artery, an opening, however, the ductus arteriosus, remaining between the two vessels till the end of foetal life. After the division of the auricles, an opening (foramen ovale) remains, and, as we shall see, plays afterwards an important part in the congenital post-natal affections of the heart. In the foetal circulation, it will be remembered, the blood passes through the umbilical vein to the under surface of the liver, a very small quantity being distributed to this organ, the larger amount passing into the vena cava through the ductus venosus, where it is joined by the blood from the lower extremities, and that which has circulated through the liver. Carried on to the right auricle, most of the blood passes at once into the left auricle through the foramen ovale,

thence into the ventricle, where it is distributed to the upper and lower extremities, and head and neck. The blood from the head and upper extremities returns by the superior vena cava, thence into the right auricle, the greater portion now passing into the right ventricle, whence it is driven into the pulmonary artery and through the ductus arteriosus into the descending aorta. At birth, a notable change in the circulation at once takes place. Along with the establishment of the respiratory act, the blood in the right ventricle at once passes through the lungs, to be returned oxygenated to the left side of the heart for distribution to the body. The left auricle receiving a larger quantity of blood than formerly, the auricular blood-pressure becomes equalised, and the foramen ovale gradually closes. The ductus arteriosus soon becomes impervious, and the ordinary course of the circulation, as in the adult, comes into operation. The pathological conditions met with in congenital heart disease are numerous, and we can only allude to those most commonly met with. They all arise from arrest in development of the part, or persistence of the foetal conditions. In connection with these affections, the occurrence of foetal endocarditis, myocarditis, or thrombosis, must be borne in mind. Rokitansky believes that pathological inflammatory conditions are present, apart from arrest of developmental processes, in a large proportion of cases. Foetal endocarditis is a condition known to exist not infrequently. Rauchfous has collected a large number of such cases, and many other observers record examples.

Patent or Premature Closure of Foramen Ovale, with or without deficiency of auricular septum.—Deficiency of the septum is comparatively rare, and is usually a cause of early death of the foetus. Patency of foramen ovale is usually associated with obstruction to the outward flow of blood from the ventricle, due to arterial obstruction, or, it may be, defect of the auriculo-ventricular orifice. It usually results from pulmonary obstruction of one form or other.

Tricuspid Valve and Right Auriculo-Ventricular Opening

Malformations, rarely occur apart from those of other parts. The orifice may be either stenosed or too patulous, allowing regurgitation. The pulmonary artery is usually narrowed, and the cusps sometimes undeveloped, the valve forming a membranous diaphragm between the cavities, with a little slit in its centre.

Patent Septum Ventriculorum.—The entire septum may be deficient, or there may be one or more small openings. This defect is usually secondary to some other malformation in the pulmonary circuit, most frequently stenosis of the pulmonary artery. It is one of the most common varieties of malformation.

Pulmonary Artery and Valves.—Stenosis or atresia may exist, either with or without open septum ventriculorum. When the septum is closed, the foramen ovale, as well as the ductus arteriosus, is generally patulous. The pulmonary valve alone may be malformed, the cusps being deficient or excessive in number and formation. When the cusps are deficient there is usually regurgitation. The valves may be altogether absent, a simple membranous diaphragm representing the cavities.

Patency or Premature Closure of the Ductus Arteriosus is rarely a primary malformation. When patent the blood passes from the aorta into the pulmonary artery. It is most commonly found associated with atresia or stenosis of pulmonary artery.

Malformations of the left side of the Heart are comparatively rare. The conus arteriosus and its orifices are more frequently affected than the mitral opening. In affections of either valve, hypertrophy, either concentric or dilated, of the left ventricle results.

More rare anomalies of heart formation are occasionally met with, such as (1) absence of the pericardium, (2) ectopia cordis, met with in those conditions of the foetus in which the anterior chest and abdominal wall are deficient, (3) displacements or transposition of the heart, dextrocardia or mesocardia. Transposition of the other viscera generally accompanies displacement of the heart, thus the liver and spleen are often

transposed. A very typical example of this kind was lately exhibited, in the case of a young woman, to the Medico-Chirurgical Society of this city.

SYMPTOMS.—Cyanosis, dyspnoea, and excited action of the heart are the leading symptoms of malformation. Sometimes symptoms are absent altogether, as in a case lately under my care in hospital—a boy aged eight, with all the objective and auscultatory signs of malformation. The temporary cyanosis which many new-born babies exhibit before the complete establishment of the respiratory and circulatory processes, and which soon disappears, must not be confounded with that due to complicated malformation. Persistency of the cyanotic condition, or the development of it some weeks after birth, generally indicates some defect, unless there be pulmonary atelectasis, which must be always excluded before a diagnosis is established. Rapid heart action and a murmur will generally lend additional probability to an affirmative diagnosis. Children with congenital heart disease are often languid, ill nourished, develop slowly, are incapable of exertion, and suffer much from dyspnoea. The temperature is often subnormal. Troublesome cough exists, due to pulmonary stasis and congestion. Clubbing of the fingers is often present, and also congestion of the abdominal organs (local and general), dropsy, or albuminuria. On physical examination of the heart a thrill is often felt on palpation, the apex beat may be in its normal position, or transposed when the organ is displaced. Percussion dulness may be normal or increased. Auscultation reveals a loud blowing murmur, usually systolic in rhythm and basic in intensity. Sometimes the murmur is of a mixed character and diastolic. Sansome classifies the clinical features of the various forms of malformation as follows:—Cyanosis may exist without any murmur in cases of patent foramen ovale. A systolic or pre-systolic murmur, heard over the sternal ends of the third and fourth costal cartilages or third intercostal space, may indicate patent foramen ovale. A loud systolic murmur, of greatest

intensity at the apex and of almost equal intensity in the interseapular region, indicates probable patency of the septum ventriculorum. Cyanosis, especially if complicated with anæmia, produces a basic systolic murmur, probably due to pulmonary stenosis. It may be at once admitted that the physical signs of congenital heart disease are by no means distinctive, and it is difficult in any given case to arrive at a certain diagnosis. As in acquired heart disease, the *prognosis* does not so much depend on the nature of the malformation as in the compensatory conditions which are brought into play to counterbalance the congenital defect. As regards *treatment*, rest and careful attention to the functions, especially of respiration and digestion, with avoidance of excitement or chills, and residence in a mild and equable climate, if possible, are the most important points requiring attention.

ACQUIRED HEART DISEASE.

In its general bearings and clinical features, acquired heart disease may be said to present no distinctive peculiarities, contrasted with the same disease in adult life. During the period of infancy acquired disease is comparatively rare. After the fifth year, and during the course of the second dentition, the various causes which predispose to cardiac inflammation are most prone to arise. Thus, as in the adult, rheumatism holds the first place as a factor in causation. The acute infectious diseases, particularly scarlatina, are often associated with endocarditis or pericarditis as a complication or sequela. Of 240 cases noted by Goodhart, twenty complicated an attack of rheumatic fever, 134 are classed as rheumatic, either occurring as a sequela to rheumatism or in children hereditarily predisposed to the disease, fifty-nine were associated with chorea, and in fifty-five no cause is assigned. Typhoid fever rarely gives rise to valvular disease, but not infrequently muscular weakness and dilatation come on during convalescence. Considering the frequency with which

syphilis affects the arterial system, it might naturally be expected that the heart would suffer more often than it does. Some rare cases of valvular disease in congenital syphilis are recorded. The occurrence of endocarditis in intrauterine life has already been alluded to, and is probably more common than many physicians are disposed to admit.

Endocarditis, in the acute form coming on during the progress of rheumatism or other disease, is often insidious in its invasion and progress, and unless frequent examination of the heart is practised may often be overlooked. A rise of temperature, with discomfort in the præcordia, anxious expression, and excited action of the heart, will often indicate the onset of endocardial inflammation. In the endocarditis of early life there is a special tendency to relapses, which should always be borne in mind. In treating of rheumatism, this is noted in some of the clinical records of cases. There is often a latency in the physical signs. Whereas the rule is that sooner or later we have the development of murmurs, generally referable to the mitral valve, such signs may be absent, at all events in the earlier stages. Some of the earliest signs of cardiac involvement in rheumatism are impurity and reduplication of the sounds, or tumultuous or, more rarely, unrhythmical action, without reduplication. The systolic mitral murmur is the most frequent, and generally, though not invariably, indicative of organic disease. The presystolic murmur of mitral stenosis is always evidence of valvular disease. Basic arterial murmurs are rare, but generally mean valvular disease, especially the diastolic murmur.

In *Chronic Valvular Disease* there are often few or no symptoms present, except in the advanced stage, when all the train of ulterior consequences, congestion of internal organs and dropsy, supervene. Breathlessness on exertion, and tumultuous action of the heart when present, generally attract attention. As a rule, however, children appear to suffer little from valvular disease, unless dilatation and weakness of the heart muscle exist.

Ulcerative Endocarditis, often called *Septic*, is met with during the progress of suppuration, generally in bones or joints, also during the course of diphtheria, and in the infectious fevers. The ulcerative inflammation of the endocardium may be associated with minute emboli, or result from simple intensity of the inflammatory and exudative processes in the membrane, causing necrosis and detachment of portions of dead tissue, which are carried off in the blood current. Sometimes minute abscesses are found on the valves. The rupture of these leave small ulcerations, which give rise to the characteristic appearances found on dissection. Eberth was the first to demonstrate the presence of micrococci in this disease. Klebs, Marie, Koch, and many others, have also corroborated his results. The disease is essentially a septic one, and the local and constitutional effects are produced by the transference of morbid products through the circulation to different parts of the body. The clinical recognition of this disease is not always easy. A little boy, lately under my care in hospital on account of acute necrosis of the femur, died a week after admission from septic poisoning, with well-marked ulcerative endocarditis; the temperature rose to between 104° and 105° , with frequent remissions. The symptoms assumed a typhoid character, with marked dyspnoea and delirium, loud systolic bruit, slight jaundice, albuminuria, and enlargement and tenderness of the spleen. On examination after death, the mitral and aortic valves were eroded, multiple abscesses and minute hæmorrhages were found in lungs and kidneys, and the spleen was much enlarged with large necrotic infarcts.

Pericarditis may be acute or chronic, usually secondary, rarely primary. Although less common than endocarditis in the child, it is a disease of equal if not more serious import, for various reasons. It usually supervenes during the progress of acute rheumatism, not infrequently in scarlatina, sometimes in kidney disease. In the chronic form it sometimes complicates pleurisy or peritonitis. In serous inflammation in children, the liability to similar disease being set up in adjacent

cavities should never be lost sight of. The intimate connection of the various cavities through the lymphatic system favours this. A girl aged seven, recovering from pleural effusion on the left side, was attacked with pericarditis, from which she ultimately recovered. A boy aged ten, under treatment for chronic peritonitis in the same ward, developed pericarditis, from which he died in ten days. One of the great dangers of pericarditis with effusion is the frequency in children of purulent formation. A rare form is the hæmorrhagic. A case of this kind occurred several years ago under the care of one of my colleagues in the hospital. Paracentesis pericardii was performed, and a large quantity of bloody purulent fluid drawn off; the hæmorrhage continued, and the child ultimately succumbed. The pericardium was found much thickened and covered with granulations, containing vessels with extremely delicate walls, from which the bleeding had proceeded.

SYMPTOMS. — Whether acute or chronic, one of the most notable facts to record about this disease in children is the frequent latency of its symptoms. Unless careful and frequent examination of the præcordia be made during the progress of acute disease, the invasion of pericarditis is apt to be overlooked. In pleurisy or pneumonia, especially of the left side, it should always be looked for. When symptoms are present, they are often sufficiently distinctive to attract notice. Alteration in the child's expression is often noted, a look of anxiety with a degree of puffiness of the face, slight dyspnœa and short cough, accompanied evidently by more or less præcordial pain and distress, may be considered fairly characteristic symptoms. The pulse at first is regular, but often as the case goes on and effusion takes place it becomes more feeble and intermittent. It is by physical examination, however, that the true nature of the case must be verified. The characteristic to and fro friction murmur is present in the early stages, giving place later on to muffled sounds, with pyramidal dulness in the præcordial region, diminished car-

diac impulse, and undefined apex beat. The occurrence of an endocardial murmur at the same time is not infrequent. Sometimes exocardial murmurs very closely simulate in character endocardial sounds, and it is often difficult at first to distinguish them. In chronic pericarditis, with adhesion, dilatation of the cavities is apt to take place, and more or less displacement of the heart, as indicated by change in the situation of the apex beat.

PATHOLOGY.—The *pathological anatomy* of endocardial disease in the child differs from that of the adult mainly in the absence of degenerative changes, so common in advanced life, and the presence as the main factors in the diseased changes in the valvular endocardium, of hypertrophied connective tissue formations, due to cellular proliferation and fibrous tissue development, giving rise to thickenings often of a nodular nature on the valves. According to Barlow and Warner, these nodular formations are probably identical with the nodules met with in the connective tissue in various parts of the body in acute rheumatism in children.

PROGNOSIS varies according to whether the disease be acute or chronic, complicated or otherwise. In ordinary acute rheumatic pericarditis, with or without simple effusion, the prognosis is favourable. In the chronic disease, especially if complicated by endocarditis and dilatation and muscular changes, it is more grave. Purulent effusions are always dangerous.

TREATMENT.—Acute endocarditis or pericarditis being hardly ever primary in nature, the treatment of the constitutional disease of which they are complications must be rigidly carried out. In rheumatic fever, salol in five to ten grain doses, for a child of from five to seven years, repeated every two or three hours, until the temperature is reduced and relief to the symptoms takes place, is generally useful. Salicylate of soda may be given, if preferred, but in my experience often produces sickness, a symptom more rarely induced by salol. Should these remedies fail, I am very much in favour of the

old alkaline treatment, acetate of potash being given freely till alkalinity of the secretions is produced, when it should be intermitted for twelve hours and then resumed. When the pulse is soft and compressible, and indicative of feebleness of the cardiac muscle, small and carefully regulated doses of brandy will be found useful. Mild counter-irritation to the præcordia with mustard leaves or dilute liniment of ammonia is useful, a pad of Gamgee tissue covered with jaconett being laid over all. Blisters in my experience are often of service, especially in pericarditis. The liquid blister should always be used, never the plaster. Tincture of iodine may be tried, but not continued, if pain or too much irritation is produced. I have no experience of the application of ice-bag to the præcordia in acute cardiac inflammation, but I know it has found favour in the hands of others. I should hesitate to use it, except in a very robust child with sthenic symptoms. Keating and Edwards recommend a combination of three parts of the tincture of iodine with one of sp. chloroformi, and one-half part of tinct. of aconite root as less liable to produce disagreeable irritation. In cases of hyperpyrexia the salicylates should be given in larger doses, and if this fail antifebrin may be tried, or quinine suppositories. The diet ought to be chiefly of milk and nourishing broths, the bowels being regulated with laxatives, and the action of skin and kidneys promoted by suitable remedies, if need be. Perfect quiet and rest of mind and body is of the greatest importance, and the patient should not be allowed to sit up or make any sudden movement. In post-scarlatinal or post-typhoid cases there is more risk of myocardial weakness, and great care must be taken to give nourishment frequently and in small quantities, alcoholic stimulants especially in typhoid cases being generally indicated. Later on digitalis is required—earlier, I believe, than in rheumatic cases. In the treatment of acute pericarditis the same general rules of treatment apply as in endocarditis, but more benefit is derived generally from local applications and especially counter irritation. When large effusion takes place,

the question of paracentesis presents itself. The indications for tapping are large serous effusion, with signs of heart failure or displacement of the heart. In purulent effusions aspiration is always indicated. In any case, a preliminary exploration should be made with a Wood's syringe. If the fluid be serous, aspiration may then be performed at the site of the exploratory puncture. The best place to puncture is at the apex of the heart, where there is absolute dulness, generally in the fifth interspace to the left of the sternum, care being taken to keep to the left of the mammary artery. Another point where puncture may be made is just in the left costo-xiphoid angle, in which case the needle must be pushed upwards and parallel with the sternum. The pericardium should be entered, and care be taken not to puncture too deeply, in order to avoid wounding the heart. As to the amount of fluid to be withdrawn, the balance of opinion seems to be in favour of removing only part of it, sufficient to afford immediate relief, and repeating the aspiration again when necessary. In purulent effusions, as much of the fluid as possible should be removed; and if, after repeated aspirations, reaccumulation takes place, an incision should be made and the sac drained. Careful antiseptic dressing is essential. The results of paracentesis of the pericardium are not very satisfactory. Of nineteen cases collected by Keating and Edwards, only four recovered. The immediate effect of the operation, however, is generally relief, and the postponement at all events of a fatal termination.

The treatment of chronic heart disease in the child must be conducted essentially on the same principles as in the adult, and therefore does not require special mention here. Rest is more than ever needful in early life. The great dangers are myocardial weakness and dilatation. As to drugs, iron and digitalis take first rank. My experience of strophanthus in children is very favourable. In many cases I prefer it to digitalis. It acts more rapidly, is not so liable to produce sickness, and has no cumulative effects. Dietetics are all-important. The stomach should not be overloaded, milk and

white animal food is the best. Occasional purgation, to relieve the congested liver, affords great relief. The action of the kidneys should be promoted by acid tartrate of potash, caffeine, or other remedies, if need be.

DILATED HEART.—This occurs in children from a variety of causes, apart from the dilated hypertrophy which so often accompanies valvular, especially mitral disease. In anæmia it is commonly met with, and forms an element of danger in many cases. The heart's action is disturbed, and a soft blowing systole frequently heard. On palpation the cardiac pulsation is diffuse, the area of dulness increased. In all the acute fevers, specially after scarlatina or typhoid, dilatation is apt to occur. In post-scarlatinal nephritis it is also frequently met with. Dilatation, occurring under these conditions, requires careful treatment and rest in bed. The diet needs special attention. The food should be as nourishing as possible, consistent with the power of the primary digestion and eliminating organs. Prolonged rest is the most important element in treatment. Those remedies which tend to improve the condition of the blood and muscular system, as iron and arsenic, are most useful. Digitalis is also of much service, but probably in a less degree than strophanthus. I have had the best results from this remedy in such cases. It is a pure cardiac tonic, with little or no action on the blood-vessels, as is the case with digitalis. I am in the habit of giving it every eight hours in doses of five to ten drops, in children from six to ten years of age.

CHAPTER XVII.

THE RESPIRATORY SYSTEM.

IN the examination of the respiratory system of the child, it is desirable, in the first place, to have recourse to careful *inspection*, from which a great deal of information can be obtained. For this purpose the child should be stripped of all its clothing and laid on its back on a couch or bed ; failing this, it must be kept in the mother's or nurse's arms. In a healthy infant the chest will be found to be more or less barrel-shaped—that is to say, the antero-posterior diameter relatively is greater than in the adult. A transverse section through the chest of a healthy infant shows therefore a more or less circular outline. The chest should be well clothed, and the outline of the ribs hardly visible. The next noteworthy point is the almost entire *absence* in quiet, normal respiration of *thoracic movement*, the respiration being chiefly abdominal (diaphragmatic). The frequency of the respirations varies from about forty in the young infant to twenty-four to twenty-eight in young children. There is generally a difference of at least four to six beats between sleeping and waking. The normal pulse respiration ratio is 1 to 3 or 3·5. It should be noted whether the alæ nasi are at rest or in motion. In infants it may also be observed, and this may best be seen during sleep, that the respiratory rhythm is often slightly irregular under quite normal conditions. After inspection it is desirable to palpate the chest by placing the hand over its different parts. In this way, the crying or rhonchal fremitus, if present, can be made out.

Under abnormal conditions, we note by inspection the development of the chest, whether it is well formed or deformed, properly clothed or emaciated. If there be deformity, what is its nature? The most common deformity is that of rachitis, generally of the nature of lateral contraction, with increased antero-posterior diameter, from pushing forwards of the sternum. Any movement of the thoracic wall must be carefully noted. When the child is excited and crying, the normal thoracic movements of adult type are observed. In acute cerebral disease the respiration is often markedly irregular. In abdominal disease the abdominal movement is minus, and the thoracic correspondingly increased. The general character of the breathing may be easy and free, or laboured and shallow, quiet or noisy, or "catchy." Laboured or noisy respiration is heard in bronchitis and in laryngeal stenosis. In grave lung affection, especially of an acute nature, the *alæ nasi* are in active movement; in nasal stenosis the breathing is "snuffling." The sputa are not expectorated in infants, except in pertussis. In bronchial catarrh they are swallowed and subsequently vomited. A careful examination of the sputa, both by microscope and naked eye, should be made. The cry in respiratory affections is often a useful indication in a negative sense. Children with grave lung affection, especially of an acute nature, do not cry as a rule. In bronchial catarrh the cry is harsh and smothered. In laryngeal affections it is often abated, if present it is noisy and clanging. So far as we have gone the indications derived from examination of the respiratory organs are clear and not liable to misinterpretation, and therefore more valuable. The same cannot be said for percussion and auscultation, the interpretation from either being often very difficult and misleading in the child. This may be said to be due, first, to the physical peculiarity of the child's chest, and secondly, the quality of the respiration. In general terms, it may be said that auscultation is more reliable than percussion as a means of physical diagnosis, and

for reasons which will be evident as the student becomes acquainted with the signs under various diseased conditions. The thin and delicate nature of the chest walls and included lungs in the infant, render the conductivity of sound much easier. The tone and pitch of the respiratory murmur is also different from that of the adult. The quality of the respiration, as well as its force on the two sides, may be relatively unequal under normal conditions, due probably to unequal neuro-muscular development and functional activity of the two lungs. In regard to *percussion*, the mistake young practitioners generally make is to percuss a child as they do an adult, with two fingers and forcibly. One finger as a hammer is generally enough, and it should be used lightly. Too heavy percussion will often elicit a totally misleading note as regards the portion of lung under immediate examination. By light percussion a truer note is obtained. Thus, in examining the right posterior base, forcible percussion will often elicit a dull note from the liver, whereas light percussion will correspond exactly with that of the same portion of the left lung. In like manner, in percussing the left base in the posterior or lateral region, we may elicit by too forcible an effort a note referable to the stomach or the spleen, if it be enlarged. Sometimes a note very nearly approaching a "cracked pot" sound may be elicited in infants, when there is no other indication of a cavity, in which case the sign is of no value. In the diagnosis of pleural effusions the same remark applies—a too heavy stroke will bring out the note of the lung beneath, whereas a light one will interpret the physical condition immediately under the chest wall.

Auscultation should always be made with the stethoscope, as by its means alone can we find out limited areas of altered sounds. The relative qualities of the sounds on the two sides, over the corresponding portion of lung, should be noted as a matter of necessity, in order to correctly interpret the sounds. As is well known, the respiration in the child is much louder than in the adult, and the inspiratory murmur

high pitched. The expiratory sound is generally more distinct. The general explanation of these variations from the adult type is probably accounted for by the relatively greater narrowness of the glottis and air tubes, and the greater delicacy and thinness of the chest walls. In examining the chest under diseased conditions, too great care cannot be taken in arriving at a conclusion; no one sign should be solely relied on, and careful comparison of the corresponding portion of the two sides should be made. If this be not done wrong conclusions will be arrived at. The character of the respiratory murmur, qualitatively and quantitatively, is often so different in the child compared with the adult, that constant mistakes are made. Thus, on auscultating one lung, it may be found that the expiration is prolonged and almost bronchial in character; on comparing the corresponding portion of lung, on the opposite side, the same peculiarity is heard. This most frequently happens when the child is excited and the respiration quickened. The accompaniments heard in disease are of the usual character met with in adults, but not always easy to interpret, especially as to exact locality. They may result from affection of the part *immediately* under examination, or be communicated from some distant part of the chest. Thus, in auscultating children with a slight catarrh, a loud râle may be heard all over the chest, which is communicated from the larynx or trachea. Most physicians admit that sounds may occasionally even be communicated from one lung to that of the opposite side. The voice, crying or coughing resonance are all-important and valuable signs in children. A slight amount of crying in auscultating the lungs is rather a help than a hindrance, as thereby the respiration is rendered deeper, and the accompaniments and resonance are more distinctly brought out. In bronchial catarrh, with copious accompaniments, it is often difficult to distinguish between intra-bronchial and extra-pulmonary (friction) sounds, the former often closely simulating the latter at a particular part.

Cough is one of the most important symptoms in connection with respiratory diseases. It is essentially an expiratory effort. In the child, it is purely of a reflex nature; in the adult, voluntary effort is superadded. The absence of voluntary effort in infants and young children has an important significance in the bronchial affections of early life, as compared with adults. The relatively smaller calibre of the bronchial tubes in infants, and the readiness with which they become blocked by catarrhal secretions, taken along with the general absence of voluntary effort on the part of the patient, are undoubted obstacles to the clearing of the tubes and the expectoration of retained secretions. In bronchial catarrh, cough, to the extent necessary to rid the tubes of morbid secretions, is distinctly salutary. It is often, however, present as a symptom, out of all proportion to the necessities of the case in this respect. In such cases it is desirable to use sedatives cautiously, to allay undue irritation. On the other hand, it is bad practice as a routine to give sedatives in all cases of cough, yet probably no symptom is more persistently and wrongly treated than this, often to the detriment of the patient, and this is particularly the case in children. One of the gravest symptoms in some of the respiratory affections of childhood is the abolition of cough. Cough is "croupy" in laryngeal affections, harsh and deep in bronchial catarrh, short and hacking or painful in pleuropneumonia. It may be more or less constant, or irregularly intermittent or paroxysmal, diurnal or nocturnal, and is essentially due to reflex irritation of the sensory fibres of the vagus, which are distributed through mucous membrane of the larynx, trachea, and bronchi, and also, according to recent investigations, to irritation of the sensory nerves supplying the respiratory tract in the nasal cavities. Lennox Browne and Stoerck are inclined to believe that the reflex or cough area in the respiratory tracts is situated in its upper part, chiefly in the trachea and larynx in the posterior walls and inter-arytenoid folds, and that retained secretions

and other irritants in the further portions of the respiratory tubes are not so liable to produce cough. Dr. M'Coy believes that the night cough to which children are so subject, is mainly due to nasal irritation from accumulation of secretion in the nares when the child is asleep, acting directly on the sensitive reflex area over the lower turbinated bodies and septum. It is quite well known that touching this area with a probe instantly produces cough or sneezing. Irritation in the laryngeal cavity from catarrhal disease, or affection of the lymphoid tissues of the tonsils, or in the region of the posterior nares, and disease of the Eustachian tube and middle ear, have all been known to produce cough. In like manner, it is admitted that gastro-intestinal irritation will induce cough, whether from the presence of catarrhal sputa or lumbrici.

DISEASES OF THE NARES.

Reference to these diseases must be made, although, in a work of this kind, they cannot be referred to in detail. They are none the less important, as affecting the health and often the life of the child. In sucking infants any serious obstruction in the nares may prevent the child from taking the breast, causing death by inanition. This not infrequently occurs in the specific catarrh of syphilitic babies, when sucking is rendered impossible by the stenosed condition of the nares and constant snuffling.

Certain congenital conditions of the nares are met with in children. The nostrils may be obstructed in the anterior, middle, or posterior portions, from hypertrophy of the bony structures or deviation of the septum. Polypi of the nose are rarely met with in children. Dr. Morell Mackenzie relates the cases of two children, aged respectively four and five, from whom he removed mucous polypi. The same author alludes to a peculiar form of nasal obstruction, which he terms "obstruction of patency." When the nares are abnormally dilated, the force of the respiratory current of air

is so diminished as to give rise to retention of the mucus, thus causing obstruction, and favouring decomposition of the secretions. Disease of the naso-pharynx, whether from enlarged tonsils or adenoid growths, is a not uncommon form of nasal obstruction. Children often put foreign bodies into the nostril, and in making an examination in cases of nasal obstruction this should always be borne in mind. The general results of nasal obstruction in the child are important and often far-reaching in their effects on the health and physiological activity of neighbouring organs. Deafness and aural disease are common effects of retro-nasal affections. Collapse of the lung and emphysema, and chronic conditions of the bronchial and pulmonary mucous membrane, are often induced by the obstruction and diminution of the relatively weaker forces of the inspiratory effort. A child who has suffered from prolonged nasal obstruction has a dull and heavy look, with pallid countenance, the mouth is kept open, and the contour of the face altered, from the flabby cheeks and depressed lower jaw. The gums and lips are often inflamed or ulcerated from dribbling saliva and nasal discharge.

Coryza may be acute or chronic. It may be simply the result of cold or the poison of syphilis. It is also frequent in strumous or rickety children. The *simple acute form* is generally accompanied by conjunctival and pharyngeal catarrh, with mild febrile movement — sneezing, watering of the eyes, increased lachrymation, and often cough. Symptoms of obstructed respiration are a prominent feature, especially in babies, in whom it interferes with the suckling process, and often causes much distress. Under suitable treatment the affection abates in a week or ten days. In delicate children, especially of strumous constitution, a *chronic catarrh* often remains, which becomes intractable and difficult to cure, and may give rise to lymph gland enlargement, pharyngo-Eustachian catarrh, and otitis media. The *syphilitic coryza* has been already referred to in the chapter on that disease. In measles and whooping-cough, nasal catarrh is often trouble-

some, and may require careful treatment. The purulent, croupous, or diphtheritic catarrhs, met with either as sequelæ of acute catarrh of a simple nature, or after measles, scarlatina, or diphtheria, are important conditions, requiring great care and persistent treatment, local as well as general. Other chronic affections of this kind met with in children are *fætid catarrh* or *ozæna*, a disease in which atrophy of the pituitary membrane takes place with the formation of unhealthy mucus, which forms itself into crusts, giving rise to a peculiar and offensive odour. Dr. Roseworth has described a *chronic purulent catarrh* (rhinitis), which he says arises in debilitated children, or is a sequel of measles, in which the purulent discharge tends to continue for an indefinite and prolonged period. The discharge comes from both nostrils, and is of a thick muco-purulent nature, and tends to form crusts around the anterior nasal openings. During the progress of the affection acute exacerbations are common, with swelling of the nasal membrane, accumulation of secretion, and stenosis.

TREATMENT.—The management of the various forms of nasal catarrh must have reference to the constitutional state and the local condition. In the *simple acute catarrh*, the child should be kept in bed in a warm room, and cooling, diaphoretic, saline, and gentle purgatives administered. Little local treatment is needed, unless the case threatens to become chronic, or there is retention of discharge after it becomes thicker in the later stages. If necessary, a lotion, containing sodæ bicarb. gr. v, sodæ biboratis gr. x, glycerini ʒij, aq. ad ʒij, may be sprayed into the nostrils. Glycerite of tannin ʒi to ʒi aq. may also be tried, or dilute boracic lotion. In *chronic catarrh* the general health of the patient must be carefully attended to, and the administration of cod-liver oil and iodide of iron, or iron and strychnia, or other tonic remedies, is indicated, along with nourishing diet suited to the age of the patient. In *syphilitic cases* mercury or iodide of potassium should be given. The local treatment must be

suited to special conditions. In all cases cleanliness and frequent spraying or douching of the nostrils is necessary. Useful lotions are glycerini acidi carbolici ℥i, sodæ bicarb. gr. x, sodæ biborat. gr. xxiv, aq. menth. pip. ℥ij, aquam ad ℥vi; or zinci sulpho-carbolatis, sodii chloridi āā gr. xx, aquam ad ℥vi; or liq. sodæ chlorat. ℥vij, aquam ad ℥vi. These should be used frequently, as may be indicated by the necessities of the case. In ozæna the occasional local application to the diseased membrane of tampons, soaked with dilute iodo glycerine, or sulphate of copper in glycerine gr. x to ℥i, or nitrate of silver gr. v to ℥i, are very serviceable.

Epistaxis in children requires a passing notice, on account of its frequency under various conditions. Many children have a constitutional predisposition to nose bleeding, whether in hæmophilia or otherwise. There can be no doubt that it is often salutary. About puberty, it is not uncommon in either boys or girls. In congestive headache it gives certain relief, the direct connection of the nasal veins with the longitudinal sinus favouring this. In the eruptive fevers, especially measles and typhoid, epistaxis is quite common. In altered blood conditions, especially in splenic or renal disease, it frequently occurs, so also in liver disease. In pertussis it is not infrequent, and sometimes in acute lung affections, more rarely in tubercular disease. In malignant scarlatina or diphtheria it is more rare, but when it occurs it is generally a symptom of great gravity, and difficult to arrest, as it partakes more of the character of a slow and persistent oozing than a large and sudden hæmorrhage, and gradually tends to exhaust the patient. The site of bleeding in epistaxis, in the large majority of cases, is from the septum, more rarely from the mucous membrane, covering the lower turbinated bone.

TREATMENT.—In the vast majority of cases, if the child is kept at rest, with the head slightly elevated, and all excitement avoided, the bleeding will stop. The old treatment of

cold, applied by wet compresses or ice to the forehead and nose, is often successful. Warm water, according to most recent experience, is more efficacious employed in the form of continuous douche. Alum or perchloride of iron are also useful, applied with the spray or tampon. Simple plugging of the anterior nares with cotton-wool, so as to favour the formation of clot, is also a serviceable method of treatment. It is rarely necessary to plug the posterior nares, but this must be done if other means fail.

LARYNGEAL AFFECTIONS.

The ordinary laryngeal affections of childhood are *catarrhal laryngitis*, of which there are two varieties, the simple and the spasmodic, and *membranous laryngitis*.

Catarrhal Spasmodic Laryngitis, False Croup, is the commoner of the simple varieties. It occurs most frequently at the age of two or three years, until the fifth year, and is believed to be more common in boys than girls. It may be due to cold, or associated with gastro-pharyngeal catarrh. Violent coughing or fits of crying sometimes seem to favour its occurrence. The relative narrowness of the glottis in the child renders it very liable to suffer from the effects of catarrh even of a slight nature, which in an adult would give rise to little disturbance. When the glottis is examined in these cases, the mucous membrane will be found reddened and somewhat swollen, and generally dry at first, afterwards coated with tenacious mucus, which may ultimately become thickened and purulent.

SYMPTOMS.—There may be slight hoarseness and aphonia, coming on gradually, with mild febrile movement; but the child is not generally ill, and continues to play with its toys. This, however, is not the ordinary picture of the disease, but the following:—A child in apparently perfect health, or at most one in whom for a day or two previously slight symptoms of catarrh or gastric derangement have presented themselves,

is suddenly seized in the middle of the night with great oppression of breathing of a stridulous and croupy character. It probably awakes from sleep in a restless and excited state, which causes great alarm to the mother or nurse. This excitement and difficulty of breathing continues for a short time, varying from one to two or three hours, and, after the exhibition of some simple remedy, the child falls over to sleep, and the breathing is noticed to become quiet and natural, or nearly so. On again awaking the child presents similar symptoms, which continue to a lesser extent, probably during the day. At the end of two or three days all laryngeal symptoms pass off. Such attacks as this are generally termed by the parents or nurse, "false croup." The croupy symptoms are in those cases due to spasm, which affects the laryngeal muscles, and in very severe cases, where there is tracheo-bronchial catarrh, the bronchial muscular fibres are likewise affected, superadding an asthmatic element to the case. The complaint is met with most commonly in children in whom the neurotic disposition is well marked.

DIAGNOSIS.—It is of the utmost importance that this should be assured at once, and fortunately we are generally able to do so, and allay the alarm of the friends. The special characteristics of the complaint are sudden invasion, the croupy symptoms attaining their maximum intensity at once. The attack frequently occurs during the night, or on awaking from sleep at any time, the child being considered previously quite well, as a rule. The cough is loud and croupy, much more so than in membranous laryngitis. The breathing becomes natural, or nearly so, when the child falls over to sleep; if at all stridulous, it is only slightly so and during inspiration, the expiration being easy. The constitutional symptoms are slight, the febrile movement rarely showing a temperature above 100° or 101° , which becomes normal in the morning. The tongue is slightly furred and moist, and there are no signs of enlargement of the lymphatic glands in the submaxillary or tonsillar regions. Laryngismus stridulus is hardly liable to be confounded

with it, the child being under two and generally rachitic, the history and general clinical features of the case contrasting with sufficient distinctness. It must be remembered, however, that children who are the subjects of laryngismus stridulus may have subacute attacks of laryngeal catarrh, during which the croupy symptoms are less intermittent than on other occasions. Secondary spasmodic laryngitis may occur in, or succeed, acute fevers, particularly measles, and may be the cause of sudden stridulous breathing. Œdema of the glottis is a rare but very dangerous complication. Membranous laryngitis.—In this disease the breathing becomes slowly and gradually croupy, both inspiration and expiration are equally noisy; the cough is hoarse and croupy and of a suppressed character as compared with that of spasmodic laryngitis, the voice is weak or entirely lost. There is often lymphatic glandular enlargement and albuminuria, and patches on the pharynx, and the constitutional symptoms indicate low type of fever.

PROGNOSIS is almost invariably favourable, unless there be any complication, such as bronchitis or pneumonia, or the attack turns out to be the precursor of one or other of the acute febrile disorders of childhood.

TREATMENT.—It is well to put the child at once into a warm bath, the soothing and relaxing effects of which are generally apparent. After being taken out of the bath an emetic of ipecacuanha or sulphate of zinc should be given, and when this has acted freely, a dose of any aperient which may be considered suitable may be administered. Castor-oil or senna are often sufficient. If the tongue be much coated, calomel should be given in a single aperient dose, or grey powder with a sufficiency of compound scammony powder, to act freely and quickly. I generally order a saline mixture with $\mathfrak{z}\text{i}$ of liq. acetat. ammoniæ, and gr. v to gr. viii of potass. bromidi, in $\mathfrak{z}\text{ss}$ of aq. menth. pip., to be given every two or three hours at first, and increasing the interval or stopping the mixture altogether within twenty-four hours. This will act on the skin, and control the laryngeal spasm. After the child

has recovered it is well to prescribe tonic doses of quinine, or Easton's syrup, or other similar remedies, and suitable advice must be given with the view of preventing the recurrence of another attack, by avoiding causes giving rise to catarrh, such as overheated rooms and draughts, and careful attention to the digestive system, which in many children is often at fault.

Simple Acute Laryngitis, unaccompanied by spasm, may occur in children, and is generally of a trivial character. It may be the result of cold, and is characterised by a hoarse croupy cough, without any signs of laryngeal stenosis. It may be an intercurrent affection during the progress of measles, or remain as a sequela of the disease. The treatment is that of an ordinary catarrh—confinement to the house, with regulation of the temperature of the room, and the exhibition of mild aperients and salines. The symptoms usually pass off within a week.

Traumatic Laryngitis, the result of scald of the larynx, is sometimes met with in children from drinking too hot tea, putting the mouth to the spout of a kettle or teapot. The result is an acute attack of laryngitis, with membranous exudation, simulating true membranous or diphtheritic laryngitis. It is a serious condition, and generally requires the operation of tracheotomy. Before having recourse to the operation, however, the child should be kept in a steam tent, and soothing poultices applied externally to the larynx, mild demulcent drinks being given *ad libitum*, and all means adopted to allay inflammation.

Chronic Laryngitis may be *simple*, *tubercular*, or *syphilitic*. The two latter are rare in children, and present similar characters, local and general, to the disease as met with in adults.

Simple Chronic Catarrhal Laryngitis may be a sequel of an acute attack, or may come on slowly and insidiously, generally after an attack of measles or small-pox. It usually gets well under constitutional treatment of a tonic and alterative nature,

quinine or iron, iodide of iron, or iodide of potassium, with counter-irritants applied locally to the larynx. In some cases there is considerable thickening of the laryngeal mucous membrane, and stenosis, requiring the performance of tracheotomy. In many cases of this kind the laryngeal thickening is complicated by the presence of papillomatous growths. In the case of a boy, G. M., aged four years, lately in hospital, the child had measles four months before admission, and ever since had been croupy, with evident laryngeal stenosis. On admission there was considerable lateral retraction of the chest during inspiration on both sides, and, the breathing becoming steadily worse, tracheotomy was performed, and the tube was worn for ten months, after which recovery took place. The complete rest to the larynx afforded by tracheotomy is alone sufficient in most of these cases to affect a cure, the warty growths shrivelling up, and the swelling of the mucous membrane disappearing in a few months.

Pseudo-Membranous Laryngitis, True Croup, Laryngeal Diphtheria, Fibrinous Laryngitis, are synonyms for this common and most fatal of the respiratory diseases of childhood. It may occur at any age, but most frequently from one to five years. The essential clinical feature of the disease is laryngeal stenosis, progressive in character, with constitutional symptoms of a low or adynamic febrile type.

SYMPTOMS.—At first these are of a catarrhal type, with harsh cough, restlessness, and fever. In the course of a few days the cough becomes of a decidedly croupy character, and the respiration stridulous, and persistently so even during sleep. During excitement or cough the breathing is more noisy. As the case goes on the child becomes more restless and troublesome, the breathing more aggravated, and the voice lost. The *alæ nasi* move actively, and the accessory muscles of respiration are brought into play. Inspiratory retraction in the epigastrium and lateral regions of the chest comes on. Signs of defective blood aeration are well marked, the lips being livid, and the complexion of the child

of an ashy colour. The tongue is generally coated with a whitish fur, the fauces are red with slight mucous swelling, and pharyngeal diphtheria may or may not be present. The temperature range generally averages about 100° , sometimes being much lower, especially in the later stages, when there is much depression and cyanosis. Examination of the chest reveals harsh respiration with sibilant râles and a few moist accompaniments towards the bases or in the inter-scapular regions. Over portions of the lung there may be areas of feeble breathing from pulmonary collapse, and there is often tympanitic resonance in the upper lobes or anterior margins of the lungs from emphysema. As the disease advances the symptoms of laryngeal stenosis become more marked and the cyanosis extreme, and unless the membrane is coughed up, or the child relieved by tracheotomy, death soon takes place. The disease may be localised in the larynx, or more commonly it extends further along the respiratory passages, developing tracheo-bronchitis, the tubes becoming gradually blocked by secretion and the formation of false membrane, or not infrequently broncho-pneumonia is set up, which renders the ailment almost certainly fatal. The disease usually runs its course in from four to six days, when death results from asphyxia, the result of laryngeal stenosis or gradual blocking of the respiratory tubes further down. Death, however, may occur from other causes, such as heart failure. The diphtheritic poison has a specially depressing effect on the heart through the nervous system. Another common cause of death is septic poisoning. Under these circumstances the fever assumes a different type. The temperature runs up to 103° or 104° , or even higher, with frequent remissions, and the case is not so rapidly fatal as in death from respiratory blocking. If no complication occurs, such as septic pneumonia, which is frequent, and the child be strong and vigorous and not very young, recovery may take place.

PATHOLOGY.—The disease is essentially a specific laryngitis,

accompanied by the formation of false membrane on the mucous surface, which frequently extends into the trachea and bronchi (tracheo-bronchitis). The pathological process going on in the mucous surface varies in degree in different cases. Sometimes it is mainly, often at first, of a croupous character, consisting of a pale yellowish exudation which partially destroys the epithelial coating, with granular and pus corpuscles in a fibrinous matrix, coagulating so as to form a loosely adherent membrane, which can be removed, leaving the mucous surface practically entire, but with some epithelial desquamation. This often passes at a later stage into a true diphtheritic process, in which the epithelial coating, instead of desquamating, undergoes a true coagulative necrosis. The membrane shows a close network of fibrinous material, with cellular elements devoid of nuclei, leucocytes, and often hæmorrhages. When the membrane does not extend beyond the epithelium it is generally termed "superficial diphtheritis." Frequently, however, it affects the deeper textures, extending to the underlying connective tissue, and forms a necrotic mass or true slough, which separates, leaving an ulcerated surface. In addition to appearances presented by the disease in the larynx, there are always morbid conditions in the lungs and bronchi. The lungs are hyperæmic generally, collapsed in certain areas, often emphysematous at the apices and anterior margins, and not infrequently pneumonic. The bronchi are filled with muco-purulent secretions, and fibrinous casts are often found in the tubes. The other pathological appearances are referred to in the article *Diphtheria*.

DIAGNOSIS.—In most cases the diagnosis may be made with tolerable certainty in a clinical sense, although the exact nature of the morbid process in the larynx is not so easily ascertained. If there be pharyngeal diphtheria, and laryngeal stenosis comes on, the diagnosis is assured. Laryngoscopic examination may also clear up the case. On the other hand, nothing may be observed above but swelling and redness of the laryngeal opening, and yet there may be symptoms of

stenosis from the existence of the membranous disease lower down in the larynx and trachea, in which situation it often commences, spreading upwards—"laryngitis ascendens." The fact of the existence of laryngeal stenosis is therefore the only one that can be definitely made out in many cases; the stridulous breathing, well marked especially on inspiration, but also on expiration; the general laboured character of the respiration, with loss of voice and inspiratory retraction of the chest walls, being the certain signs on which reliance can be placed. The exact nature of the membrane, whether it be of a croupous or superficial diphtheritic nature, or of a more malignant character involving deeper textures, cannot be made out from the clinical features of the case, unless there be membrane on those parts of the mucous surface visible to the naked eye by the laryngoscope or otherwise. In certain rare cases, laryngeal stenosis may be acutely induced by abscess near the trachea, or by an enlarged thyroid or other tumour; but such cases are rare, and the history is altogether different, and there may be symptoms present indicating pressure on other parts in the neck, with difficult deglutition.

TREATMENT.—The indications of treatment are to prevent the extension of disease in the air passages, and relieve the laryngeal stenosis, by adopting every means to facilitate the loosening and coughing up of the membrane, at the same time maintaining the child's strength by suitable nourishment and stimulants. The child should be put into a tent bed with one or two steam kettles, and the vapour medicated by adding *ol. eucalypti*, creasote, or carbolic acid, or cresolene. The room should be well ventilated, and the temperature of the tent kept between 65° and 70°. The child should be fed chiefly on milk, but this must be mixed with either barley or lime water, and given warm. Beef-tea or Valentine's juice may be given occasionally, but should not be relied on as a nutrient. White of egg, diluted with water and brandy, is an excellent and better nutrient. According to the age of the child, brandy

or good whisky should be given every two or three hours, or oftener if need be—the use of stimulants being invaluable in this disease. The medicines most to be relied on are *emetics*, which, however, must be used with caution, and only as a rule in the early stages. Ten grains of sulphate of zinc with five or six of ipecacuanha, or half a grain to a grain of sulphate of copper, in several doses, at intervals of a quarter of an hour, till emesis is induced, are the most suitable. They promote the mucous secretion from the inflamed surface, and tend to loosen the membrane, which may be coughed up. The internal remedies most serviceable are those of a tonic and antiseptic nature, such as mercury, iron, hyposulphite of sodium, or sulpho-carbolate of sodium. Whichever drug is chosen it should be given in small hourly doses. To obtain any benefit from the use of such remedies, they must be given in such a way as to produce speedy effects. I have had the best results from a mixture containing five minims of tinct. ferri perchlor., ten minims of liq. hydrarg. perchlor., with thirty minims of glycerine, in a dessert-spoonful of water, given every hour. When the mercurial dose induces purgation it must be stopped, and mercurial ointment rubbed in over the larynx, the iron being continued as before with a quarter grain of hydrochlorate of quinine added to each dose instead of the ferric chloride. If the child objects to this mixture in water alone, some fluid extract of liquorice may be added to cover the taste. In prescribing hyposulphite of sodium, two to four grains should be given with ten minims of a solution of sulphurous acid, and half a drachm of glycerine in a dessert-spoonful of water, every hour. In like manner, four to six grains of sulpho-carbolate of sodium, with $\frac{1}{30}$ th of a grain of carbolic acid, and thirty minims of glycerine, in a dessert-spoonful of water, may be given with the same frequency. Careful attention in all cases must be given to the state of the circulation, and any indication of heart failure must be met with digitalis or strophanthus. Other therapeutic means may be alluded to, chiefly of a local kind—antiseptic and resolvent sprays, or

applications to the larynx. Morell Mackenzie has tried various applications to the larynx with a brush made from squirrel's tail hair with a view to loosen and dissolve the membrane. The remedies credited with this action are lactic acid, lime water, liquor pancreaticus or papayotin. They may be also sprayed into the larynx. Bicarbonate of sodium, twenty to thirty grains to the ounce, is also a useful solvent spray, and a solution of permanganate of potash is often of service. Stoerck has invented a very useful laryngeal syringe, with which any of the membrane solvents may be injected into the larynx. It requires some dexterity to do this, the laryngeal mirror being used so that the fluid may be injected directly into the larynx. Lime water is a useful remedy for this purpose. In very young children such methods of medication are impracticable, but in older ones they may often be readily accomplished. The steam of the tent may be medicated by iodine, creasote, or carbolic acid, or by vapour from medicated cones, which are now conveniently made of different antiseptic substances. I have not tried insufflation to the larynx, so useful in pharyngeal cases; iodoform and boracic acid, in the proportion of one to three, are recommended as most valuable applications. Externally to the larynx I have not found counter-irritation by blisters of any service, but hot sponges frequently applied, or continuous fomentations with boracic acid, covered by jaconet, often give much relief. The application of ice is a favourite local appliance with some physicians, but I prefer the warm applications. Should such means as have been alluded to fail, and the symptoms of laryngeal stenosis become aggravated, the question of tracheotomy or intubation must be considered. It should be remembered that the effect of such operations is simply the relief of laryngeal stenosis, and that the general disease is in no way influenced by the performance, although in cases where the membrane is localised in the laryngeal cavity the operation may help to prevent its extension into the trachea and bronchi. It is not easy to lay down distinct indications for the operation; the instinct

of the physician who has been watching the case from the first will be the best guide in coming to a decision. In cases complicated by capillary bronchitis or pneumonia, or when there is sufficient evidence of the extension of the disease into the smaller bronchial ramifications, the operation is contra-indicated. Should it be decided on, the first question which presents itself is that of the administration of chloroform. Except in cases where the child is unconscious, the anæsthetic should generally be given. The operation may be performed either above or below the thyroid isthmus. Theoretically speaking the low operation is the best, but the higher operation is more easily performed, the trachea being nearer the surface. The patient should be placed on his back, the shoulders being raised, and a pillow put under the neck, so as to allow of full extension of the head, which is held steady by an assistant. The incision should be made from below the lower border of the thyroid cartilage, directly in the middle line downwards, nearly to the top of the sternum, and should be carried well through the subcutaneous fat; the edges are then held apart by an assistant. The deeper tissues should be divided freely to the same extent as the superficial incision passing through the muscular fascia between the edge of the sterno-thyroid muscles, care being taken to avoid wounding the thyroid veins, which should, if possible, be drawn aside, or, if not, divided, and the bleeding stopped by pressure before opening the trachea, which may now be felt with the finger. The fascia surrounding the wind-pipe should now be cut through, so as to lay the tube bare. It is then fixed by an assistant by means of a sharp hook. The scalpel is then entered below and pushed upwards, the handle being depressed, so as to make an incision about an inch, or not less than three-quarters of an inch, in length. A dilator is then introduced into the trachea, and the tube slipped in, the sharp hook being removed. The tube is fixed by tapes tied round the neck, and the patient put to bed in a steam tent. The child should now be fed as before the operation. The

tube must be kept clear, and the inner one removed as often as need be, and washed clean in warm boracic solution. If, on the removal of the inner tube, there is much coughing and evidence of secretion or loose membrane in the trachea, a feather which has been wet with the antiseptic solution, must be pushed down the trachea, and frequently a quantity of secretion is coughed up with manifest relief. A piece of antiseptic gauze should be kept over the tube, and underneath and round the edge of the outer tube a dressing of boracic lint covered with boracic vaseline.

Intubation is the alternative operation to tracheotomy. It is frequently resorted to in the first instance, tracheotomy being afterwards performed if it proves unsuccessful. The advantages of the operation are simplicity and rapidity, with the avoidance of the knife, which insures the more ready consent of the friends. Another advantage is that it allows the patient to breathe *per vias naturales* and not through the tracheal wound, which of itself may prove a source of danger by taking on diphtheritic action and inducing septicæmia. The objections to the operation in diphtheria are that the tube may very readily become blocked with secretion, requiring its frequent removal, or it may be coughed up, and if skilled assistance is not at hand to replace it, the child will be in danger of suffocation. The instruments required are a gag, the tube, the introducer, and the extractor. Before performing intubation for the first time, the operator, as advised by Dr. Waxham, should familiarise himself with the instruments, and for this purpose ought to practise introducing the tube into the closed hand of a friend, withdrawing the introducer and then making use of the extractor. The steps of the operation are thus described by Dr. Waxham. A tube suited to the age of the child must be selected and a silken thread attached to it, with a loop at the end about sixteen inches long. The patient is placed on the nurse's knee in an upright sitting posture, a light blanket being put round the child and pinned up to the neck. The nurse allows the child's head to rest on one of her

shoulders, and the head is steadied by an assistant standing behind the nurse. The nurse's hands encircle the body of the child so as to keep it steady and hold down the arms. The operator now screws the obturator upon the introducer, which attaches the tube firmly. The gag is then introduced on the patient's left side, so as to open the mouth widely. The operator having quickly seized the introducing instrument, hooks the loop of silk over the little finger of the left hand, and introduces the index finger of the same hand, closely following the tube. He then hooks forwards the epiglottis, and passes the tube directly through the glottis, at the same time raising the handle slightly so as to guide the tube downwards and somewhat forwards in the tracheal axis. The tube passes down directly under the tip of the index finger. The introducer is then relaxed and the left index finger still remains to press the tube well down. When the tube has been properly introduced a fit of coughing ensues and the respiration is freed. The operator now waits a few minutes to see that the respiration is free, and until coughing has ceased. He should then remove the gag, cut the loop of string near the mouth, pass the left index finger again down to the tube and hold it firm while the string is withdrawn. If, after introducing the tube, it should be blocked by loose membrane, forced into it by coughing, it should be at once removed and reintroduced. In extracting the tube the child should be placed in the same position, and the gag having been introduced, the left forefinger is passed down to the tube, and the extractor guided along it into the opening. In the after treatment, if there be any difficulty in feeding the child in the ordinary position, it should be laid over the nurse's knee, allowing the head to fall back so that the tip of the chin points upwards, and the child allowed to suck the milk through a bottle. Dr. Ridge of London recommends, and has performed successfully, nasolaryngeal intubation in the following manner. The child is put under chloroform, and a gum-elastic tube passed through the nostril into the pharynx, the tube being guided by the left

forefinger into the glottis. The method is a simple one, and may succeed in giving temporary, if not permanent relief. In Dr. Ridge's case the tube was worn three days with complete relief, but unfortunately septicæmia came on, which ultimately caused the death of the child.

CHAPTER XVIII.

THE RESPIRATORY SYSTEM—*continued.*

BRONCHIAL CATARRH.

IN discussing the important subject of bronchial catarrh in children, our picture will be drawn from the disease as it occurs in young children under the age of three years, and chiefly during the dentitional and pre-dentitional periods. In older children there is little to distinguish the disease in its clinical features and complications from that of adults. In infants, on the other hand, there are many points of special import and peculiarity which merit attention. I have already made some general remarks on the respiratory function in early life, and with reference to this and the pathology of bronchial catarrh it is desirable that three points should be kept in mind:—(1) The peculiarities, anatomically and physiologically considered, of the function of respiration in the child, and the disturbed physical relations which are brought about either by pre-existing disease, or secondarily as the result of the complications of the bronchial catarrh; (2) The extreme proneness of young children to catarrh, and the tendency to its indefinite extension along the respiratory tract, due to the activity of the catarrhal processes in early life; (3) The pathological relations of cough in the young child, its purely reflex nature, and the comparative absence of voluntary effort as in the adult.

CAUSATION.—Bronchial catarrh in this country is a common affection even in healthy children. It is still more frequent and dangerous in those who are debilitated, from whatever cause.

Climatic Influences are among the most potent factors in its production. The frequent and sudden changes of temperature, and the variations in the atmosphere as regards moisture, are powerful in favouring the production of the disease.

Anti-hygienic Influences, by lowering the tone of the system and depressing the vital power, render children less able to resist the exciting causes of the disease. The direct effects of cold, or chilling of the surface from draughts, acting even on healthy children, but more particularly on those who are debilitated, are readily productive of it. In the poorer classes this is especially a frequent cause; and among well-to-do people, where opposite conditions obtain, children are hardly less liable to be attacked, coddling and keeping them in too hot rooms producing liability to catch cold.

Deficient or improper Clothing operates in a large number of cases. The practice in this variable climate of keeping young infants with bare arms, and, after they are short-coated, with bare legs, is a most dangerous custom, in favour of which little can be said except that it panders to the vanity of mothers, who are fond of displaying the natural beauty of their children. Surely common sense would dictate that infants are at least as liable, we believe more so, as adults to catch cold by having their limbs exposed.

The *Dentitional Period* is one in which children are especially sensitive and liable to catarrhal attacks. The physiological activity of the great mucous tracts is very marked at this time, and therefore the susceptibility to the influence of the exciting causes of disease is greater. Many acute diseases, such as measles or whooping-cough, predispose to bronchial catarrh. Chronic debilitating diseases, specially *rachitis*, also develop a strong predisposition to catarrhal attacks. So frequently is this the case in rickety children, that, when an infant suffers from chronic and persistent bronchial catarrh, there is a strong suspicion of its being rachitic.

CLINICAL FEATURES.—Acute bronchial catarrh often begins,

as in the adult, with a coryza, the catarrh spreading by continuity of surface to the tracheo-bronchial mucous membrane. The symptoms vary in the further progress of the case, according to the extent of the tubes involved; the extension may take place only to the larger bronchi or further to the medium-sized tubes. In either case we have to deal primarily and perhaps solely throughout with a bronchial catarrh. When the disease spreads to the minute bronchial ramification, pulmonary catarrh is almost invariably, I believe always, superadded in

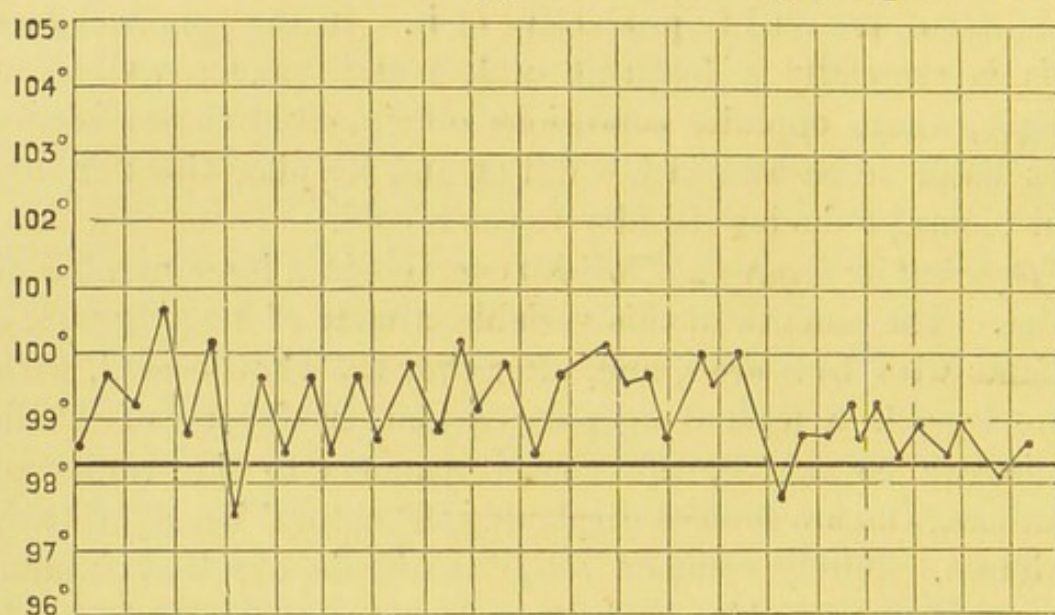


Chart 24.—Acute Bronchial Catarrh, uncomplicated—Recovery.

the young child. The symptoms of a *slight catarrh*, in which the large or medium-sized tubes are involved, are febrile movement of a moderate type, the temperature range showing an average of about 100°, or even less, with little variation, the respirations being accelerated, but seldom over forty. The pulse shows a corresponding increase to 120 or 130. The cough, at first dry and harsh, becomes looser as the secretion from the inflamed surface is established. On examination of the chest the percussion note shows normal resonance throughout, and on auscultation the usual sounds of scattered sibilant rhonchi, mixed after a time with coarse crepitant râles, become audible. In this disease in children, the clinical features show considerable variation. In many children a catarrh may become pretty

well established, with little sign of illness. There may be only slight fever, hardly any cough, and the child may be playful and apparently well until the catarrh extends to the smaller tubes, when the nature of the case becomes apparent, and the physician is called in. In sucking babies, sometimes the only symptom is drowsiness, with restlessness and crying during sucking, the child being obliged at intervals to let the nipple drop to free the respiration. This is especially the case when there is coryza. When the bronchial tubes are extensively involved, the symptoms and physical signs are more marked and fully developed. The respirations are hurried, running up to fifty or sixty. The temperature ranges from 100° to 102° , or even higher, being pretty regular and not characterised by great remission. The physical signs are characteristic during the first few days, the respiratory murmur being high-pitched and often harsher than natural, with few accompaniments other than those of a dry character. These signs are soon succeeded by crackling mucous râles, heard generally all over the chest both during the inspiratory and expiratory acts. These râles are the most important and characteristic signs of extensive and fully-developed bronchial catarrh in the child, and are relatively more copious and frequent than in similar conditions in the adult. They are heard, as a rule, generally over the chest, but are most numerous posteriorly in the mid-scapular regions and at the bases. In a previously healthy child such a condition as this, under careful treatment, may end satisfactorily in from ten to fourteen days, the physical signs gradually disappearing, and convalescence becoming established. In a delicate child, or in any case where the disease does not show signs of amelioration within a reasonable period, it may either become chronic, or extension may take place to the bronchioles, and the symptoms assume a more severe character from the development of pulmonary catarrh. Under such circumstances the pulse and respiration become much accelerated and the relative ratio perverted, the pulse running up to 150 or more, and the

respirations to about sixty. The countenance becomes dusky and the lips more or less livid, the alæ nasi and accessory respiratory muscles being brought into action; the cough at the same time becomes shorter and more troublesome, often paroxysmal in character; the mucous râles are more copious and general, and the respiration often shallower. In extensive bronchial catarrh of this nature, certain complications or extensions of the disease are almost inevitable; and of these, pulmonary or alveolar catarrh, with pulmonary collapse and emphysema, are the most frequent and serious.

Pulmonary Collapse or Acquired Atelectasis is a frequent, it may be said almost constant, complication, to a greater or lesser extent, of bronchial catarrh in the infant. The anatomical peculiarities of the bronchi and respiratory apparatus generally, in infancy, favour its production. The bony thorax is softer and more yielding than in the adult, the muscular apparatus less developed and weaker. Up to the age of three or four years, not only the thoracic walls but the bronchial tubes retain more or less their foetal peculiarities. The mucous membrane is highly vascular and easily congested, the surface more delicate, soft, and loosely attached to the muscular layer. The epithelial cells are large and very numerous, and tend to proliferate more readily than in later life, the catarrhal process being much more active. These physical and anatomical peculiarities specially predispose, under exciting causes, to pulmonary collapse. The physically feebler respiratory power without, and the increased secretory and cell proliferating activity within, the tubes, renders them more liable to be blocked and occluded. Pulmonary collapse, although generally associated with the more extensive and serious form of catarrh, is not infrequently met with in young children, even in the slighter forms of catarrh. Perfect recovery and reinflation of the collapsed lobules may take place, or the lung may remain in a permanently atelectic condition. In pleuritic effusion the lung for the time being is rendered more or less atelectic. In exhausted children it

may occur gradually from simple feebleness of the respiratory power. In catarrhal pneumonia Dr. Keating believes that atelectasis is directly produced by peri-alveolar inflammation, causing gradual pressure on the alveoli. Early recognition of the occurrence of pulmonary collapse is of importance, as prompt and energetic treatment is successful in many cases in inducing reinflation of the lung, and presenting the occurrence of further complications. The *causes* of pulmonary collapse are mainly of a physical nature. Bearing in mind the peculiarities of the infantile respiratory apparatus, it is evident that anything which interferes with the normal

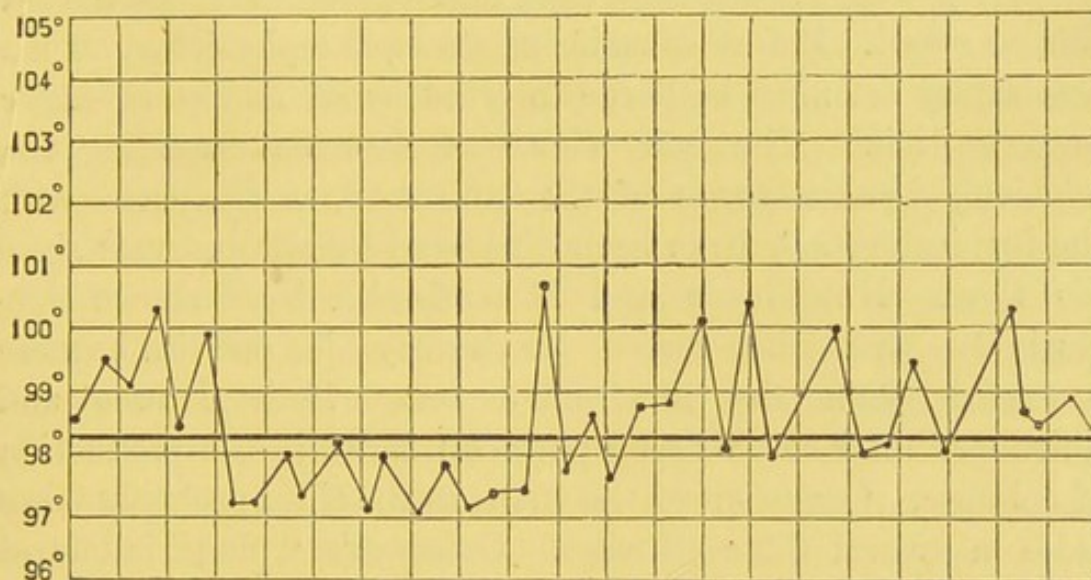


Chart 25.—Bronchial Catarrh—Pulmonary Collapse—Recovery.

mechanism of respiration is apt to produce collapse, apart altogether from causes within the bronchial tubes themselves. In atrophied or debilitated children, especially those affected with rickety deformity of the chest, collapse results from weakness of the respiratory act, due to disturbance of its physical balance from softness of the bony thorax and feeble muscular power. The condition of inspiratory retraction of the lateral base of the chest, so common in rickety children, is one of the most frequent physical causes of collapse. Any obstruction to the respiration from nasal or laryngeal stenosis produces the same effect. In the like manner, distension of

the abdomen from flabbiness of the muscles and flatulent distension of the bowels, by interfering with the descent of the diaphragm and weakening the inspiratory power, helps in its production. There can be no doubt that all these causes operate in the production of atelectasis, apart altogether from the existence of bronchial catarrh; the result, as already stated by the author,¹ being slowly produced by the more powerful expiratory act emptying the alveoli of the contained air, which is not replaced by the feebler inspiratory effort. When catarrh is present, the physical condition of the tubes is altered, and, more or less secretion being present, another group of causes comes into operation to produce a similar result. Before considering these, the physiology of the respiratory act must be borne in mind as an important factor in causation. The old views of Lænnec regarding the relatively weaker power of the expiratory, as compared with the inspiratory act, have been disproved by all observers since his time. Hutchinson and Mendelssohn have shown conclusively that the forced expiratory is one-third more powerful than the inspiratory act. Both Traube and Gairdner² refer to this as a powerful factor in the production of collapse. Occlusion of the tubes in the child probably takes place in several different ways. Gairdner's "plug" is one of these, a mass of inspissated mucus blocking up one of the larger tubes and acting as a ball valve, whereby, on account of the natural shape of the bronchial tube, the entrance of air is rendered more difficult than its egress. As a cause of collapse in the child, I believe it is less frequent than in the adult, on account of the greater fluidity and copiousness of the secretions. In this way, I believe, from careful examination after death of a large number of cases in which no plug could be found that collapse takes place from the gradual accumulation of secretions, damming up the tubes by viscid material, which the child is unable to cough up, but which

¹ *Transactions Edin. Med.-Chirurg. Society*, Vol. for 1886.

² *Path. Anat. of Bronchitis*.

in the adult would probably be got rid of by forced voluntary effort. In the child under these conditions, the more powerful expiratory effort gradually forces the air through the secretion and empties the alveoli, the air not being replaced by the feebler inspiratory act, any residual air becoming slowly absorbed, as shown by Fuchs. The only other cause of pulmonary collapse in the child to which I shall allude, is the probability of temporary occlusion of the tubes, partial or complete, by spasmodic contraction of the bronchial muscles. Lænnec and after him Trousseau and other writers have alluded to this. Trousseau, in proof of the existence of spasm, has found therapeutically that belladonna, from its well-known action on the vagus system, in lessening vascular congestion of the mucous surface, diminishing secretion, and relieving spasm, is a most efficient drug in treating such cases. In young children, especially those previously in good health, in whom reflex nerve action is very active, it seems highly probable that this is not an infrequent cause of pulmonary collapse in the milder forms of bronchial catarrh, when the larger tubes are chiefly implicated. In fact it is difficult to account for its production except on some such theory in those cases where the catarrh is of a slight nature, and there is little evidence of secretion in the tubes. The exact relations and condition of the bronchial muscles in acute catarrhal affections require elucidation. It cannot be doubted that reflex spasm, as is generally supposed, must seriously affect the ingress and egress of air. A further development of spasm, ending in more or less paresis of the muscular wall, especially if accompanied by swelling of the mucous membrane, would tend to produce the same effects. Important observations have been made during recent years by Huck and others on the presence of erectile tissue over the inferior turbinated bodies of the nares. Stenosis of the nares in young children often plays an important part in the production of pulmonary collapse. Nasal catarrh is common in children, and dangerous in this respect in direct proportion to

the rapidity and completeness of the nasal occlusion. It is not yet known whether any erectile tissue exists in the bronchi. If present, it would readily account for the rapid occlusion of the tubes, which occurs in the slighter forms of catarrh in previously healthy children. Whooping-cough is a disease in which collapse invariably occurs, the forcible expiratory efforts during the cough and the succeeding laryngeal spasm interfering with the subsequent inspiratory effort, and affording conditions eminently favourable to its occurrence. There can be no doubt that the causes of pulmonary collapse in infants are more complex than has been generally supposed.

SYMPTOMS.—The symptoms of pulmonary collapse vary infinitely according to the extent of lung involved, the rapidity of the production of atelectasis, and the pathological conditions with which it is associated. The collapse may be very limited in extent (lobular), or more extensive (lobar). In general terms, it may be said that the more extensive the collapse the more marked the symptoms, and the more distinct the physical signs. Again, if the collapse is rapidly produced (acute), the symptoms are more marked than when it occurs slowly. Indeed, in the latter case, there may be no marked symptoms of any kind. The most prominent symptoms in acute collapse are—*sudden increase in frequency of the respiration*, the inspiration being more difficult than expiration, *shallow breathing*, *diminished or altered cough*, *pallor*, and *lividity of face*, more or less marked; *general depression*, often *drowsiness*, *feebleness of the pulse*, its rapidity being increased, but more frequently diminished; and *lowering of the temperature*, which is almost a constant sign. In illustration of the symptoms of acute collapse occurring in slight catarrh, I mention two cases as examples:—

C. W., æt. four months, seen in consultation with a medical practitioner, who stated that the child had been on the bottle, and quite well till a week previously, when it developed symptoms of slight catarrh, two other children in the house having previously suffered from colds. The symptoms of

cold began with sneezing and cough, restlessness, and intermittent suckling, but otherwise the child was lively, and there was no constitutional disturbance. The night before I saw the baby it had got suddenly worse, becoming heavy and drowsy, refusing its bottle, and markedly quick respiration. On examination I found it well nourished — respirations, 80; pulse, 130; temperature, 99°; anterior fontanelle depressed; superficial veins of head and thorax distended. On inspection of the chest there was little or no thoracic movement, the breathing being shallow and chiefly abdominal, with slight epigastric retraction. On auscultation, the breathing was loud and freely audible all over the chest, and accompanied by occasional scattered and sibilant râles, except over a limited space, one and a half inches in diameter, on the right side posteriorly near the base, where the respiration was faint and feeble and the percussion note slightly impaired. I ordered the infant, as it had ceased to take its bottle, to have a tablespoonful of sack whey every hour and a half, for which it was to be wakened up if asleep, and, if possible, made to cry; a warm bath for three minutes, after which it was to be taken out before the fire in a warm blanket on the nurse's knee, and the hand, dipped in cold water, applied suddenly to the chest three or four times, then dried quickly, and a light cotton-wool jacket put round the chest under its flannel night-dress; to be kept lying as much as possible on the left side; the flannel binder to be removed from the belly; five minims of aromatic spirit of ammonia, with one minim of spirit of chloroform, to be given every two hours. In two days the child had resumed its natural appearance and begun to take its bottle, the breathing becoming louder and natural over the affected area, with a few fine crackling hard râles chiefly during inspiration. Perfect recovery took place.

A second and similar case was that of a baby girl, one year old, who had been suffering from mild catarrh for about ten days. I was asked to see her, as she became suddenly worse,

the breathing having become rapid, and a good deal of general distress. Her respirations having been previously about 36, had run up to 68, the pulse being 130, the temperature $99^{\circ} \cdot 2$. Examination of the chest showed scattered sibilant ronchi, with occasional crackling moist sounds, in the inter-scapular regions, and at the bases of both lungs. The respiration was exaggerated in parts, and generally of unequal intensity. There were no definite localised signs of pulmonary collapse, but its existence was diagnosed as probable, and the further progress of the case corroborated this view. The chest had been previously covered with a light cotton-wool jacket. A liniment, consisting of one part of lint. ammoniæ and three parts of lint. camphoræ, was ordered to be applied to the chest. She was given two ounces of milk, with twelve drops of brandy and six drops of tinct. of belladonna, every three hours, for which she was to be roused from sleep, if necessary. In four days the aggravation of symptoms had disappeared, the respirations coming down to forty. The only alteration in the physical signs was the occurrence of fine crepitant râles over a limited area of the right lung, posteriorly at the base. She got rapidly well. Such cases as these are met with not infrequently. Many may be diagnosed with certainty as pulmonary collapse, when accompanied by well-marked physical signs. In others, the physical signs are either absent or at first indistinct. Yet the general features of the case leave little doubt as to the existence of pulmonary collapse of an acute nature.

In *severe and extensive bronchitis* the occurrence of collapse, limited or extensive, is the rule and not exceptional, as in the milder catarrh. Re-inflation of the collapsed portions is the exception. The symptoms and physical signs vary according to the extent of the affected area, and the rapidity with which the collapse takes place. In cases where the air is slowly expelled by gradual occlusion of the smaller tubes, no marked symptoms are present; on the other hand, when, as in the case of a plug in a large bronchus, collapse is sudden, the

symptoms are generally sufficiently well marked as to be easy of recognition. The child becomes suddenly distressed and restless, more or less drowsiness is often a prominent symptom. The countenance is anxious, with lividity of lips and duskiness of face, the alæ nasi are active, the respirations hurried and shallow, running up to seventy or eighty. The temperature, as a rule, shows no corresponding rise, but often an abrupt fall. The cough becomes altered in character and frequency, and is sometimes almost suppressed, at all events it loses its harsh bronchial character, and becomes feebler and shorter. The child generally refuses food, and, if at the breast, stops sucking. Along with these symptoms the physical signs are altered. During inspiration there is often retraction of the lateral or anterior portions of the chest walls. If the collapsed portion is near the surface, there is high-pitched percussion resonance over the affected area, or the percussion dulness may be masked by emphysema around the collapsed portion, so that a somewhat resonant note may be met with instead of a dull one. On auscultation, the breathing is shallow and feeble, and of a faintly bronchial character. There are usually no respiratory accompaniments at first, other than those previously audible, but in the course of a day or two fine crepitant râles are heard in and around the collapsed area.

MORBID ANATOMY. — The collapse may exist in small scattered patches or in larger areas. In either case the appearance of the affected portion is much the same. The patch is livid in colour, and depressed below the surface of the surrounding lung. On section, the same livid colour is observed, with congestion of the capillary vessels. The tissue is non-crepitant and fleshy, and can be readily inflated through the bronchus. Around the patch there may be more or less emphysema.

CATARRHAL PNEUMONIA.

Pulmonary or Alveolar Catarrh—Catarrhal Pneumonia—Broncho-Pneumonia—is the direct and almost constant result of

extensive or so-called capillary bronchitis in the young child. Clinically it is one of the most serious and frequent of acute lung affections in children. The variation of symptoms, inconstancy, and rapidly changing character of the physical signs, lends great interest to its clinical study. Well-marked physical signs may be present on examination, which, from rapid changes in the physical condition of the affected part, due perhaps to collapse or emphysema, may be quite changed within a few hours. Pathologically, as well as clinically, the study of acute pneumonia in children is beset with many difficulties. The pneumonic types are not so clearly defined as in the adult, and differentiation is often most difficult. The true typical catarrhal pneumonia about to be described is the most common form in children. On the other hand, we meet, in early life, with pneumonic fever or fibrinous pneumonia, as in the adult, well marked and clearly defined as regards its clinical features, yet, when we come to examine, after death, the lungs of a case exhibiting such features during life, the morbid appearances are by no means so characteristic as in the adult. The distinction of lobular and lobar in the child, as indicating in the one case catarrhal and in the other fibrinous, is of no value whatever, as lobar catarrhal pneumonia is often met with, and it is often very difficult and well-nigh impossible to distinguish it from the true fibrinous form. It is this intermediate class of pneumonias in children which are so puzzling to the clinician, and all physicians of experience in disease in children are agreed that a differential diagnosis in a large class of cases is most uncertain. This renders pathological deductions, from mere clinical observation, unsatisfactory and unreliable as regards the true nature of the disease. Statistics of croupous pneumonia in the child, in the present state of our knowledge, must, I think, be regarded as of doubtful value, as compared with similar records in the adult, where we have a much more regular and well-defined disease to deal with.

SYMPTOMS. — Acute catarrhal pneumonia is a secondary

disease, succeeding or complicating bronchial catarrh, during the progress of which it is apt to occur when the catarrhal process reaches the alveoli of the lung. Clinically, it is impossible in the child to differentiate capillary bronchitis from acute catarrhal pneumonia. Probably the ultimate bronchial ramifications are never involved in the catarrhal process, uncomplicated by alveolar catarrh. The recognition of the occurrence of acute catarrhal pneumonia ordinarily presents few difficulties. The previous existence of bronchial catarrh itself, associated with a certain group of symptoms, is strongly

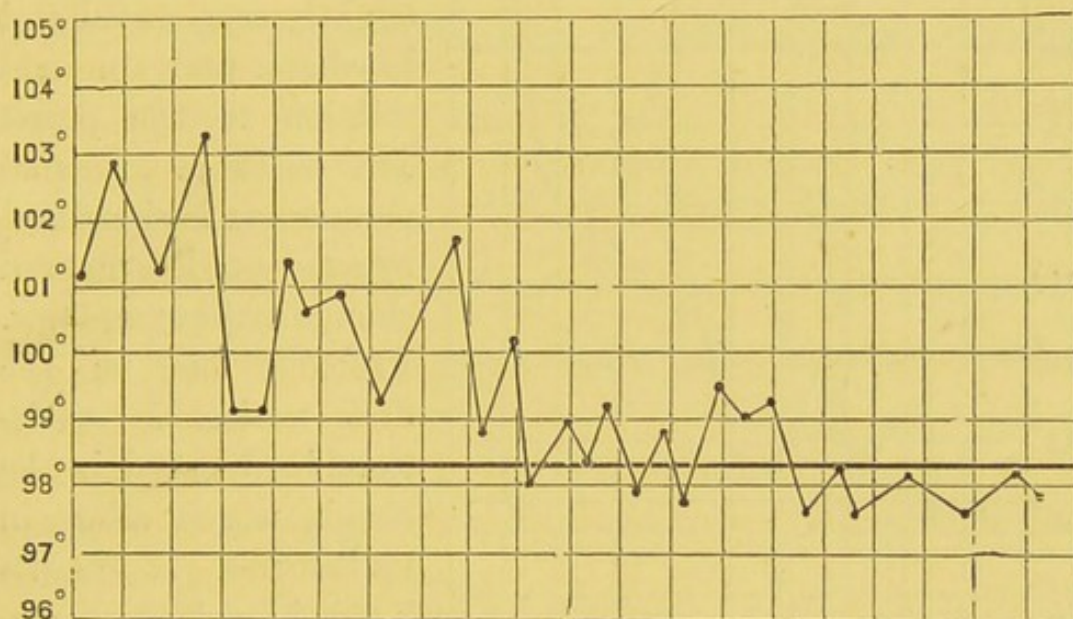


Chart 26.—Acute Catarrhal Pneumonia—Recovery.

presumptive of its existence. The diagnosis may be assured by a consideration of the general clinical features of the case, more particularly as regards symptoms, physical signs at the commencement, and when the disease is limited in extent and possibly confined to a central portion of the lung, being often indistinct in their character. When large areas of lung are involved, physical signs are well marked, and give clear indication of the true nature of the complication. I have already sketched the symptoms of bronchial catarrh, whether of a slight or severer nature, and in order to a recognition of the occurrence of catarrhal pneumonia, it is necessary to keep them in remembrance, and to note the changes in the clinical

features of the case which the supervention of catarrhal inflammation of the alveoli gives rise to. Let us, by way of illustration, again picture the case of a child suffering from a severe bronchial catarrh,—the hurried breathing, constant harsh cough (often paroxysmal in character), the accelerated pulse, anxious and distressed look, disinclination for food or playthings, foul tongue, unhealthy stools, occasional vomiting of undigested food and mucus. All the while the temperature is not very high, ranging from 99° to 101° , with no great

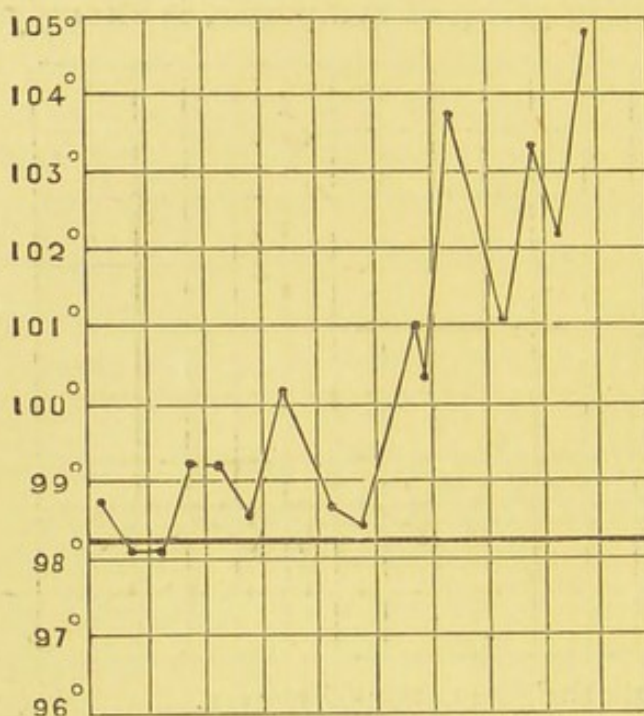


Chart 27.—Bronchial Catarrh—Catarrhal Pneumonia—Died.

variation, respirations slightly accelerated and bearing a pretty normal relation to the pulse. The onset of catarrhal pneumonia is signalled by a more or less marked change in the symptoms. Probably one of the first noticeable variations is observed in the cough, which alters in its features. It loses its harsh bronchial character and becomes shorter and hacking, and apparently is often accom-

panied by pain during the act. It may be more frequent, often very constant, but sometimes one of the most characteristic features is its diminished frequency; at the same time, the respirations are much accelerated, running up to sixty or seventy, and the breathing more shallow, the *alæ nasi* acting visibly. The pulse becomes quicker, and its ratio to the respiration is markedly perverted. The temperature rises to 103° or 104° , and becomes altered in type. Contrasted with the comparatively low and regular type of the uncomplicated bronchial catarrh, it shows considerable variations, a decided

morning fall with afternoon rise. In no class of cases is the graphic method of recording temperature more valuable, as by it alone we can often predict the occurrence of pneumonia. The child lies more quietly than before, and does not resist examination to the same extent as it did in the uncomplicated catarrh. The cry, which before has been harsh and smothered, is probably now absent. When a child with bronchial catarrh cries well, there is strong presumptive evidence of the absence of any serious lung complication. The digestive functions are often much disturbed, the symptoms indicative of gastro-intestinal catarrh often complicating the bronchial

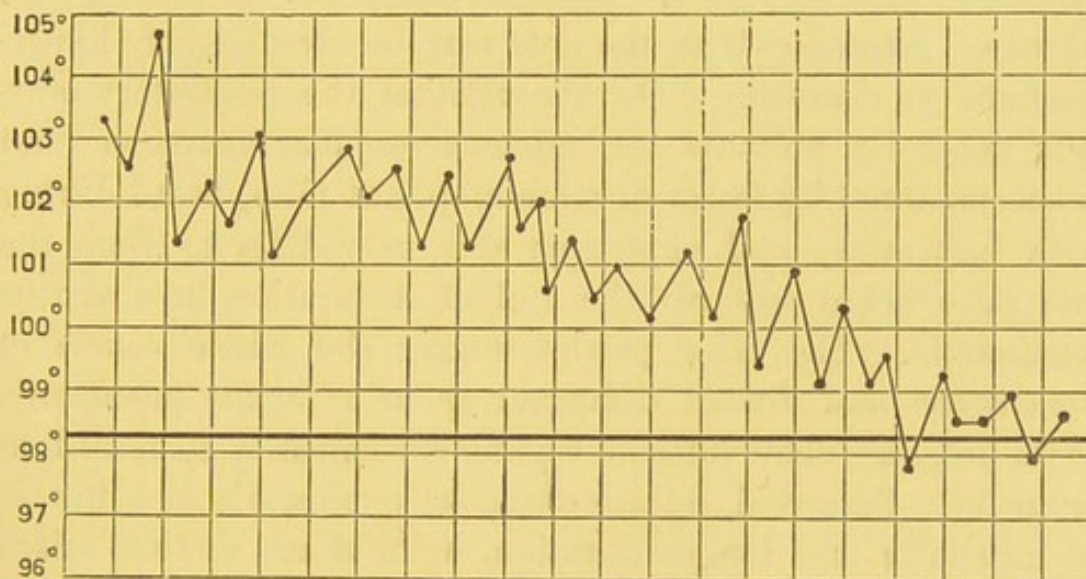


Chart 28.—Acute Catarrhal Pneumonia—Recovery.

affection. The physical signs in the chest next demand attention. Simple inspection often affords valuable information. Instead of there being almost entire absence of thoracic movement, as normally obtains in the infant, there is more or less indrawing or retraction of the intercostal spaces during inspiration; and in rachitic children, with soft bony chest framework, there is considerable inspiratory retraction of the ribs at the lateral bases of the chest. Auscultation and percussion show much variation in the physical signs, according to the site and extent of the disease, the number of lobules involved, their contiguity to one another,

and proximity to the chest wall. In some cases, where the patches are small and not near the surface, physical signs are ill marked, or absent, and we are forced to base our diagnosis on symptoms alone, which, if they are of the characteristic nature already described, leave little doubt as to the true nature of the case. As a rule physical signs are sufficiently distinct. The percussion note loses its natural resonance and becomes impaired in proportion to the amount of consolidation and its proximity to the surface. When much healthy lung-substance intervenes between the patch and the surface, the resonance may be normal or little impaired. Should emphysema be present to a lesser or greater extent, the note may be even slightly hyper-resonant in character. On auscultation the respiratory murmur generally presents the broncho-vesicular character, and is accompanied by fewer or more crepitant râles, heard during both inspiratory and expiratory acts, very different from the fine râles heard towards the end of inspiration in croupous pneumonia. The râles persist during the whole course of the disease, and do not disappear as in croupous pneumonia at its height. The voice or crying resonance is increased in intensity. Catarrhal, unlike croupous pneumonia, is a disease of indefinite and longer duration, without any distinct crisis. Its further progress is characterised by the more pronounced nature of the symptoms. The physical signs become more distinct as the pneumonic areas enlarge or coalesce, when, as often happens, lobar consolidation takes place, from splenisation of considerable portions of the lung. When recovery takes place, the child shows gradual and slow signs of improvement, both in regard to symptoms and physical signs. If, within a fortnight, there are no signs of abatement, the case generally runs into a subacute phase, and may terminate favourably at the end of six or seven weeks, or convalescence may be indefinitely delayed, in which case chronic disease, with ulterior and more serious lung changes, may ensue, or tuberculosis may supervene at a later period.

COMPLICATIONS.—*Collapse of the lung*, with compensatory *emphysema*, have already been alluded to, and are the most frequent and ordinary complications. In more chronic cases there is a tendency to extension of the inflammation to the peri-bronchial tissues, causing induration and contraction and bronchiectasis. Pneumothorax may occur from rupture of a subpleural abscess. Abscess of the lung is a rare complication or sequela of catarrhal pneumonia. I have lately seen two well-marked cases of this. In both, the clinical features of the cases were similar. The symptoms were protracted, with high fever of a hectic type, distressing paroxysmal cough,

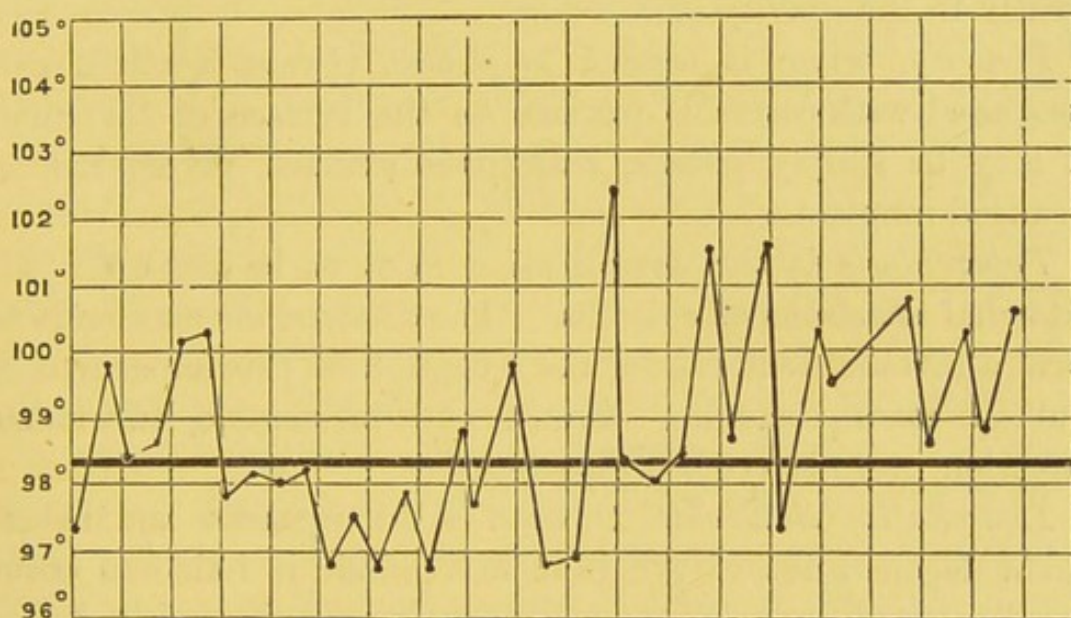


Chart 29.—Bronchial Catarrh—Collapse—Catarrhal Pneumonia—Death.

with expectoration of purulent material at intervals and temporary relief to the symptoms. In both cases, the physical signs of a cavity were well marked at the posterior base of one lung. Both cases ultimately recovered.

Digestive derangements are common and often of serious import. Many children, suffering from catarrhal disease of the lung, succumb to the effects of gastro-intestinal catarrh. Such complications seriously interfere with the assimilation of food and increase the general distress, and lead to rapid exhaustion. The catarrh is probably caused directly by the swallowing of the irritating bronchial secretions, which set

up an irritative catarrh in the gastro-intestinal tract. Those children who vomit at intervals and get rid of the catarrhal secretions are less liable to be affected. The symptoms of gastro-intestinal catarrh of this nature are, a red-coated tongue, afterwards desquamating and becoming dry and glazed, disinclination for food, vomiting of mucus and undigested food, diarrhoea, with offensive stools deficient in bile, with undigested food and mucus—sometimes the stools becoming of a watery character as the case goes on. When there is gastric catarrh alone, without involvement of the intestines, the case is less serious. Under any circumstances these complications add greatly to the gravity of the case.

Pleurisy, when it occurs, is almost always localised and associated with catarrhal patches on the surface of the lung. It may be simply plastic, sometimes effusive, giving rise to localised empyema.

Tuberculosis is the complication most to be dreaded in all catarrhal affections of children. The diseased mucous surfaces form a favourable nidus for the reception of tubercular germs, and in cases becoming chronic and intractable, tubercular infection may always be suspected.

Lymphatic Glandular Disease.—Enlargement and subsequent degeneration of the bronchial glands is liable to occur in all cases of bronchial and pulmonary catarrh, and is always a serious complication, the glands being readily receptive of tubercular infection.

MORBID ANATOMY.—The morbid processes are essentially catarrhal in their nature. The normal ciliated epithelium is shed and replaced by small embryonic cells, which undergo rapid proliferation. The catarrhal process in children, once started, proceeds with unusual rapidity. Along with the cellular proliferation going on, there is increased glandular activity, and the cellular *débris* mixed with excessive mucous secretion tends to block the tubes, owing to the difficulty which all young children have of getting rid of the expectoration. In the more advanced stages of the disease the

secretions become purulent, and thicken. Accumulated material in the bronchi gives rise to collapse of the lung, and also and not infrequently to acute and rapid dilatation of the tubes. On the other hand, according to the observations of Delafield, the morbid processes going on outside the tubes in the peri-bronchial tissues have important relations in the morbid processes. The interstitial changes going on around the bronchioles and alveoli are apt to cause obliteration of the tubes and collapse. The disease going on in the alveoli consists of shedding of the epithelium and rapid proliferation of young nucleated cells, the mature epithelial cells undergoing fatty changes, the products being absorbed when the case runs a favourable course. Pus formation takes place when the catarrhal process in the alveoli is very active. The distribution of acute catarrhal pneumonic patches on the lung may be scattered or diffused (disseminated). The most characteristic examples of the acute disseminated form are met with as a complication or sequela of measles or whooping-cough. The appearance of the lung in these cases is highly characteristic. The surface is more or less congested, and numerous solid, firm, purple, depressed patches, varying in size from one-fifth to one-tenth of an inch, can be seen on the surface. These are collapsed areas, and interspersed with them are numerous raised patches of catarrhal lobules. Around these the interlobular septa are often distinctly marked, and the lobules immediately surrounding them are emphysematous. On section the entire lung-substance is found to be congested, and the pneumonic areas and collapsed portions can be readily distinguished, the latter being smooth and non-vesicular. In the more advanced stage of the disease, the collapsed and pneumonic patches run more together and form large areas of consolidation, in some degree resembling croupous pneumonia, but distinguishable from it by the fact that the consolidation is less dense, and consists of a number of small patches run together with a somewhat irregular outline. Sometimes a condition of grey splenization

is met with, still more closely resembling croupous pneumonia. In these cases, according to Woodhead, "the lung is not nearly so congested, and in some cases may appear, as a whole, even paler than normal, though this pallor is due to the more solid patches." On squeezing the lung, in whatever stage of the catarrhal process, muco-purulent material exudes freely from the bronchi. Ulterior changes of various kinds are apt to take place. The more common of these are:—(a) Acute suppurative broncho-pneumonia, in which acute infiltration takes place around a bronchus, with the formation of an abscess, which may involve a large portion of the surrounding lung-tissue; (b) Acute diffuse interstitial pneumonia, the result of the irritation of the absorbed broncho-pneumonic products (Woodhead); (c) Caseous broncho-pneumonia, often of a tubercular nature; (d) Bronchiectasis, with ulceration of the tubes and the formation of cavities.

TREATMENT.—*Prophylactic*.—A great deal can be done by common-sense management in preventing "colds" in children. The ordinary advice to take care of cold is too often acted on in an extreme manner, the child being "coddled" and over-clad and kept too much in the house in overheated rooms. This extreme is probably as dangerous as the opposite one of over exposure. In this country young children in the winter and spring months should wear flannels and have their arms and legs suitably covered. The flannel should be of a light texture and worn loosely. Tightness of the underclothing is objectionable as tending to restrain muscular and respiratory movement, which is all-important in allowing of free exercise of limbs and chest. In summer the child should, unless very delicate, have a natural (cold) bath every morning. In colder weather the bath should be tepid. In either case, plenty of friction with a bath towel should be used to stimulate the cutaneous circulation. Even in winter the face and neck should be bathed in cold water every morning. The nursery or bedroom should be kept as nearly as possible at mean temperature, 60°. Open air exercise should be regularly taken

in fine weather. Young infants ought not to be kept out too long in cold weather. Carrying in the nurse's arms is generally safer than a perambulator. On the appearance of the earliest symptoms of coryza or catarrh, the child should be kept in the house and the temperature of the nursery slightly raised. A mild purgative may be given, if necessary, and a saline diaphoretic at bedtime, with a few drops of camphorated tincture of opium.

Curative Treatment. — On the supervention of bronchial catarrh the child should be put to bed, and the temperature of the room maintained between 65° and 70°. The cot should be placed at the side of the fire if possible, and a bronchitis kettle kept steaming into the room; or a tent may be put over the bed, and the bronchitis kettle kept steaming into it. Another plan, and one I generally adopt, is to hang wet towels all round the inside of the tent. This is equally serviceable in keeping the air soft and moist, provided the temperature is kept high enough to insure rapid evaporation. The importance of keeping the child in the early stages of bronchial catarrh in a moist atmosphere, cannot be over-estimated. By this means the cough is relieved, and secretion from the inflamed mucous surface favoured; the secretion is rendered more fluid and less viscid than if the child is breathing a drier air. The expectoration is therefore more easily coughed up, and the tubes cleared. It is well to medicate the air with a mildly stimulating antiseptic, such as eucalyptus or pumiline, for which purpose a small quantity of eucalyptine or pumiline essence should be added to the steam kettle or sprinkled on the towels in the tent. The child should be clothed in a loose flannel night dress, and the belly bandage, if worn, should be removed. In cases of young infants who cannot be kept constantly in bed, a light blanket or woollen shawl should be kept round the child while it is on the nurse's knee at the fireside. The next question to be decided is that of external applications to the chest. Acute bronchial catarrh in children is generally

relieved by rubefaction of the chest, and local diaphoresis kept up by suitable means. By keeping the cutaneous capillary circulation in a state of activity, we have a ready and direct means of relieving the congested condition of the pulmonary and bronchial vessels. Rubefaction may be produced by the application of sinapisms, care being taken to prevent them causing more than simple redness of the skin by too long application. Mustard is one of the most ready and efficient means at our disposal for this purpose, and as a rule is best applied in the form of the ordinary cataplasma sinapis, of the strength of one part of mustard to four or five of linseed meal, applied in the form of a jacket poultice, which should be kept on for from half-an-hour to an hour, according to requirement. Rubefaction may also be produced by the application, one part of lint. ammoniæ to three parts of lint. camphoræ, or with lint. terebinthinæ or terebinthina aceticum. After painting the liniment over the entire chest it should be encircled with a jacket of cotton-wool. Having produced rubefaction, our endeavour should be to keep up the activity of the skin and prevent any revulsion or chill. Such means of outward application are often all that are necessary in regard to external treatment. The question of continuous moist poultices in bronchitis is an important one. The necessity of keeping the chest and body warm, and maintaining continuous local diaphoresis, is most needful as a therapeutic aid in treatment, and for this purpose the time-honoured linseed and other emollient poultices have been the means hitherto adopted. For the purpose of maintaining continuous heat and moisture on the chest of a child suffering from bronchial catarrh, I have for many years given up the routine use of linseed or porridge poultices. They are too heavy, dirty, and unctuous, and do not fulfil the necessary indication of affording heat and moisture without weighting the chest too heavily and impeding to a certain extent free respiration, an all-important matter in these ailments in children. I am satisfied that hitherto we have unwittingly done a deal of harm by the

habitual use of large emollient poultices in young children. Except in hospital, or in private practice when you happen to have the advantage of a skilled nurse, it is difficult to get poultices properly made and applied, even if we desire to use them. A poultice badly made and improperly applied, and perhaps allowed to get cold, is worse than useless. Another objection is that in young infants, who are constantly moving and require perhaps to lie in the nurse's arms, the poultice is apt to get crumpled up and lumpy. I am quite sure I have seen evil results in private practice from the careless application of poultices, and I consider it to be the duty of every practitioner, if he think it desirable to order them, to see that they are *properly made and applied*. It is not sufficient in these cases to write a prescription and order a poultice, but to see that the details of treatment are carried out in every respect. The practice I am in the habit of following out, and which I notice is coming more and more into favour, is to encase the chest of the child with a loosely-fitting cotton-wool or light flannel jacket, after rubefaction has been first produced in one or other of the ways already indicated. This serves the purpose of keeping up a uniform warmth on the surface of the chest, and answers the purpose admirably. The jacket may be made and applied in three different ways. The cotton-wool may be basted on to a thin flannel jacket. This should be put on at once after rubefaction, and if the skin remains moist and perspiring, no further application is needed, but an occasional renewal of the rubefacient. On the other hand, if the child does not perspire, two methods may be adopted to this end. The cotton-wool or flannel should be basted on to a jacket of light jaconet, which is often sufficient to maintain the needed moisture on the surface. Should this fail, the whole jacket should be wrung out of warm water, to which a little boracic acid has been added before application. This forms a light, continuous poultice, which may be worn constantly. Flannel is the best poultice when wetting is required, as cotton-wool is apt to get lumpy. Sometimes other

medications are more useful than the boracic acid, which merely serves the purpose of keeping the jacket sweet. Pumiline essence, or pinewood or eucalyptus oil, are the best of these. Cold compresses or ice-bags, sometimes useful in pneumonia, are in my opinion inadmissible in bronchial catarrh. Other outward applications are occasionally useful, especially dry-cupping in severe cases of complicated bronchial catarrh. Local bleeding, by the application of a leech over one or other interscapular region, or at the base of the lung, or external jugular venesection, may be indicated, if there is evidence of impeded action or congestion of the right heart.

The administration of drugs in acute bronchial catarrh and its complications, deserves careful consideration with reference to the peculiarities of each case. The old routine treatment, still lingering in the hands of some practitioners, of ordering squill or ipecacuanha cough mixtures cannot be too strongly deprecated. Every case must be treated on its own merits, and with due regard to the constitutional state and peculiarities of the child, bearing in mind the principle, which we cannot too often recall, that it is not so much the disease that we have to treat, but the disease as it exists in the patient specially under observation at the time. In hospital practice, when one is untrammelled by the necessity of ordering drugs to please the relatives or friends of our little patients, I very often treat ordinary cases of bronchial catarrh without the administration of any medicine except a simple aperient, or it may be an emetic, trusting solely to hygienic and dietetic and local treatment on the lines indicated. In severe cases, however, the benefit to be derived from drugs, carefully selected, is of great value. The classes of remedies useful are chiefly those belonging to the emetic, diaphoretic, and expectorant varieties. Emetics are among the most powerful means at our disposal of promoting secretion from the inflamed bronchi, and emptying the tubes. They must be used, however, with discriminating care. I have already alluded to natural emesis in bronchitis as the only way young children

get rid of accumulated secretions which are retained in the stomach. When this takes place from time to time, as it does in many cases, no emetic is needed. On the other hand, when the child has not vomited, and there is constant dry cough with deficiency or dryness of secretion, high fever, with full strong pulse and deficient action of the skin, an emetic will afford relief. Ipecacuanha is deservedly one of the best, and should be given in teaspoonful doses of the wine till the desired effect is produced. Sulphate of zinc in doses of ten or twelve grains, either with the ipecacuanha or alone, is also useful. Apomorphia may be tried if these remedies fail, but only in strong children with steady circulation, as in my hands it has sometimes been followed by great depression. In debilitated children the use of emetics of any kind requires caution. It may be stated generally that these remedies are more suitable in the earlier than in the later stages of the disease, and in sthenic than asthenic cases, and in catarrhal pneumonia their employment is often of doubtful value. Regarding the use of expectorants, judicious selection is needful. Choice must be made with due regard not only to the extent of the disease and its complications, but with reference to the constitutional peculiarities of the child, and especially with reference to the state of the circulation, bronchial and cutaneous secretions. In a strong child, during the earlier stages of a severe bronchial catarrh, great relief is experienced from the administration of sedative circulatory expectorants, such as antimony, apomorphia, or ipecacuanha. The effect of these remedies is often most beneficial, but their action should be closely watched, and their administration discontinued towards the height of the disease, or when symptoms of depression become manifest. Children do not bear the administration of this class of remedies so well as adults, or, at all events, do not tolerate a long continuance of their administration. After the height of the disease, or in cases where there is a tendency to debility or feebleness of the circulation, ammonia, in the form of the aromatic spirit or

subcarbonate, or small doses of the hydrochlorate of ammonia, or with minute doses of that most valuable of all stimulants of the respiratory centre and nerve respiratory apparatus, strychnia, will be found of great service. Perhaps the most useful of all the expectorants in children are the alkaline carbonates, or citrate of potash, combined with small doses of ammonium or sodium iodide. The effect of these drugs in promoting expectoration, by favouring fluidity of the secretions, is most satisfactory. They may be given early in the disease, and continued to its height, thereafter being combined with senegæ or nux vomica. Another class of remedies deserving mention are the terebinthinate ones, such as turpentine or terebene, and eucalyptus. The former may be given internally, in three or four drop doses after food, the latter is useful as an inhalation. They are mildly stimulating, antiseptic, and antispasmodic. Terebene is especially useful in the later stages of catarrh, when there is deficient secretion combined with bronchial spasm. In acute catarrhal pneumonia, the use of emetics requires great caution, and is often contra-indicated from the feeble condition of the child. The treatment of pneumonia is essentially that of the catarrh with which it is associated. The special indications are the maintenance of the child's strength by careful dieting, and stimulants, if required—and as a matter of fact they are generally needed—a suitable dose of old whisky or brandy, along with food, every two to four hours. The disease being of indefinite, often long duration, sorely taxes the child's strength, and the dietetic management, along with stimulants, is the most important part of the treatment. Digitalis or strophanthus must be given, if there are any indications of heart failure. As to drugs, the stimulating class of remedies are the most useful. Antipyrine in one grain doses every four hours for two or three days, intermitting its administration every third day for twenty-four hours, is most useful in many cases. Subcarbonate of ammonia in two grain doses, with one grain of ammonium or sodium iodide, may be given every four hours,

a drop or two of tincture of *nux vomica* being added to the mixture. Warm continuous poulticing, as a rule, is not beneficial in catarrhal pneumonia. Intermittent rubefaction, or blisters of small size, over the affected part, are far more useful. The treatment of acute pulmonary collapse should be conducted on definite principles, the end we desire to attain being clearing of the tubes and relief of spasm, in order to permit of reinflation of the collapsed portion, and this may be brought about, especially in those cases of milder catarrh where the minute tubes are unaffected. In the collapse occurring around pneumonic patches it may be doubted whether complete or even partial reinflation ever takes place. The first indication in treating a case of the former kind is to promote, by all possible means, free respiration, more especially the act of inspiration. For this purpose the child's clothing must be light and loose, and the abdominal binder in infants removed. The child should be kept lying as much as possible on the sound side, so as to allow the affected one to have full play. As the infant is generally drowsy, it should not be allowed to sleep or lie too long, but should be taken up at intervals, and made to cry if possible, and as it is often cold, it should be put occasionally in a warm bath for a few minutes, and thereafter taken out in a warm blanket on the nurse's knee before the fire, and the nurse's hand, after being placed in cold water, should be suddenly applied to the chest three or four times to induce sudden inspiration. The child is then dried quickly—and dressed. Stimulating epithems to the chest are also of service, such as mustard, turpentine, or hartshorn. The child should be fed regularly, according to age. If at the breast, and it refuses to suck, as is often the case, it must be fed with a spoon. Stimulants are almost invariably useful; a few drops of brandy, every hour or two hours, should be given, or, in the case of a sucking baby requiring the spoon, sack whey is the better stimulant. In regard to drugs, aromatic spirit of ammonia or the subcarbonate are the best. In spasmodic

cases, belladonna is indicated. Its influence in this complication is often most marked, in diminishing the tension of the bronchial muscles and allaying reflex irritation, thereby facilitating the ingress of air to the collapsed lobules. The drug is of no use in the more serious cases of collapse occurring in capillary bronchitis and catarrhal pneumonia.

CHAPTER XIX.

THE RESPIRATORY SYSTEM—*continued.*

PLEURITIS.

INFLAMMATION of the pleura is common in children, and is met with either as a primary or secondary disease. It may occur during, but rarely till after, the first year. Localised pleuritic adhesions are very commonly found in post mortem examinations, unsuspected during life. The chief interest in the disease lies in its effusive nature. Ordinary acute pleurisy, whether of a plastic kind or accompanied by liquid effusion, presents clinical features identical with those met with in the adult, and does not therefore demand special description here.

MORBID ANATOMY.—The disease may be localised or extensive (general), or loculated—a very common occurrence in children. The pleura in the early stage is congested. Effusion of lymph succeeds the congestion, and this may or may not be followed by liquid effusion, serous or purulent. The final stage consists in either organisation of the lymph, absorption of fluid, persistency of the effusion, or suppuration. The appearance of the membrane in the earliest stage shows congestion of the vessels, which soon gives rise to a cloudy, granular-looking dry surface. On closer examination, a thin covering of lymph can be detected, very much resembling, on microscopic examination, the material found in the alveoli in croupous pneumonia. The endothelial cells become swollen, and the membrane generally thickened.

The fibrinous lymph readily becomes organised into new connective tissue, causing general or localised adhesion of the opposed surfaces, in which case, if liquid effusion or suppuration takes place, loculation of the fluid may occur.

ETIOLOGY. — Recent investigations into the pathological etiology of serous inflammation throw great doubt on the frequency of pleuritis occurring from simple exposure to cold. That such may be sometimes the sole cause is no doubt possible, but the probability is, in the great majority of cases, largely the other way; at the same time, cold is believed to act as a predisposing cause, producing disturbance of the capillary circulation in the pleura, which in the presence of micro-organisms determines active inflammation. Traumatism, as in the case of peritonitis, is evidently, in some cases, sufficient to induce it in children. According to the light of our present knowledge, it seems that the causes of pleuritis may be—and I mention them somewhat in the order of probable etiological frequency—croupous pneumonia, catarrhal pneumonia, tuberculosis, septic blood conditions as in measles, scarlatina, rheumatism, septicæmia, small-pox, nephritis, and typhoid. In inflammation of contiguous serous membranes, as pericardium or peritoneum, pleuritis is very apt to occur, and this liability, especially in children, should ever be remembered. Investigations into the nature and character of the fluid in effusive pleuritis, particularly empyema, have been made by Fränkel,¹ Ehrlich,² Weichselbaum, and others, with a view to determine the probable part played by micro-organisms in the causation of pleural inflammation. The result of their labours, although they show negative evidence in some cases, affords sufficient proof of a positive nature, of the influence of micro-organisms in setting up pleural inflammation. In empyema, streptococcus pyogenes has been repeatedly found, both in cases where pleuritis alone existed and also where pneumonia had preceded it. Fränkel has found, in all cases in which pneumonia was primarily present, that the

¹ *Charite Annalen*, p. 14, 1882.

² *Ibid.* p. 207, 1888.

diplococcus pneumoniae was found in the exudate, and he believes that this organism is directly the cause of the suppuration. Weichselbaum has also proved the same organism to exist in catarrhal pneumonia, and that secondary empyema in these cases is also probably caused by it. Dr. Koplik¹ of New York has lately placed on record a number of cases of exudative pleuritis, in which he has examined the organisms present, on the lines of the investigations of the German school. In three cases, in which the probability of tuberculosis or traumatism existed, he found either the streptococcus pyogenes or the staphylococcus pyogenes present. In seven cases of a second group he found the pneumococcus present, and he specially notes in two of these cases that this organism was found in the early stage of the disease when the exudation was serous, and that it afterwards became purulent, thus confirming Weichselbaum's results. In the third group of cases he refers to tubercular empyemas, and agrees with Fränkel as to the negative results as regards the presence of the bacillus which he obtained. In the cases recorded, not only were bacilli found in the exudate, but also numerous streptococci. Livny² has made more recent experiments, somewhat at variance with previous observers. He found no micro-organisms in sero-fibrinous effusions, and in purulent effusions there was an absence of micro-organisms, indicating probably that the cases were tubercular. He does not admit that the presence of staphylococcus pyogenes indicates that the effusion will likely become purulent, nor that the presence of Fränkel's pneumococcus increases the probability of empyema.

SYMPTOMS.—The clinical features vary infinitely according to the acute or chronic nature and extent of the disease. As a rule, in children the disease is subacute or chronic, and more or less latent in its symptoms. An acute attack is ushered in by the usual symptoms met with in the adult. The chill is not well marked in children, more rarely than in

¹ *Trans. American Pediatric Society*, 1890.

² *Archiv für Exp. Pathol. und Pharmacol.* xxvii, heft 4 and 5.

pneumonia, there may be a convulsive seizure. Vomiting is not infrequent, often taking the place of rigor, as in other acute affections in children. In whatever way the acute attack is ushered in, special symptoms referable to the chest soon show themselves; the most prominent of these is pain with tenderness of the chest surface. The respiration becomes accelerated, but not to the same extent as in pneumonia. The pulse is quick, but the pulse respiration ratio is not usually perverted. Cough may or may not be a prominent symptom. Strange to say, cough and pain may be almost entirely absent; if present, however, the cough is generally short and painful. The tongue is furred and the child has all the appearance of suffering from headache. When effusion takes place there is generally a relief to all the painful symptoms, and an alteration in the physical signs. Pleuritic friction gives place to diminished breath sounds and fremitus, altered vocal resonance, which may or may not be of a typically ægophonic character, dulness on percussion, bronchial breathing of a peculiar type. The breathing is generally more or less distinct, but often pretty loud and high-pitched, with a peculiar clanging tone, which is highly characteristic to the practised ear, and differs distinctly from the purely pneumonic bronchial breathing. The temperature in acute pleuritis is generally pyretic, but not of a characteristic type nor very high, ranging between 100° and 102° , or more rarely 103° . The type of pleurisy in the young child is not acute, but generally subacute or chronic, and presenting as a rule few symptoms at all events referable to the chest. Latency and indefinite nature of the symptoms are thus the essential characteristics of most cases of effusive pleuritis in children, except those of an acute nature already alluded to. In ordinary cases, when the child comes under observation and its history is inquired into, it is generally ascertained that he has been ailing for weeks or months. Within this period he may have passed through one or other of the acute diseases, as scarlatina, measles, or rheumatism, or there may be no history of any definite ailment, except an initial "cold."

The mother generally states that she does not know what the child is suffering from, but that it is languid and listless, and is losing flesh and has little appetite. There may or may not be signs of pain. So little presumptive evidence can as a rule be obtained from the history of the case as to its true nature, that the diagnosis of the existence of pleural effusion must be based on physical examination, which should be carefully and systematically carried out.

Inspection.—In *acute cases* the breathing is accelerated and the countenance expressive of pain. The face is usually pallid, and in large effusions there may be more or less lividity, from defective oxygenation of the blood. Cyanosis, when well marked, is noticed chiefly on the lips, ears, and finger tips. In all cases of large effusion, alteration in the thoracic movements is observed in defective movement on the affected side, with increased motion of the opposite side. The intercostal spaces may be obliterated, and sometimes there is œdema of the affected side. This last sign has been believed to be constantly present in, and to be characteristic of, purulent effusions, but it is only occasionally met with in my experience, and I believe is not so specially indicative of the nature of the effusion, as of its extent. In large effusions the diaphragm is depressed, and when the left side is affected the heart is displaced, the organ being rotated on its base, so that the apex is found in the region of the epigastrium or between that and the right nipple. This sign, when present, is an almost certain indication of a large left-sided effusion. Palpation of the affected side confirms the absence of respiratory movement, and also of any thrill or fremitus. In dry pleurisy in children, with well-marked friction, “friction fremitus” may be felt. Mensuration of the chest, when the effusion is large, may show increase in the diameter of from half-an-inch to one inch. In *chronic effusions* all the physical phenomena noticed on inspection are well marked, but there is an absence of painful respiration, and the breathing is not accelerated at all, or at most only to a slight extent.

Palpation, as already stated, confirms the absence of respiratory movements in the affected side. The vocal or crying fremitus is absent. The value of this sign alone must be tested by percussion, as in pneumo-thorax the fremitus is also absent, but the hyper-resonant percussion note would at once indicate the probable physical condition. In pointing empyemas fluctuation can be distinctly felt.

Percussion.—The nature of the note elicited varies with the amount of the effusion. In employing percussion on children, the general rule of using light percussion is specially applicable in pleural effusion. Too forcible percussion on the delicate chest-wall of a child is apt to give an incorrect impression of the physical condition of the thoracic contents *immediately* under the finger, and to bring out a note in which resonance or dulness, as the case may be, is communicated from a deeper part. In small effusions the note is of a high-pitched and slightly dull character. The dulness increases *pari passu* with the amount of the effusion, until in large accumulations it becomes absolute. In children the Skodaic resonance at the apex, when there is effusion at the base, is a valuable sign when well marked. It is a high-pitched tympanitic note.

Auscultation.—The auscultatory signs of pleural effusion are somewhat peculiar in children. The respiratory murmur is feeble in proportion to the amount of effusion, but the diminution of the intensity of sound is rarely so marked as in adults. Even in very large effusions respiration may be distinctly audible. The character of the breathing is bronchial and is generally described as "distant bronchial." In effusions of moderate amount it is extremely difficult to distinguish the bronchial breathing of pleuritic effusion from that of consolidation, and yet to the practised ear there is a peculiar distinction in the respiratory tone not easily described. The sound may be said to be higher pitched than the true pneumonic respiration, and of a peculiar sonorous character, typically distinct from it, in a well-marked case. No respiratory accompaniments are heard in effusion of consider-

able amount, but in the early stages, when effusion is small, crepitant râles may be audible, indicative of alveolar catarrh in the peripheral portions of lung, from extension of inflammatory action inwards from the pleural surface. This sign is an important one in relation to the differential diagnosis from ordinary lobular pneumonia in the early stages. The localised pneumonic areas near the pleural surface have important bearings in purulent pleural effusion, as in or around them abscesses are apt to form with ulceration of the pleura, and in this way the pus in empyema finds a natural exit, being coughed up by the child in paroxysmal fits. A curious fact in this connection is that in these cases, although the pleural cavity is in communication with the bronchi, pneumo-thorax rarely takes place; or, to state the case more correctly, the pneumo-thorax is not followed by collapse of the lung, the pus being gradually coughed up and the lung expanding *pari passu* with the escape of the fluid.

Nature of the Effusion.—The fluid may be serous or purulent. In serous effusion the fluid appears transparent, but on close inspection it is slightly turbid, and on microscopic examination a few leucocytes can almost always be detected. Purulent effusions are relatively more common in the child than in the adult. In forty-three of my cases, nineteen were purulent. In one hundred and forty-nine of Goodhart's cases seventy-eight were purulent. The clinical interest in the differential diagnosis between simple and purulent effusion is largely deprived of its importance by the practice of early exploratory puncture, which, if done with careful antiseptic precautions, is a harmless proceeding. Starting with the fact that about one-half of all effusions in children are purulent, or become so within a short time, what are the symptoms which guide us in giving a probable opinion as to the nature of the fluid? The only local sign that is of any value, in indicating the purulent nature of the fluid, is pointing (*empyema necessitatis*). This occurs in a certain proportion of cases, the pus finding its way to the surface in the direction of least resist-

ance, and pointing in an intercostal space. Physical signs, auscultatory or otherwise, give no clue to the nature of the fluid. Edema of the affected side has been thought by some physicians to indicate the presence of pus, so also has enlargement of the superficial thoracic veins ; but both signs are known to occur in large simple effusions of a chronic nature. More help is afforded in diagnosis by the constitutional condition of the patient. In purulent effusions the child is often feeble and more emaciated than in simple effusion, the complexion is altered and has often been described as "straw-coloured," the face sometimes has a slightly puffy appearance, the finger tips are often clubbed and somewhat livid. The temperature affords no certain indication, yet when it is abnormally low the probability is in favour of purulent effusion, in obedience to the "temperature law" in most chronic debilitating conditions in children ; large collections of pus in the child's chest, like chronic abscesses in other situations, being often associated with vital depression and low temperature. In fourteen cases of empyema in hospital, five had normal and subnormal temperatures, five were noted as slightly pyrexial, and four as pyrexial. In fifteen cases of simple effusion, eleven were pyrexial, three slightly pyrexial, and three average normal. The effusion may be purulent from the first, and the formation of pus largely depends, no doubt, on the intensity of the inflammation. In some cases the effusion is serous, and afterwards becomes purulent. I lately saw a little girl, aged four, in consultation. She had passed through an attack of croupous pneumonia, and, at the end of a week, resolution not having apparently taken place, I found, on exploration, a large simple effusion. Five days afterwards the effusion had become purulent, and I opened the pleural cavity and introduced a large drainage tube, twelve ounces of thick pus escaping. The child made an excellent recovery.

Loculated Effusions are common in children, from organisation of lymph in the early stages of the attack. The collections may be large or small, and situated anywhere over the

pleural surface. Small accumulations are often difficult to detect, requiring repeated exploratory punctures to determine the site. The fluid is generally purulent. A child, aged two and a half, was lately in hospital on account of a considerable effusion on the left side. The physical signs on admission were immobility of the left side of the chest, complete absence of respiration with absolute dulness or percussion above the fourth rib, before and behind; impaired percussion over the base, with loud broncho-vesicular breathing. The most interesting point in the case was that there was no displacement of the heart, the apex beat being an inch below, and an inch and a half internal to the vertical nipple line. Exploratory punctures were made in front in the second intercostal space, and behind in the seventh. Both punctures withdrew clear serous fluid, the physical signs indicating a larger amount of fluid in the upper than in the lower half of the chest. I expressed the opinion to the clinical class that probably we had to deal with a biloculated effusion, with adhesion about mid-lung, which prevented the displacement of the heart. Aspiration was performed at the base, and three ounces of fluid withdrawn. The physical signs in the upper half of the lung remained the same, absolute dulness and absence of breath-sounds. The next day four ounces of fluid were removed by aspiration from the third intercostal space in front, and to the left of the vertical nipple line. The breath-sounds could be heard after the aspiration. The child made a good recovery, and was dismissed about a month after admission.

TREATMENT.—In all cases, exploratory puncture should be made to determine the nature of the fluid.

Simple Effusions—Acute Cases.—The child should be kept in bed, and mild counter-irritation, with soothing poultices, applied to the chest. Saline aperients are most useful. Sulphate of magnesia or Victoria natural water are the best. A diaphoretic mixture, with liq. of the acetate of ammonia and acetate or citrate of potash, should be given. If there is much pain, a mild opiate, such as Dover's powder, may be ordered

at bedtime, or oftener if required. When the acute symptoms are passing off, iodide of potassium should be given along with the acetate of potash instead of the acetate of ammonia. Instead of warm poulticing, stronger counter-irritation should be employed; diluted iodine liniment, or blisters. Blisters should be small, not larger than an inch or two inches square, and produced by liq. epispasticus and not by emplastra. The diet should consist of soups, milk, and farinæ. Barley water or thin gruel should be given, if there is thirst.

Aspiration.—The question of removal of simple effusion in acute cases must be decided by the amount of the fluid and the nature of the symptoms. It is rarely needed in my experience; the more acute the case the more likelihood is there of absorption under suitable treatment. The indications for aspiration are embarrassed breathing with orthopnoea, cyanosis and general signs of defective aeration, physical signs of congestion in sound lung, and disturbed heart action, showing either congestion of the right heart or general cardiac failure, with feebleness or irregularity or too great frequency of pulse. Any such signs point to the necessity of freeing the lung on the affected side by aspiration. In *subacute or chronic* cases the necessity for aspiration must be judged in a similar manner, or by the fact that there are no signs of absorption of the fluid at the end of a certain time, say two or three weeks.

Empyema.—The treatment in this case must be conducted on ordinary surgical principles. The pus should be evacuated at the earliest possible time. Two methods are available, aspiration or drainage. It is a good plan in all cases to employ aspiration first. Valuable information is obtained as to the exact nature and amount of the fluid, as well as the physical condition of the lung. Some empyemas may be cured by aspiration alone, especially small localised ones. The fact that they are curable in this way shows that a certain amount of pus may be absorbed or got rid of by the pleura, as in any case the whole of the pus cannot be got rid of by aspiration.

I mention shortly one case in point lately under treatment in hospital.

Jessie S., æt. nine, admitted November 1; dismissed, cured, December 16. She had been languid and debilitated for some time before admission, with slight cough a week previously. There was no history of any acute attack. Right side of chest showed no signs of disease. Left side was deficient in movement, with slight flattening in front. Behind, from tip of scapula to base of lung, the flattening was distinct. There was almost absolute dulness over the lower half of the lung, the percussion of the upper half was fairly resonant below the clavicle, and the note distinctly hyper-resonant. Auscultation showed somewhat harsh vesicular breathing in front and behind, broncho-vesicular breathing, unaccompanied except at the base, where a few moist sounds could be heard. Voice resonance diminished. Temperature chart showed a pretty regular curve, with an average of about $99^{\circ}5$ during one month after admission; afterwards, until dismissal, it was normal. The exploring needle showing the presence of pus, about five ounces of thick, dark, yellow, creamy fluid were drawn off. The physical signs showed an improvement in the character and intensity of breath-sounds. A week after the first aspiration, two ounces of pus were drawn off. After this there was a steady improvement. The child was kept in hospital for five weeks, and repeated exploratory punctures made with negative result. She increased in weight seven and a half pounds during residence, and the note on dismissal was, "Very much improved in health, increased in weight seven and a half pounds; physical signs almost normal except slight dulness on affected side." She was brought up for inspection a month after, and was quite well.

Although cure by aspiration is exceptional it is not altogether infrequent. Before describing the method of draining the chest, it is desirable to allude to the manner in which nature, unaided by art, gets rid of the pus. The abscess may point

and open at any part of the chest *externally*, or it may be open *internally* into the abdomen through the diaphragm—a rare occurrence, but a very dangerous one, as peritonitis is set up, which may prove fatal. More frequently the pus opens into a bronchus and is coughed up in paroxysmal fits. Generally, if the child is otherwise in fair health, and the opposite lung sound, a good recovery takes place. Ulceration of the pleura, and the establishment of a communication with the bronchial tubes, may occur in secondary exudations after pneumonia; but it is probable that it may take place also in another way, as long ago pointed out by Trousseau, who showed that in any case of pleuritis, especially of a purulent nature, the inflammatory action in the serous membrane is apt to cause inflammation in the peripheral pulmonary alveoli, forming localised pneumonic patches, followed by pleural ulceration or localised abscess. The course and treatment in these circumstances may be pictured by reference to two cases. A healthy boy got a chill playing football, not having changed his clothes after the game. Two days afterwards he had a rigor, and an acute attack of pleuro-pneumonia followed. The temperature came down on the ninth day to 100° , and several occasional dips to normal occurred during the next three days, but it gradually rose again and exhibited an irregular type ranging from $102^{\circ}\cdot5$ to 97° . Physical signs of effusion became well marked, and the exploring needle drew off thick pus. Aspiration was to have been performed on the evening of the same day, but after a fit of coughing he brought up a large quantity of pus. Paroxysmal fits of coughing continued at intervals, and during the next three weeks he brought up a considerable quantity of pus, gradually diminishing in amount. He ultimately made a good recovery, the lung fully expanding. Another case was that of a boy, aged four, who was sent into hospital with a purulent effusion, which had been twice aspirated before admission. On each occasion, it was stated, twenty ounces of pus had been drawn off. On admission the signs of effusion were well marked.

The child was pallid, thin, and debilitated, with a subnormal temperature. On the following day the chest was drained, with antiseptic precautions. Three days after the operation, the boy, after a paroxysmal fit of coughing, brought up a quantity of pus. Very little now came through the drainage tube, and at the end of a week it was taken out. He continued to bring up small quantities by coughing, during the next fortnight. He was dismissed cured, two months after admission. The side showed slight retraction, but the respiratory murmur was good in quantity and quality. I saw this boy a year after, and he was in excellent health, little difference being observable between the two sides of the chest. These two cases show how the pus often naturally finds exit in empyema, and also what a perfect recovery takes place in the growing child. One caution is necessary in regard to aspiration in empyema in children. It should never be too powerful. The pleura in many cases is much thickened and covered with vascular granulations, which bleed very readily, and too powerful aspiration is apt to cause serious hæmorrhage. I have seen one child die exhausted from bleeding after aspiration. Aspiration having been tried without success, drainage should be effected without delay. In localised empyemas the tube must be introduced at the spot. In pointing empyemas it must be introduced at the situation of pointing. In generalised accumulations the most suitable situation is in the seventh or eighth interspace below the scapular angle or in the mid-axillary line. The operation is a simple one. The child should generally be anæsthetised. As large a sized drainage tube as possible should be used. It should be fitted with a lid of the same rubber as the tube is made of, which will prevent slipping into the chest. The incision should be made from one to one and a half inches long midway between the ribs. When the point of the scalpel has entered the pleura it should be withdrawn and the incision freely enlarged, to the extent of the skin wound, with a probe-pointed bistoury. The drainage tube is then

slipped in and covered with a piece of lint, soaked in an antiseptic solution, under which the discharge is allowed to drain away for a few minutes. The dressings are then adjusted, a piece of protective oiled silk being put over the tube, then several layers of carbolised or iodoform gauze, and over this a plentiful supply of antiseptic cotton-wool, the whole being retained in position by a flannel bandage. The dressings must be changed in frequency, according to the amount of discharge. The child should lie as much as possible on the affected side, to favour drainage. After the operation, the temperature, if high, generally comes down speedily to an average normal range; if it is normal or subnormal it generally rises to the natural level. The temperature chart, after the opening of an empyema, is an unfailing index of the efficiency of the drainage, the slightest retention of pus being indicated by a rise on the chart. The tube should be gradually shortened, and taken out whenever the discharge ceases. Washing out the cavity of the pleural sac is rarely, if ever, necessary in children. It is only indicated when the discharge is foetid, or there is evidence of retention of curdy or caseous masses which will not pass through the tube; but it is rarely needed if the cavity is properly evacuated at the time of the operation. Resection of ribs is rarely necessary in children. The prognosis in empyema in children is generally favourable. If the other lung is sound, and the child is not tubercular, recovery almost invariably takes place. In cases that are treated properly at an early stage, the perfection of recovery in the affected side is astonishing. Exceptionally, deficient expansion of the lung and retraction of the side is met with, but as a general rule the normal physical condition of the chest is restored. An interesting fact in connection with drainage of the pleura in children is the free expansion of the lung, apparently without obstacle. Physiologists teach that when air gains admittance to the pleural cavity, the physical conditions are such that during respiration the lung does not inflate, but the air is simply driven in and out of the

pleural cavity. Such is not the case in children. An opening in the costal pleura seems to be no obstacle to the full reinflation of the lung. The physics of this apparent paradox are discussed in a paper by Dr. O'Dwyer¹ of New York, which is well worthy of perusal.

¹ *Trans. Amer. Pediatric Society*, vol. i., 1889.

CHAPTER XX.

LACTATION.

THE physiological process of lactation in woman continues from the birth of the infant till about the end of the first year. It is a scientific dictum of universal acceptance, that mother's milk during this period is the natural and only suitable food for the infant, under strictly physiological conditions. Unfortunately, in these days of advanced civilisation, the proportion of mothers in our large towns who are able to discharge the maternal duty of lactation during the natural period appears to diminish. The unhealthy conditions of town life compare unfavourably with those of the country in this respect, and one of the most important and frequent duties the medical practitioner has to discharge is the laying down of distinct and definite rules for the artificial rearing of infants, who are unable to obtain their natural and proper food. Until within recent years infants have been reared in a haphazard and unscientific manner, with the result that the enormous mortality during the first two years of life has been a reproach and a by-word to the profession. To their credit be it said, that the recent important improvements in the artificial rearing of infants have been due largely to the painstaking researches of continental physicians, closely followed up by those in America. By a careful study of the physiology of lactation, we are now able so closely to imitate nature in providing a food chemically and physically resembling mother's milk, as to render the rearing of infants comparatively safe and much more satisfactory in its results than hitherto.

As soon as may be convenient after the child's birth, it should be put to the breast. The exact period at which the secretion of milk is established varies in different women, and is later in primiparæ than multiparæ. Nevertheless, it is well to put the child early to the breast, as it encourages the secretion and promotes uterine tonicity. The child should be fed at regular intervals from both breasts at each sucking. After birth, and for the first few weeks during the day, it requires the breast about every two hours. As it gets older the intervals between feeding are lengthened as the capacity of the child's stomach increases. The quantity of milk ingested varies somewhat according to the weight of the infant. During the first week, on an average, one ounce is taken at each sucking; at the end of the first month, the child will be able to take from two or even three ounces, when large and healthy.

Disorders of Lactation.—In considering these it is desirable to allude to pathological conditions affecting the *mother*, which in turn react on the child. Unless a woman's health appears to suffer thereby, she should always be encouraged to nurse her baby, even although she be unable to do so entirely. It is generally admitted, although among nurses and mothers there is a fallacious belief to the contrary, that a child may be reared partly on the breast and partly on the bottle.

In all cases of disordered lactation, the mother's state of bodily health should be carefully investigated and the milk analysed if need be. Any departure from the normal state of the secretion very quickly and injuriously affects the infant, and the causes leading to defective milk supply are numerous. *Debility* or *ill-health* in the mother, from whatever cause, interferes with the secretion of milk. *Defective hygienic* and *dietetic conditions*, so common among the poorer classes, also operate in this way. The secretion, whether deficient in quality or quantity, readily produces ill effects in the child. Mothers in the upper classes of society are often bad nurses, from causes of a different nature to those affecting poorer women; fashionable life, with all its excesses—high feeding,

over stimulation, and excitement—being quite as injurious in its effects on lactation. *Mental worry* of any kind, especially in women of neurotic disposition, operates in a similar way. According to analyses given by Rotch, mental worry or depression has a marked effect in altering the quality of the milk. In one case¹ in which he records the analysis, which was made on account of the illness of the infant, the fat was reduced to 0.62 and the albuminoids increased to 4.21, the total solids being only 10.83. *Chronic diseases*, such as phthisis or syphilis, or organic disease of any of the organs, generally prevent the mother nursing. In phthisis she should on no account be allowed to nurse her baby. In syphilis every case must be judged on its own merits. If the milk supply is good and the child thriving, there is no reason why the baby should be taken from the breast. *Diseases of the breast*, such as abscess, cracked or ulcerated nipples, or malformed nipples, often render nursing impossible. Gastric irritation and catarrh may be set up in the infant by the discharge from ulcerated nipples. *Galactorrhœa*, when persistent, contra-indicates the continuance of lactation. The milk, in such cases, seldom agrees with the child. If subjected to examination, it will be found of low specific gravity, indicating diminution of the solid ingredients, which leads to defective nutrition and irritability in the child, and a tendency to gastro-intestinal disorder.

Irregular Suckling is a fruitful cause of illness in the infant, and this even when the mother is healthy and the secretion abundant. Mothers should be warned as to the evils attending the practice of giving the child the breast at irregular times, or whenever it cries. Too frequent suckling acts injuriously, by allowing the ingestion of milk before that of the previous sucking is digested, and gradually induces gastric catarrh, which, by causing thirst, only aggravates the craving of the infant for the breast. This, however, is not the only evil. It is well known from chemical analysis that

¹ Keating's *Cyclopædia*, vol. i. p. 282.

constant irritation of the mammary gland, with insufficient intervals of repose, alters in a marked manner the quality of the milk by increasing the proportion of solids—in fact, rendering it more concentrated. Such milk invariably disagrees with the infant. The effects of *menstruation* on the milk secretion deserves careful attention, and also the question of the desirability of allowing a mother to nurse after menstruation has begun. Rotch found that during menstruation the albuminoids were increased and the fat diminished. Seven days after cessation of the menses the milk had returned almost to its normal condition and agreed well with the child. In regard to the whole question, I think no hard and fast rule can be laid down. The condition of mother and child must be considered from a common-sense medical point of view, and if the child continues to thrive on the whole, in spite of some temporary disturbance during the menstruating period, lactation may be allowed to go on.

Although the causes of disorders in the child during lactation are mainly referable to the mother, yet the *infant* itself, apart from the mother, may be subject to influences of an injurious nature. Gastro-intestinal catarrh may be set up from cold or chills to the surface, from neglect or improper clothing. All *anti-hygienic conditions* are also apt to affect it injuriously. Damp or badly-ventilated houses and noxious emanations, whether of a malarial or miasmatic nature, operate in this way. *Excessive heat* in warm climates is known to prove injurious. Constitutionally delicate, rickety, or strumous or syphilitic children are apt to suffer from causes referable to the constitutional depravity. Vomiting in the infant is a sign which requires a passing allusion. It may occur under purely physiological conditions, from excessive ingestion of milk. This is not uncommon, and unattended with any evil results. Some infants are very greedy at the breast, and when the stomach is over-distended they reject the excess of milk. An earlier withdrawal of the child from the breast is all that is required in the way of treatment.

Before laying down rules for the artificial rearing of infants, it may be well to refer generally to the causes producing *ill-health* in *bottle babies*. These may be peculiar to the child or due to climatic or other influences, or more commonly to the quality of the food. All the causes already mentioned, which operate injuriously in breast babies, are far more liable to prove hurtful in those reared on the bottle. Thus, debility or hereditary weakness, or climatic influences, stand prominently forward in this connection. In summer and autumn, children are much more liable to suffer than at other periods of the year. Great heat has a powerful effect in inducing choleraic diarrhoea. In America this condition has attracted much attention among pediatric physicians, from the large fatality which attends it, quite unknown, to anything like the same extent, in this country. Apart from anti-hygienic conditions and constitutional depravity on the part of the child, improper food is the main cause of illness and mortality in infants. The practice of feeding babies on unsterilised milk and farinaceous foods is a common cause of mal-nutrition and indigestion, and one of the greatest improvements in infant feeding in the present day is the administration of sterilised food.

Artificial Feeding of Infants.—Taking mother's milk as the standard food, physicians in all ages have been in the habit of substituting a food which is, as nearly as possible in chemical constitution and physiological properties, like that of the mother. It is generally admitted that cow's milk, suitably treated so as to render it, in the relative proportion of nutritive ingredients, as nearly as possible the same as woman's milk, is the most suitable food at our disposal. The question to be decided is the best method of treating the milk, so as to render it easily digestible and assimilable as well as sufficiently nourishing for the young child. In order to arrive at a correct conclusion, cow's and woman's milk must be compared. According to most recent

analysis we may accept the following as nearly correct as possible :—

Cow's Milk.		Woman's Milk.	
Water,	86·87	Water,	87·88
Solids,	14·13	Solids,	13·12
Fat,	4·0	Fat,	4·0
Albuminoids,	4·0	Albuminoids,	1 to 2
Sugar,	4·5	Sugar,	7·0
Acid—Bacteria.		Alkaline—Aseptic.	

A comparison of the two milks shows that cow's milk contains relatively more solid ingredients; but, in comparing the qualities of the two, this does not largely require to be taken into account. The principal differences are in the quantity and quality of the albuminoids—4·0 in cow's milk as compared with 1–2 in woman's milk. The albuminoids in both milks chiefly consist of caseine, which in itself differs in quality. Cow's caseine is a white substance in its moist state, soluble in water in the proportion of 1 in 20, forming a slightly acid solution reddening litmus paper. Woman's caseine is much more soluble in water, forming a neutral or alkaline solution. When subjected to the action of gastric juice, woman's caseine dissolves quickly and rapidly. Mineral and also organic acids, along with the digestive ferment, coagulate cow's caseine into hard lumps. Woman's caseine, on the other hand, coagulates in light flocculent masses. The indigestibility of cow's caseine forms one of the main difficulties in rearing children on cow's milk. When treated in a suitable manner, however, this objection can to a large extent be removed. The methods adopted consist of *dilution*, *alkalinisation*, *addition of cream and sugar*, and *sterilisation*. The relative proportion of the fatty element or cream is the same, and so also its quality in woman's as in cow's milk. In diluting the milk so as to reduce the amount of caseine, the quantity of fat is diminished below the normal standard, and therefore requires to be added in suitable proportion. The sugar in cow's milk exists in relatively smaller quantity, which is still further re-

duced on dilution, therefore it also requires to be added in large proportion. The next point requiring attention is the reaction of cow's milk. The acidity requires neutralisation, by the addition of sufficient alkali to render the mixture slightly alkaline. This result is best attained by adding either lime water or sodium bicarbonate in sufficient quantity to obtain the desired result. Sterilisation of the milk is one of the most necessary and important requirements in the artificial feeding of infants. Mother's milk is sterile. It is therefore necessary that its substitute should be made free from all injurious contamination, and the best and indeed only method at our disposal for effecting this is to raise the milk to a sufficiently high temperature to destroy any germs which may have got access to it. Boiling the milk in an ordinary pan, exposed to the air, is an imperfect and unsatisfactory method of sterilising. A certain proportion of gases—chiefly nitrogen, oxygen, and carbonic acid—escape during the process of boiling, and on cooling a scum forms, consisting of part of the fat and some coagulable albumen; and the taste of the milk is altered and less liked by the child. When the milk is sterilised by steam in a close vessel, the above-mentioned changes take place in lesser degree; at all events, very little if any scum forms, and the taste of the milk is little altered, and therefore quite acceptable to the child. There is some difference of opinion on the effect of boiling or sterilising on the digestibility of milk, but the balance of opinion goes to show that little or no difference is produced in this respect. As is well known to bacteriologists, milk is one of the best pabula for the reception and multiplication of germs of all kinds, and it cannot be long exposed to the air without contamination. A great many investigations have been made of late years on the flora of the stomach and intestines, especially by Brieger¹ and Escherich.² The former has described a bacillus which goes by his name, and Escherich discovered the bacillus lactis aërogenes, which are both

¹ *Zeitschrift f. Physiol. Chem.*, 1884.

² *Die Darmbakterien der Säuglings*, 1886.

commonly present in the intestines of infants. The proteus vulgaris and other putrefying forms are likewise seldom absent. Escherich is of opinion that his bacillus as well as Brieger's keep out other forms, from their power of converting part of the milk sugar into lactic acid, which, along with the bile acids and the absence of oxygen in the intestines, is inimical to the growth of putrefying and pathogenic bacteria. Lactic acid production within certain limits would thus appear to go on in normal lactation, and to be beneficial. Beyond certain limits, on the other hand, its production is necessarily attended with evil results, by causing over-acidity and indigestion. The process of sterilising is effected by maintaining the milk in closed bottles at a temperature of 212° for forty-five minutes. The apparatus in common use are Soxhlet's, Arnold's, and Rotch's sterilisers. The bottles are filled with all the ingredients except the lime water (which is added just before the bottle is given to the child), and after having been in the steriliser for ten minutes, the stoppers are pushed down and the sterilisation completed at the end of forty-five minutes. The method of treating cow's milk, according to the principles already laid down, falls now to be considered. Much study has been given to the subject, and the general principles laid down by Meigs of Philadelphia and Rotch seem to be gaining general acceptance. Both of these physicians recommend a mixture which contains the relative proportion of nutritious ingredients in the proper amount, and if due care is taken in mixing, and the mixture carefully sterilised, the results are found to be satisfactory. Meigs gives the following directions:—A solution of milk sugar is made, of the strength $17\frac{3}{4}$ drachms to one pint of water; the bottle is then made up with three pints of this solution, two parts of cream (fresh) containing 12.47 per cent. of fat, one part of fresh milk; the mixture is sterilised, and two parts of lime water are added; it is then well shaken and given to the baby after being warmed. Rotch's mixture is made as follows:—Cream one and a half ounces, milk

one ounce, water five ounces, milk sugar $3\frac{3}{8}$ drachms; the mixture is sterilised and half-an-ounce of lime water added. Biedert's cream mixture, although it does not contain, as in the other two mixtures, the nutritive elements in quite the proper proportion, is nevertheless a useful one for very young infants, who are altogether unable to digest the caseine of cow's milk. It consists of twelve parts of water, four parts of cream, half-an-ounce of sugar of milk. As the child grows older, two to four of the parts of water are replaced by milk. This mixture is useful occasionally in special cases for a time. The practice of using cane instead of grape sugar is a common one, and the question arises whether there is any objection to the substitution. Cane sugar is cheaper than that of milk, and it has valuable preservative qualities, as shown in condensed milk, and it agrees quite well with most children. Milk sugar, on the other hand, is an animal product, the natural sugar of milk, and, as shown by the experiments of Escherich, it serves a useful purpose in the digestion of milk in connection with the lactic fermentation. Cane sugar is liable to alcoholic and sometimes butyric fermentation, and, no doubt, disagrees in some cases. On the whole, on scientific grounds, milk sugar ought to be the proper ingredient to use. The mixtures of Meigs and Rotch are made on sound scientific principles, and answer their purpose well when carefully made; yet in practice, especially among the poorer classes, it is difficult, often impossible, to persuade mothers to take the trouble or go to the expense of carrying out all the directions. In such cases I am in the habit of recommending the following method, not scientifically accurate, but yet answering the purpose. For an infant during the first six weeks, two ounces of fresh milk are diluted with three ounces of water or barley water, in which a teaspoonful of milk sugar is dissolved, and to which two teaspoonfuls of fresh cream and a small pinch of sodium chloride are added. After sterilisation, one ounce of lime water is added, and the mixture is ready for use. This ready mixture I have found after many years'

trial agrees with most infants. Having adopted one or other of the above plans of feeding, it will be found that the artificial food agrees well with the child in a large proportion of cases, but not in all. We are therefore forced to modify in some way or another the preparation of the food. The first question to be determined is the cause of failure, and this can generally be made out by careful observation of the infant as to the state of its digestive system, and particularly the character of the stools. Some infants cannot be reared on artificial food at all. They pine and waste, and cannot assimilate what they take, although perhaps there may be little vomiting or diarrhoea, or other signs of intestinal catarrh. The only resource in such cases is a suitable wet-nurse. Such cases are, however, exceptional, for most children may be reared one way or another by artificial means. Children, like adults, when we come to attempt artificial feeding, are found to possess idiosyncrasies in regard to their digestive functions; and in my experience no hard and fast rule can be laid down which is universally applicable. The case of every infant must be studied on its own merits, and several modifications in the mixing of food may require to be tried before success is attained. It is a good rule in practice to safeguard our advice by telling mothers that, as the child is unable to obtain its natural food, it will be necessary to try what plan of feeding will suit it best. In most cases the examination of the stools is the best guide in diagnosis. The most frequent difficulty in digestion is the curd of the milk. Should there be any quantity of this present in the stools, a further dilution of the milk is necessary until no curd is passed. If along with the passage of curd there is much mucus or blood, indicating acute catarrh, the milk must be stopped and the child put upon barley and rice water alone for a few days. If there are signs of indigestion of fat, the cream must be reduced or stopped altogether. Acid fermentation in the stools indicates the need for omitting sugar from the food, and the addition of more lime water and chloride

of sodium. In these and other ways, by careful observation of the infant and its excreta, we can modify the food so as to suit digestion. Other methods of treating the mixture will be presently referred to in our consideration of other foods.

Condensed Milk.—There are two kinds in commerce—the unsweetened and the sweetened. The former is pure condensed milk without any addition, and when diluted with from seven to ten parts of water it will often be found to agree better with the child than fresh cow's milk. It is a useful alternative food to fresh milk. In condensation, however, its nutritive value appears to be lessened; the fat being diminished, or undergoing some modification, and the salts precipitated and rendered insoluble. The sweetened condensed milk is the one in most frequent favour with mothers, and this for two reasons, its cheapness and its ready digestibility. It contains at least thirty per cent. of cane sugar, and when diluted with water in the required proportion gives a food deficient in fat and caseine. It cannot be recommended as an efficient substitute for mother's milk, but is useful as a temporary food for a time, when fresh milk disagrees with the child, until the digestive power has sufficiently recovered to allow of a return to more suitable and nourishing food. Mixed with a proportion of farinaceous food, condensed milk agrees very well with the child, after the age of three or four months. Lœflund's condensed milk is a variety in which the milk is mixed with a proportion of starch, sugar, and dextrine, and is a useful alternative food in some cases. It must be remembered that condensed milk is an unsterilised food, except Lœflund's variety, which, as it exists in the tins, purports to be sterilised. In mixing with water it necessarily becomes unsterile, and therefore requires renewed sterilisation before use.

Infant Foods may be classed in four varieties:—

1. *Natural Cereals*—barley, wheat, and oats.—These are excellent foods, containing all the elements required for nutrition. The only defect in them, as compared with milk, is the small proportion of fat they contain, especially wheat

and barley, the former containing 1·70 per cent., the latter 2·12 per cent. Oats contains 6·04 per cent. of fat, and is an excellent food. The purely starchy foods, the types of which are rice or arrowroot, cannot be considered suitable for children, on account of the large quantity of starch they contain, the entire deficiency of fat, and the very small amount of albuminoids.

2. *Cereal with converted starch*, of which Mellin's¹ food may be taken as the type. This food contains 0·15 per cent. fat, 5·95 albuminoids, 48·20 sugar, ash 1·89, and a small quantity of starch. Dissolved in equal parts of cow's milk and water, in the proportion of three per cent., it forms a nutritive food for infants, the entire starch, except a minute quantity, having been converted into dextrine.

3. *Cereal and Condensed Milk*, of which Nestle's may be taken as the type. This food contains only a minute proportion of fat, and a considerable amount of starch and cane sugar. It is a mixture of cereal with condensed milk.

4. *Converted Cereal and Milk*, such as *Mellin's Lactoglycose*. It is Mellin's food dissolved in cow's milk by a process which is said to render the curd more easily digestible. It is probably one of the most perfect of the artificial foods as regards nutritive quality and digestibility. Infant foods, as substitutes for mother's milk, are unreliable, many of them being far below milk in nutritive quality. The natural cereals being of known composition are more useful additions to cow's milk, either in the form of decoction or thin gruel. Infants during the earlier months are unable to digest starchy food, except in minute quantities. After the age of four months, the ability to digest starch increases as age advances, and many older children thrive admirably on milk and water, to which a certain proportion of cereal gruel, or such foods as Mellin's, are added.

Peptonised Milk.—The conversion of the albuminoids into peptone renders milk more digestible. A few grains of Fairchild's peptonising powder added to the feeding bottle

¹ Rotch's Table, *Keating's Cyclopaedia*, vol. i. p. 311.

may be found advantageous in some cases, but the peptonised milk is often objectionable. On the whole, the question of the artificial feeding of infants is a wide one, and requires great care and discrimination on the part of the physician to insure success.

I would sum up in the following conclusions:—

1. Mother's milk being the natural food of the infant during the period of lactation, a healthy wet-nurse is the best substitute, if the mother is unable to nurse her child.

2. If artificial rearing be determined on, cow's milk, suitably treated, so that the mixture contains the various nutritive ingredients in the same proportion as mother's milk, and in such a manner as to suit the digestion of the infant, is the best food.

3. The discrepant results of the quantitative analysis of woman's milk, in regard to the proteid and saccharine elements, still leaves us without an absolutely accurate standard from which we can prepare a physiologically perfect food for the infant.

4. Mother's milk being sterile and cow's milk unsterile, and liable to contamination with all kinds of germs, it is of primary importance that the food should be sterilised in a suitable apparatus. Boiling in an open pan is not sufficient for the purpose.

5. When fresh cow's milk cannot be obtained, or when it persistently disagrees with the child, condensed milk may be used as a temporary substitute, the unsweetened or peptonised varieties being the most suitable. Sterilisation is specially necessary in condensed milk.

6. The number of infant foods in the market indicates that none of them have sufficiently answered the purpose for which they are intended. All are deficient in nutritive quality, and as many of them contain unconverted cereal, they are indigestible to the young infant. Many of the foods are useful additions, in suitable proportion, to cow's milk and water, especially those in which the cereal starch has been previously converted into dextrine.

CHAPTER XXI.

DENTITION AND ITS ATTENDANT DISORDERS.

IN considering the influence of teething on the health of the child, we must ever remember that we are dealing with a physiological process, one of growth and development, which is going on contemporaneously with similar changes in the alimentary canal, as well as other parts of the body. The popular belief still prevalent, and in former times largely credited by members of our own profession, that dentition was directly the cause of many of the disorders occurring during its course, is an entirely erroneous one. Bearing in mind the fact that the evolution of the teeth is only one of a number of developmental processes going on in the body, and recognising the truth of the axiom, that organs and tissues are prone to disease very much in direct ratio to their normal or physiological activity, it will be evident at this period of infant life that there is a natural disposition to disorder, from various and often trivial causes, of the digestive organs more particularly, apart altogether from anything specially connected with the teething process. The nervous system at this time is always in a state, more or less, of hyperactivity, and exercises an important influence on all the other processes.

Dentition commences usually about the sixth month, and is completed at the end of from two to two and a half years. It is subject to certain irregularities, consistent with perfect health. Children are sometimes born with one or more teeth. On the other hand, the eruption of the teeth may be delayed, apart from any existing pathological condition which can

account for it. Van Swieten mentions the case of a perfectly healthy child, who did not cut a tooth till he was nineteen months old, and Underwood a similar case, in which the eruption first took place at twenty-two months; and many other exceptional examples might be noted. In ordinary circumstances, the cutting of the milk teeth takes place in the following order—the two lower central incisors about the seventh month, followed in a few weeks by the two upper central incisors. Then follow in order the two lower lateral incisors, and at a short interval the two upper corresponding teeth. Next in order come the four front molars, succeeded by the canines and posterior molars. The second dentition commences about the sixth year, with the cutting of the first permanent molar, immediately behind the back milk molar. The other teeth follow at long intervals as the milk teeth are shed, very much in a similar order. Under favourable conditions, a healthy child cuts its teeth with few or no symptoms except those of a local nature. The child is somewhat restless, at times fretful, and the sleep is often disturbed. Salivation is more or less present; when you put your finger into its mouth it bites it, or if it gets hold of anything it immediately stuffs it into its mouth. If nothing else can be got the fingers are used for the purpose. The bowels sometimes become a little irregular, often lax. The irritation sometimes extends to the nares, and there is slight running of the nose. A child with difficult dentition presents a somewhat different picture. In such a case the mouth will be found to be often hot and dry, the gums swollen and red and extremely tender, so much so, that the child cannot bear them to be touched, and screams loudly when its mouth is examined. On this account it does not incline to bite things, and often is disinclined to suck. The mucous surface of the mouth is more or less affected with catarrhal stomatitis. Sleep is disturbed, the child is restless and frequently cries, and will not be amused with its playthings. It is very thirsty, and likes cold rather than hot drinks. The

flow of saliva is often arrested, sometimes excessive. The sub-maxillary glands are frequently swollen and tender. A painful teething bubo may result. It is in such cases we are called in to prescribe for the child. What are we to do? The question of scarifying the gums here presents itself. This practice, almost universal in former times, is seldom now had recourse to. There can be no doubt, however, that in exceptional and suitable cases it is of service. We should not be influenced by the request of the mothers to cut the gums, but form our own opinion in each individual case. If the gum is swollen and hot, and the tooth near at hand, the constitutional disturbance great, and there be any premonitory symptoms of convulsions, and we are satisfied that the symptoms are solely due to teething and not to gastro-intestinal disturbance, or other causes,—then the gum should be freely scarified. Warm hip-baths, especially at night, are very soothing in these cases. Mild aperients of rhubarb or magnesia are often useful. In severe cases the bromide of sodium may be given with benefit. Sometimes a few drops of succus hyoscyami alone, or combined with the bromide, affords relief.

COMPLICATIONS may arise during dentition. The most common of these are some of the forms of stomatitis, or *gastro-intestinal disorders*, simple catarrh of the stomach or bowels, as evidenced by vomiting or diarrhœa. These must be treated according to general principles, by suitable remedies.

Skin Eruptions are not uncommon, and these generally of the simplest kind. The various kinds of strophulus, or red gum—the strophulus confertus or the strophulus intertinctus in very young infants. Pruriginous affections are also met with, and not infrequently eczematous eruptions, most frequently on the head and face. Eczema is difficult to cure during the period of teething, and is apt to recur during the cutting of a tooth. It is often closely associated or alternates with gastro-intestinal disorder. The simple forms of skin eruption require little treatment beyond careful attention to the cleansing of

the skin and avoiding the use of ordinary soap, using instead a non-irritating soap, such as Unna's over-fatty basic soap, with the application of soothing dusting powder after the skin is thoroughly dried. In eczematous eruptions, washing should be sparingly had recourse to. If any soap be used, the over-fatty is the best, but I prefer simple washing with oatmeal or barley gruel. Local applications should be of the most soothing kind, and of these the various preparations of zinc oxide or oleate are to be preferred. The zinc may be applied as a powder on cotton-wool, and covered with a bandage. It may also be used in the form of ointment with benzoated lard or as zinc gelatine, which forms a thin unirritating coating over the surface of the inflamed skin.

Affections of the Nervous System are liable to complicate the dentitional period. *Convulsions* may occur in highly neurotic children, or in those of rachitic constitution. There can be no doubt that, in a large proportion of the cases where convulsions occur in teething children, rickets forms the chief etiological factor. *Laryngismus Stridulus*, or *Glottic Spasm*, is not an uncommon form of local nerve disorder, also squinting from spasm of the ocular muscles. *Spasmodic Cough* is another neurotic complication. More rarely we meet with transient forms of paralytic seizure. One or other or both limbs may be affected with tonic spasm, or temporary paresis. This most frequently occurs in the arm, and generally passes off in from ten days to two or three weeks. In all these nervous affections, apart from the condition of the gums, which must be treated if need be, the state of the digestive system requires attention. Any errors in feeding must be rectified, and suitable medicinal treatment had recourse to. In the treatment of convulsions care must be taken to ascertain the exciting cause.

The only other complication worthy of note, but of rare occurrence, is *otitis*, and there can be little doubt that it is often directly connected with the dentitional process, when there is more than the ordinary irritation in the mouth.

Catarrh of the middle ear in children is either an extension of the process along the Eustachian tube, or the result of reflex irritation through the nerves supplying the buccal and faucial surface, and transmitted to the tympanic cavity, causing mucous congestion, effusion, and subsequent perforation of the membrana tympani, followed by otorrhœa. With ordinary care and cleanliness, and treatment directed to the state of the mouth and digestive system, these cases end favourably, unless the child be very delicate or of strumous constitution, when the disease is apt to prove intractable. During teething, children are more susceptible of cold than at other times. It is therefore important that they should not be exposed to extremes of temperature, and that they should be warmly clad, especially about the belly and limbs; a loose flannel belly binder being always worn.

STOMATITIS.

1. *Simple Catarrhal*; 2. *Membranous Inflammation*—(a) croupous, (b) diphtheritic; 3. *Ulcerative*—(a) common ulcerative, (b) aphthous or follicular, (c) mercurial, (d) scorbutic, (e) syphilitic, (f) lupous and tubercular, (g) gangrenous; 4. *Parasitic (Thrush)*.

The different forms of stomatitis are included in this nosology, but a consideration of the more common varieties only demands our consideration.

1. CATARRHAL STOMATITIS occurs under a variety of conditions. The simplest and most common form is that met with during dentition. Improper feeding, irritating substances taken into the mouth, certain medicines, such as mercury, iodides, or bromides, too hot liquids,—all may act as exciting causes of the disease. It often complicates cases of hare-lip, or cleft-palate, or other deformities of the mouth. Sucking babies often contract stomatitis from ulcerated or unhealthy nipples. Many affections of the gastric and intestinal mucous membranes are accompanied by sympathetic irritation in the

mouth. This form is also met with in fevers—such as measles, scarlatina, tuberculosis, and other diseases—as a secondary affection.

Symptoms.—In the earliest stage the mucous membrane will be found to be somewhat red and dry, but it soon begins to secrete freely, the follicles being excited to increased action. They may be seen to be swollen the size of millet seeds, especially over the back part of the mouth and soft palate. There is usually, in proportion to the intensity of the inflammation, more or less epithelial proliferation and desquamation. The mucus, at first watery, becomes viscid and tenacious from increased cellular and nuclear formation. The disease does not always present such severe symptoms, but is often of milder type and passes off in a few days. During its progress the child is fretful and irritable, showing a disinclination to take food or the breast. It seizes the nipple and soon lets it drop from its mouth, crying fitfully at the same time. There is sometimes vomiting or slight diarrhoea. A complication which often gives rise to some trouble is swelling of the sub-maxillary or sub-lingual glands, which may end in suppurating bubo. Herpetic irritation of the sides of the mouth or chin are not uncommon. It is unnecessary to enter into a description of the pathology of this condition, further than has been already indicated, the processes being essentially of a catarrhal nature.

Treatment is of a simple kind, and essentially etiological. Whatever cause be in operation must, if possible, be removed. Gastric or intestinal irritation should be treated by altering the feeding if need be, or employing simple stomachic remedies, such as gentle aperients of rhubarb and soda, or magnesia with or without a simple aromatic water. Emollient drinks of barley or rice water generally give relief; locally, washes of borax or alum, with mild opiates if there is pain or much irritation. A warm hip-bath at night is usually of service.

2. APHTHOUS OR FOLLICULAR STOMATITIS is an inflammatory

affection of the mucous surface of the mouth, characterised by the presence of small, irregularly circular or oval superficial ulcers. When observed in the early stage, the mucous surface is seen to be studded with small elevations of the epithelial coating of a papular nature. Desquamation soon reveals the small superficial ulcers already described. These are seen chiefly on the surface of the tongue inside of the lips and cheeks, sometimes on the palate, more rarely on the gums. When close to one another they often coalesce, forming large irregular patches of ulceration.

Etiology.—Apthous stomatitis is essentially a disease of childhood, and is most commonly met with up to the fifth year. It is more frequent before the fourth year. The conditions which favour it are all those which tend to depress the general health of the child, and favour gastro-intestinal disorder. Scrofulous children are liable to be affected, and those generally under unfavourable hygienic conditions. It often occurs in asylum schools, where large numbers of children are living together under similar conditions. A secondary form of this disease is met with in older children, in debilitated health from acute or chronic disease, but this is of rarer occurrence and does not require special note.

Symptoms and Diagnosis.—Constitutional symptoms are usually of a mild type. Pyrexia is rarely present or persistent to any extent. The child is generally restless and irritable, and does not care for food, although it often drinks greedily. There is considerable increase of salivary secretion and a heavy breath. This form is not easily confounded with the other varieties of stomatitis. The small rounded superficial character of the ulcers, their site and circumscribed character—the rest of the mucous surface presenting a comparatively healthy appearance—serve to distinguish it particularly from the ulcerative form, with which it is most likely to be confounded. In this disease, which is of a severer nature, the ulcers are larger, deeper, and more irregular, and affect chiefly the dental margins of the gums, the mucous membrane of

which is red and swollen, and there is a peculiar and characteristic foetor of the breath. In some rare cases of aphthous stomatitis the ulceration may be very persistent, and even assume a gangrenous type. Such cases are more liable to be confounded with the ulcerative form.

Treatment is essentially that of the condition with which the disease is associated. Mild aperients, such as castor-oil or magnesia, should be ordered. Milk, and demulcent drinks of barley water, or decoction of marsh mallow, ought to be given. Solid food is not usually advisable for a few days. The mouth should be washed out with borax and glycerine with water. A little alum added to this is often useful. Sometimes a weak boracic lotion does good. If any of the ulcers become intractable, they should be brushed occasionally with a solution of nitrate of silver, gr. x to \bar{z} i of distilled water. As the ulcers heal, a return to ordinary diet may be allowed, and a simple bitter tonic, with an alkali, combined with some decoct. aloes co., if the bowels are constipated.

3. ULCERATIVE.—In this disease all the characteristics of stomatitis are well marked, the ulceration is of a peculiar character, and the constitutional symptoms more marked than in the aphthous variety. The ulceration almost invariably begins in the alveolar margins of the gums, which are much swollen and red and loose around the teeth, and very liable to bleed. The mucous membrane softens and breaks down into a yellowish mass, which leaves a deep ulcer of an irregular shape and varying size, the ulceration often spreading to the contiguous portion of the cheek. In the gums the ulceration may be so deep as to affect in rare cases the periosteum of the alveolus, and give rise to superficial sequestra of bone.

Etiology and Symptoms.—It is most frequently met with in children of the poor who are badly fed and housed, or in those who have been debilitated by acute disease. The child is generally irritable and languid, and refuses food; there is

evidently considerable pain in the mouth, and a good deal of salivation; the sub-maxillary glands are often tender and enlarged; the breath usually offensive. The disease, if untreated, will often run on for many weeks. Under treatment, provided there be no complication, it generally yields. It is often complicated with gastro-intestinal disturbance, sometimes diarrhœa. In any case the dejecta are offensive and unnatural. The prognosis is generally favourable, unless associated with any serious complication.

Treatment.—In dealing with this disease we must pay due attention to hygiene and diet, as well as medicinal treatment both local and general. If the patient be living in an unhealthy locality, or badly ventilated or over-crowded room, a removal from such unhealthy influences will tend to favour recovery, and should always be carried out if possible. The food should be light and easily digestible. Milk should be thoroughly sterilised, fresh beef-tea or chicken tea may be given alternately, or broth from which the vegetables have been strained; peptonised oat or barley gruel allowed to cool is also useful. Stimulants are often beneficial; port wine or good Burgundy, if the child will take it, may be given in suitable quantity along with food. The medicinal treatment must be both local and general. Any loose decayed teeth should be removed, and the mouth frequently, especially after food, washed out with an unirritating antiseptic lotion, such as boracic potass, permanganate, or chlorate of potass, gr. vi to the ounce of water, with two drachms of glycerine. The bowels should be duly regulated, if constipated, by small doses of castor-oil or rhubarb with hydrarg. c. cretâ. The most useful internal curative remedies are tonics—cinchona or quinine, with or without iron during convalescence. I prefer giving the quinine with hydrochloric acid, and some simple syrup or orange syrup added. Chlorate of potash has long been considered a specific in this disease, and may be given in two or three grain doses every four to six hours until the ulcers begin to show a healthy surface. It should be given in pure water,

with a little glycerine added. My experience leads me to the belief that most cases do very well under the simple tonic and dietetic treatment I have indicated, without the use of the chlorate internally; locally, as a mouth wash, I consider it more decidedly useful. If the ulcers resist the ordinary means of treatment, the local application of solid nitrate of silver or sulphate of copper seldom fails to induce healing action.

4. PARASITIC STOMATITIS.—*Thrush*, as is well known, occurs in adults as a secondary condition, associated with the unhealthy state of the mucous surface of the mouth met with in long-continued and debilitating disease. In children, it is most commonly seen in bottle babies who are improperly fed and cared for. It may occur in a mild form in breast babies, although more rarely. It essentially consists in the growth and development of the so-called thrush fungus—*saccharomyces albicans*, better known as *oïdium albicans*—on a previously unhealthy mucous surface. The fungus grows in the middle layers of the epithelial covering, the upper layers being cast off along with the vegetable growth. It sometimes penetrates more deeply into the mucous surface. The appearance of the mouth is characteristic, the surface being covered with patches which tend to spread over the whole surface, forming a white coating like the curd of milk, the mucous membrane beneath being redder and smoother than natural. The papillæ are sometimes enlarged, but there is no ulceration.

Symptoms.—The mouth is dry, the salivary secretion being diminished, the secretions acid instead of alkaline. One of the earliest symptoms is peevishness and distress in sucking. The infant seizes the nipple and sucks for a few moments, and then ceases with a restless cry. Gastro-intestinal catarrh is a frequent and dangerous accompaniment of this disease. The evacuations are unhealthy, and extremely acid and irritating, producing great redness and excoriation of the nates. Although the mouth is the ordinary seat of the disease, it has been demonstrated that it may spread to the stomach and intestinal mucous surface. The disease is

dangerous in proportion to the amount of marasmus and debility in the child. In comparatively healthy children it is of less serious import, and more readily yields to treatment. When the disease is localised in the mouth it seldom gives rise to much constitutional disturbance, unless other complications are present.

Treatment.—Careful attention to the feeding of the child is the most important factor in the management of these cases. If it is very young and badly nourished, a wet-nurse may be required. In any case some change in the food will be necessary, scrupulous cleanliness of the bottle being inculcated. The milk should be perfectly fresh, and carefully sterilised. Starchy foods should be avoided. If there is disorder of the stomach and diarrhœa, suitable treatment must be adopted, according to the rules laid down for gastro-intestinal disorder. Local treatment, especially when the disease is confined to the mouth, is of the greatest service. The fungus coating should be removed with the finger, or a brush, or a soft piece of rag moistened with glycerine of borax or boro-glyceride and water, two parts to one. This should be done several times a day until the mucous surface is thoroughly clean. Thereafter the mouth should be washed out after each time the child has had its bottle, with boric lotion, gr. xx to the ℥i.

5. GANGRENOUS STOMATITIS. — Gangrene may complicate ordinary ulcerative stomatitis, but the disease specially under consideration occurs independently. It is rarely seen in infants, usually in children from three years onwards. It is not met with in previously healthy children, but in those debilitated from whatever cause, most commonly during convalescence from acute disease, such as measles, typhoid fever, variola, or scarlatina. The first symptom is the appearance of hard livid swelling on the cheek near the angle of the mouth, accompanied by pain and salivation. This often shows bullæ or vesicles on the surface, and the superficial tissues soon exhibit a yellowish necrosed slough. The gangrene rapidly spreads to the deeper textures, and as a rule destroys the

whole of the tissues of the cheek, leaving the cavity of the mouth exposed when the slough separates. The diseased action is not always limited to the cheek, but may invade the upper and lower maxillary bones, causing necrosis and separation of the entire bones on the affected side. In a girl lately under my care in the Children's Hospital, this occurred—all the soft textures of the left cheek, as well as the upper and lower maxillary bones on the affected side, separated, and the child recovered; the wound healed without plastic operation.

Symptoms.—These are generally less marked than the gravity of the case would lead us to expect. The child is usually languid and prostrate, and when the gangrenous process has fairly set in there is often apparently little pain, the saliva dribbles from the mouth, and the breath presents a characteristic foetid odour. There is generally loss of appetite and thirst; the tongue is moist; the child is with difficulty fed, except with a tube passed well back in the mouth or through the nostril. The pulse is regular and somewhat accelerated; the temperature is seldom high when the gangrene has fairly set in and the case uncomplicated, although it may show a higher register the first two or three days. The child emaciates, the features become sunken, the face pallid, and the expression melancholy.

Diagnosis.—The disease can hardly be confounded with any other. Malignant pustule is rare in the child, and is an affection primarily of the skin, and not of the mucous surface. In ordinary ulcerative stomatitis, complicated with gangrene, the site and general characters of the disease are different, the rounded, thickened, and indurated hardness, commencing in the cheek, and unconnected usually with previous ulceration in the mouth, is sufficient to assure the diagnosis.

Prognosis depends on the age of the child, its previous condition and strength of constitution, and the extent of the disease. In severe cases the issue is usually fatal. When any complication arises, the prognosis is extremely grave. The most frequent complication is pneumonia, generally of a

septic character. Enteritis is a less common complication. Gangrene may spread in rare cases to the palate or pharynx; it has also been met with on the vulva, or around the anus. A rare complication is arterial hæmorrhage, from erosion of one of the larger arteries. This may cause sudden death, unless prompt assistance is at hand.

Treatment must be constitutional and local. The child should be placed under the most favourable hygienic conditions. The *local treatment*, when the case is seen at an early stage, and before the gangrenous process has exhausted itself, is the destruction of the disease by strong escharotics—acid. nitric. or hydrochlor. acid., nitrate of mercury, or even actual cautery. Strong carbolic acid is also favourably recommended. Dr. Coates has used with success, and his method has the sanction of Dr. West, the following lotion:—

R Cupri sulphatis ʒij, pulv. cinchonæ ʒss, aquæ ʒiv.
—Misce et solve.

This should be carefully applied over the diseased surface two or three times in the twenty-four hours. In all cases the mouth should be washed out frequently with boracic lotion, or solution of potass. permanganate, or dilute carbolic lotion. Constitutionally, the treatment should be tonic and nutrient: raw eggs, soups, milk, or whey, with suitable quantities of brandy or wine. Cinchona bark, or quinine, with or without iron, are the medicines most likely to be of service.

CHAPTER XXII.

DISEASES OF THE TONSILS.

DISEASES of the tonsils are very common in early life, and the milder forms, which are liable to give rise to ulterior mischief, are apt to be overlooked. It should be a cardinal rule in the investigation of the case of a sick child, never to omit the examination of the throat, yet this omission is often made. Many a case of illness in a child is put down to a "cold," or feverish attack, teething, or disordered stomach, when an examination of the throat would have revealed a tonsillitis. The following nosology of tonsillar diseases will simplify our brief consideration of this subject:—

PRIMARY TONSILLITIS.

1. *Inflammatory*.—(a) Simple or superficial catarrh, (b) follicular catarrh, (c) parenchymatous tonsillitis.

2. *Complicated*.—(a) Croupous, (b) diphtheritic, (c) ulcerous, (d) aphthous, (e) parasitic, (f) syphilitic, (g) tubercular, (h) irritant or toxic (ingesta—poisons).

SECONDARY OR SYMPTOMATIC TONSILLITIS

Accompanies acute exanthemata or other diseases, such as scarlatina, measles, variola, diphtheria, rheumatism, typhus, pneumonia, dentition, dental caries, stomatitis, gastric catarrh.

HYPERTROPHY OF TONSILS.

(a) Simple, (b) chronic follicular disease.

ETIOLOGY.—The popular belief that cold is always the cause of sore throat is incorrect. It occasionally may act, but

generally only as an exciting cause, but this I believe to be exceptional. There is usually some constitutional state predisposing to the disease. Thus scrofulous children are prone to attack, and notably those of rheumatic diathesis. In infancy, slight tonsillitis is a frequent accompaniment of the gastric-catarrhal conditions which are often met with in artificially-reared children. It is sometimes associated in these cases with stomatitis, whether of a parasitic nature or one of the inflammatory forms. The acute infectious diseases, notably scarlatina and diphtheria, and less frequently measles, are generally complicated by some form of tonsillitis. One of the commonest causes of tonsillitis, especially in children, is ordinary septic poisoning from sewer gas. This, I believe, is the common experience of all practitioners of late years, since the hygienic arrangements of dwelling-houses are looked into as a matter of routine by medical men. Another cause more prominently noted in recent years is infection. There is reason to believe that all forms of tonsillitis, even the simple catarrhal varieties, are infectious. Some practitioners adhere to the belief that it is only the more severe forms, especially the diphtheritic, that are infectious, but, from the rapidity with which even the milder cases of disease often spread through a household, it can hardly be doubted that the larger proposition is correct. The secretions from the tonsil, even in the simpler form of disease, are infested by micro-organisms which no doubt help to spread the disease, if indeed they be not the sole cause of infection.

Simple and Superficial Catarrh, characterised by redness with more or less swelling of the glands, and often of the soft palate and surrounding mucous surface, is met with in varying degrees of severity; sometimes it is so mild as to be overlooked, especially in infants or young children who are suffering from gastric catarrh. Repeated attacks of mild tonsillar catarrh in infants is, I believe, one of the commonest causes of chronic hypertrophy of the tonsils which shows itself in childhood. In this variety there are often few symptoms and little con-

stitutional disturbance further than that referable to ordinary gastric disturbance. There may be slight pyrexia, but seldom any pain in deglutition.

Follicular Catarrh, rare in infancy, is common in childhood during the second dentition. It is characterised by the usual signs and symptoms—redness and swelling of the tonsils, with lacunar catarrh, and increased secretion, which agglutinates and shows itself at the follicular openings as yellowish-white spots. Associated with this we often have a varying amount of yellowish gelatinous patchy exudation, the so-called croupous patch, which can be readily rubbed off when touched with the spatula. This variety is accompanied by well-marked constitutional disturbance and pyrexia, with painful deglutition, alteration of the voice and cry, and pain in the ears. The tonsillar lymphatic glands at the angle of the jaw can generally be felt slightly enlarged and tender.

Parenchymatous Tonsillitis in my experience is rarely if ever met with in infancy, and not very often in early childhood. When it does occur, the symptoms are identical with those met with in later life, and do not merit special note here.

Diphtheritic Tonsillitis is the only complicated variety to which we shall specially allude. It is more fully described in the article *Diphtheria*. The tonsils are swollen and of a dark red colour; the normal secretions being often diminished, the glands are covered with greyish-white patches, firmly adherent, and which tend to spread with great rapidity; when scraped off the surface bleeds. The breath is sickly and foetid, deglutition difficult, lymphatic glands at the angle of the jaw enlarged, and frequently the sub-maxillary gland also. It occurs in primary diphtheria, but often as a deuteropathic affection, complicating scarlatina or measles, or other acute diseases. The differential diagnosis between the croupous and diphtheritic exudations is still a matter of dispute. Wagner, Clawson, and other pathologists consider them identical, while Steudener, Ziegler, and Professor Henoch, from a clinical point of view, differentiate them.

Ziegler¹ describes the *croupous exudation* "as a pale yellowish membrane, consisting of fibrinous filaments and granules beset with pus corpuscles," the cellular elements embedded in the matrix undergoing what he calls "coagulative necrosis." This membrane is very loosely adherent to the surface, and can be readily scraped off. The essence of the process appears to consist in abundant extravasation of liquid and cellular material, and "the absence of such agencies as hinder coagulation." The *diphtheritic process* he describes as one in which the "epithelium is not shed, but dies without desquamation, abundant liquid being at the same time poured out, which fills the cells, and gives rise to a condition of rigidity akin to coagulation." The exudation is rich in albumen. He describes a superficial variety of the disease in which the changes only involve the mucous surface proper, and says that what he calls this *superficial diphtheria* and the *croupous exudations* present many similarities, and are apt to be confounded together. In *parenchymatous diphtheria* a much greater extent of tissue is involved—not merely the epithelial surface, but also the underlying connective tissue. In both cases you have necrosis of the affected tissues, and a line of cellular infiltration separating the dead from the living. Hæmorrhages are not uncommon, and coagula in the lymphatics. These exudations are generally loaded with lower vegetable organisms. Clinically, I think we may, as a rule, make a distinction between the two exudations, although in exceptional instances it is difficult to draw a "hard and fast" line. Certain it is that you have a simple form of patch confined to the tonsils alone, and clearing off within a few days or a week. On the other hand, you meet with cases where the patches are more adherent, and tend to spread over the adjacent mucous surfaces, the disease taking a longer time to run its course.

Professor Hensch,² in differentiating clinically between the

¹ *Pathological Anatomy*, p. 225.

² *Diseases of Children*, p. 286.

simple forms of sore throat with exudation and the diphtheritic throat, says "certain anginas present a similarity to diphtheria. On the second day of the disease, round yellowish-white patches, the size of a pin's head or larger, appear upon the tonsil; occasionally they are isolated, but often confluent, so that the tonsil appears covered with an irregular whitish-yellow mass, which looks suspicious, but usually, he says, these patches leave no doubt of their benign nature; they are composed of purulent material secreted from the follicles, are loosely adherent, and easily detached. The yellowish colour of the patch is different from the grey or white colour of diphtheritic exudation. Cases occur not infrequently in which judgment must be delayed for from twenty-four to thirty-six hours. Within this time, simple catarrhal angina is either at a stand-still or subsiding, while diphtheria steadily increases in severity. I attach no importance to the fever and enlargement of the lymphatic glands, as they are common to both conditions. Microscopically you cannot arrive at a diagnosis, as bacteria are also found in both. Many cases of severe catarrhal angina are undoubtedly regarded as diphtheria by superficial observers, and this explains the fact that many physicians cure almost every case of diphtheria."

Sometimes a diphtheritic membrane may succeed a more simple exudation. Last year I had a little girl under my care in the Royal Hospital for Sick Children, suffering from scarlatina. She had well-marked follicular tonsillitis with croupous exudation from the commencement of the disease. By the tenth day the patches had cleared off the right tonsil entirely; on the left one there still remained a very little patch, about the size of a small pea. On the twelfth day this tonsil became more swollen, and of a dark red colour, and diphtheritic ulceration rapidly spread from it to the soft palate, uvula, and nares, and also to the other tonsil. The child had a prolonged and tedious attack of diphtheria.

Scarlatinal Tonsillitis is sometimes described as characteristic, but clinically, I believe, it has no distinctive appear-

ance. We meet with all varieties and degrees of inflammatory affection of the tonsils in this disease, from the slightest form of catarrh to well-marked follicular tonsillitis and croupous and diphtheritic patches. The follicular disease, when fully developed, shows the glands to be of a brighter red colour than in the idiopathic variety, the mucous surface being in fact the same colour as that of the tongue. The appearance is sufficiently distinctive in many cases, but not in all.

Parenchymatous Tonsillitis is rarely met with in infants and young children, still more rarely tonsillar abscess.

Rheumatic Tonsillitis is that form of the affection which is succeeded or accompanied by other manifestations of rheumatic poisoning. There can be no doubt, I think, that sore throat is often one of the early signs of acute rheumatism. The disease is generally simply catarrhal or follicular in its nature, and cannot be distinguished in appearance from a similar condition produced by other or simpler causes.

Chronic Hypertrophy of the Tonsils is frequently met with in children, and the question which always seems to present itself is, Is this hypertrophy of a primary nature, or is it the result of previous inflammatory affections of the glands? The decision of the question is not easy, on account of the difficulty of ascertaining, in any given case of hypertrophy, whether the child has been previously the subject of the milder forms of catarrhal or inflammatory affection of the glands. In young children, as we know, the symptoms are objective; the child cannot tell whether, during some slight previous ailment, it has felt sore throat or not. Children are liable to the milder forms of these diseases from cold, or in association with the process of dentition. Gastric catarrhal affections, as we have seen, are more or less frequently accompanied by the milder forms of tonsillar disease, which is apt to be overlooked if a careful examination of the fauces has not been made. My own experience would lead me to believe that in the great majority, if not in all cases of hypertrophied

tonsils, the enlargement of the gland is secondary to repeated mild attacks of a catarrhal or inflammatory nature. It has been supposed that in delicate and strumous children, the tonsils and lymphatic glands may become enlarged from purely constitutional causes. I think this may, very reasonably, be doubted. It would seem more probable that, while such a constitutional condition as scrofula undoubtedly predisposes to disease of the glands, some exciting cause is required for its development.

Hypertrophy of the tonsils in children gives rise to a variety of conditions, in themselves more or less attended with distress and even danger. Dupuytren, Shaw, and others have related cases where the development of hypertrophy at an early age induced, by obstructing the respiration, deformity of the chest or chicken breast very like that of rickets. Politzer¹ says narrowing of the nostrils is a frequent result, and when present may be considered a pathognomonic diagnostic sign of greatly enlarged tonsils. Cases are related where, in the absence of any other source of peripheral irritation, enlarged tonsils may produce laryngismus stridulus or spasmodic asthma, in the same way as we know nasal polypi give rise to similar conditions from reflex causes.

Hypertrophied tonsils likewise predispose to repeated attacks of catarrh, which debilitate and annoy the child. One result of tonsillar hypertrophy, especially in delicate or strumous children, is cervical adenitis. The tonsillar glands become readily affected, and disease may spread to any of the other cervical glands. Far more satisfactory results in treatment may often be attained in the earlier periods, in these cases, by directing our attention to the cure of the tonsillar disease, than by local treatment of the glands, even if accompanied by the usual constitutional remedies.

TREATMENT.—Tonsillitis, even in its milder forms, demands careful treatment, not only on account of its immediate but possible remote effects on the child. Thus it may be the first

Jahrbuch für Kinderheilkunde, Band xxi. heft 1 and 2.

indication of rheumatism, a disease which is often apt to be overlooked in children in its earlier manifestations. The patient should be kept in the house, and if old enough put to bed. The room should be maintained at mean temperature, and well ventilated. If there be any suspicion of sewer gas poisoning, means should be taken to remove the child from the noxious influence. At an early stage of the disease a purge is beneficial, a few grains of calomel or hydrarg. cum cretâ with jalap or scammony. Sometimes saline aperients are to be preferred, such as Victoria water or Rochelle salts. If there is much pyrexia, or any suspicion of rheumatism, the following mixture may be ordered:—

R Sodæ salicylatis ℥iss, liq. acetat. ammoniæ ℥ss, aquam
ad ℥iv—Misce.—Dessert-spoonful every three hours.

Or,

Tinct. aconiti gr. xx, glycerini ℥iij, mist. guaiaci, ad
℥iv—Misce.—Dessert-spoonful every three hours.

Local applications are most conveniently made by brushing or spraying. Glycerine of borax, either alone or with one drachm of bicarbonate of soda to half-an-ounce, is an excellent application. Glycerine of carbolic acid, half strength, does well in the severer forms of follicular disease or croupous exudation. It must not be applied too frequently, in case undue irritation is produced. Glycerine of tannin is an excellent application when the inflammation is declining. When the form of spray is used, a saturated solution of boracic acid will be found useful, or a solution of hypo-sulphite of soda, ten grains to the ounce, with one drachm of sulphurous acid added. In the earliest stages of catarrhal tonsillitis a single brushing with a solution of nitrate of silver, fifteen to twenty grains to the ounce, will often arrest the disease.

In *diphtheritic tonsillitis*, the patient should be put upon tonic treatment at once. The following mixture will be found useful:—

R Liq. ferri perchlor. $\mathfrak{z}\text{ij}$, liq. hydrarg. perchlor. $\mathfrak{z}\text{ij}$,
glycerini $\mathfrak{z}\text{i}$, aquam ad $\mathfrak{z}\text{vj}$.— $\mathfrak{z}\text{ij}$ every two or three
hours. Or,

R Tinct. cinchonæ $\mathfrak{z}\text{ss}$, liq. hydrarg. perchlor. $\mathfrak{z}\text{ij}$,
glycerini $\mathfrak{z}\text{i}$, aquam ad $\mathfrak{z}\text{vj}$.— $\mathfrak{z}\text{ij}$ every two or three
hours.

The diet should consist of milk and lime water, beef-tea, or Valentine's beef extract, and it is generally desirable from the first to give brandy with the food in suitable quantity, according to the child's age. Local applications are of much service, and that method of applying them should be selected to which the child offers least resistance. Some children resist local application altogether, and if persisted in the child often refuses food entirely. In such cases, I believe, great harm results in their persistent use. It is better to trust to nutrients and tonics, remembering that in the administration of one or other of the mixtures above prescribed, a certain amount of local action is produced on the diseased parts, and it is better to trust to this than run the risk of upsetting and alarming the child. The methods of using local remedies are various. Sprays, insufflations, and local application by the brush, are most serviceable. Before proceeding to apply any remedy, it is of great importance to remove the patch, if possible, especially if it is still small and localised. For this purpose the handle of a spoon or spatula is generally quite sufficient. Immediately after, glycerine of carbolic acid should be painted over the part, or undiluted Condyl's fluid. Dilute acetic acid, one to four, in the form of spray, has been found a very useful application. Engelmann considers acetic acid a more powerful antiseptic than carbolic acid in these cases; lime water or lactic acid are also of service. Iodol is a remedy of undoubted value in these cases, and has been used with much success by Stembo.¹ He recommends a solution of ten grains with

¹ *Central. f. Klin. Med.*, Aug. 3, 1888. *Proc. Vilna Med. Soc.*, No. v., 1887.

℥ss of sp. vini gallici in ℥iiss of glycerine, or the drug to be applied simply in powder alone. Insufflation of flower of sulphur is an excellent application. Sulphurous acid in the form of spray, or applied frequently by brush with glycerine, is also very useful. Papain is a valuable solvent of diphtheritic membranes, and has been much used by Prof. Finkler and Dr. Schoffer. It should be used in five per cent. solution, and the surface painted every hour. The addition of salicylic acid increases its solvent action. In all diphtheritic cases it is necessary to make the application frequently, as the membrane tends to spread with rapidity.

Hypertrophy of the Tonsils should be treated in the first place by careful attention to the child's general health. Tonics are generally required, and if of strumous constitution cod-liver oil and iodides may be ordered. Gastric derangement should be combated by carefully-regulated diet and stomachic remedies. Frequent slight attacks of gastric catarrh, especially in strumous children, accompanied, as they often are, by catarrhal conditions of the throat, are amongst the most frequent excitants of tonsillar hypertrophy. Local applications are useful, and should be persistently and constantly used in the intervals between the catarrhal attacks. The most useful local applications are iodo-glycerine, tincture of iodine, tincture of the perchloride of iron with glycerine, insufflation of dried bicarbonate of soda, or powdered alum. A saturated solution of iron alum in glycerine is one of the best applications. Glycerine of borax ℥i, bicarbonate of soda ℥iiss, is also a good remedy in my experience. When local applications fail, the question of amputation presents itself, and the indication for its performance is increasing debility on the part of the child, and physical interference with deglutition and respiration, atrophy of the nostrils or narrowing of the chest, spasmodic asthma, or laryngismus stridulus.

CHAPTER XXIII.

DISEASES OF THE SALIVARY GLANDS.

AFFECTIONS of the salivary glands are common in infancy and childhood. During the pre-eruptive period of infancy the glands are comparatively speaking inactive. While the process of teething is going on, their physiological activity becomes fully developed and a liability to functional and other derangements manifests itself. Until the end of the second year the affections of those glands are closely associated with the evolution of the teeth and the disorders liable to occur at this time. In difficult dentition especially, the glands are in a state of hyper-activity, the saliva being secreted in abnormally large quantity, and the glands more or less tender and sometimes slightly swollen. The increased functional activity often predisposes to inflammatory action, either in the gland itself or the surrounding cellular tissue, or in the lymphatics, ending in the well-known teething bubo, which frequently goes on to suppuration. These buboes are more frequent in the region of the sub-maxillary or sub-lingual glands than in that of the parotid. Functional glandular derangement is not uncommon during the progress of the catarrhal and inflammatory forms of stomatitis, and in such conditions also acute inflammatory action may be set up, ending either in abscess or resolution.

In dealing with these conditions, it must be remembered that the glandular affection is of a secondary nature, closely associated with the pathological processes going on in the mouth. The rules laid down for the treatment of difficult

dentition and its disorders are therefore applicable, and need not be again referred to. In like manner, when stomatitis is present it must be treated in the usual way. Abscesses must be dealt with on ordinary surgical principles, and opened whenever pus is detected.

Mumps—Epidemic Parotitis.—This disease should strictly speaking be classed with the fevers, but for convenience it is described here. It is essentially a zymotic disease, usually epidemic, accompanied by swelling of the salivary glands, more especially the parotid. Involvement of the sub-lingual and sub-maxillary glands is sometimes not apparent, at other times is sufficiently well marked.

The disease is due to a specific contagion, the exact nature of which is still unknown. It is eminently infectious, and spreads rapidly in families and schools. The period of incubation varies from two to three weeks. It is rarely of shorter duration, but sometimes even longer.

ETIOLOGY.—Although we are ignorant of the precise nature of the poison, and its mode of access to the system, the predisposing influences to the disease are sufficiently well known. It is more common in boys than girls, and from the second year on to the period of puberty than at any other time. Infants are rarely attacked, and still less frequently adults, doubtless owing to the fact that so many people have been affected with the disease in childhood. The periods of the year during which epidemics are most frequently met with are spring and autumn. The disease likewise seems prone to occur during the progress or immediately before or after other epidemic diseases, such as measles, scarlatina, or sore throat.

MORBID ANATOMY.—Although opportunities rarely occur of dissecting the glands in this disease, a sufficient number of cases have been reported by reliable authorities to show that the affection is of a simple inflammatory nature. There is usually catarrh of the ducts, with more or less effusion, and œdema of the surrounding cellular tissue. Whether in

all cases the catarrh is the primary element is as yet undecided.

SYMPTOMS. — Apart from the local affections, these are essentially febrile in nature, and generally precede the local affection by a period of from twelve to twenty-four hours. The usual symptoms are slight rigors, languor, anorexia, succeeded by febrile reaction, the temperature running up to 100° or 101° , or even higher in the more severe cases. In mild cases there may be absence of febrile movement altogether. The constitutional symptoms, when present, are soon succeeded by local pain and feeling of stiffness of the jaws, in one or both parotid regions; when one side alone is affected, the left is noticed to be more frequently so than the right. The swelling gradually increases, and becomes more tense and painful, the depression between the mastoid process and the ramus of the jaw becoming obliterated. The glandular swelling persists for four or five days, or longer, and then gradually subsides. The skin over the gland retains its normal colour and appearance. During the progress of the local affection the febrile symptoms persist, the tongue is coated with white fur, the breath being heavy and sickly. The salivary secretion is generally increased, sometimes diminished in quantity. One of the most curious features in this disease is the occasional occurrence of inflammatory swelling of the testicle in boys or the mammæ or ovaries in girls. This is liable to occur at the height of the disease, or about the period of decline, and is more frequently met with in males than females about the period of puberty. It has usually been described as a true metastasis, but in reality it is more probably a direct result of the constitutional state. Orchitis as a rule is unilateral, the right testicle being more frequently affected than the left. Taking into consideration the course of the disease, and its epidemic nature, the diagnosis cannot be said to present any difficulty after the glandular affection becomes pronounced. As a rule, the prognosis is favourable. Suppuration rarely occurs, the glandular swelling disappearing along with the constitutional

symptoms. In delicate or scrofulous children the swelling may persist for an indefinite time, and the surrounding lymph glands become enlarged.

TREATMENT.—Rest in bed, or at all events confinement to one room, should be enjoined. The diet ought to consist of milk, light soups, or farinaceous gruels; ordinary solid food, on account of the difficulty in mastication, being contra-indicated. A mild aperient may be given occasionally, or an emetic at the outset, especially if there is nausea and a thickly coated tongue. When fever is present, a simple diaphoretic mixture, with the liquor ammoniæ acetatis, or citrate of potash, is useful. Local applications of a soothing nature always afford relief. Simple warm fomentations, or medicated opiate, or, still better, belladonna epithems, are useful. Mustard pediluvia are often very soothing. Between the fomentations, the jaws should be tied up in cotton-wool or soft flannel.

In consequence of the long incubatory stage in this disease, a period of at least twenty-five days' quarantine should be enjoined in boarding schools.

Symptomatic Parotitis, as its name implies, is a secondary inflammatory affection of the glands. In this case the disease is almost invariably unilateral. The other salivary glands may be similarly but more rarely affected in the same way. In children, these conditions are met with chiefly in the fevers, when of a malignant type. Thus in scarlatina, typhus and typhoid, and septicæmia, such a complication may occur. The inflammation is generally of a low type, and often ends in unhealthy suppuration. There is usually tumefaction of the surrounding cellular tissue and lymphatic glands, the cellulitis often ending in sloughing, if the child survives.

TREATMENT is that of the constitutional state, with which the local disease is associated. Stimulants and nutrients must be chiefly relied on, along with quinine or cinchona. By such means suppuration and sloughing may be prevented. Abscesses must be treated, when they occur, on ordinary surgical principles.

CHAPTER XXIV.

GASTRO-INTESTINAL DISORDERS.

INTESTINAL CATARRH.

DISEASES of the digestive tract are very common in children, and therefore of great importance. During the periods of lactation and the first dentition, on account of the developmental activity of the mucous surface, derangements of digestion are very prone to occur. These may either be of a trifling or temporary character, or of a more serious nature, ending in one or other of the various forms of inflammatory affections of the stomach or bowels. We shall treat of those conditions, chiefly as they are met with during dentitional period, as in later life gastro-intestinal disorder is less frequent, and assumes more and more of the adult type, and therefore does not demand our special attention. Indigestion in the infant, if not speedily arrested, sooner or later sets up gastric or intestinal catarrh of an acute or more chronic nature. This is by far the most common disorder of the digestive system we are called upon to treat, and is of special importance.

CAUSES.—It may be laid down as a rule, that a healthy child, suckled by a mother of sound constitution and in average health, rarely if ever suffers from disordered stomach or bowels. Certain causes, apart from either the mother or infant, may operate. Infants are more sensitive than adults to the influence of extremes of temperature, and these often play an important part in causation. Anti-

hygienic conditions—such as damp, defective ventilation, noxious effluvia—must be taken into account. Infants of naturally delicate constitution, or those of rachitic, strumous, or syphilitic habit, are specially prone to these affections. Causes on the part of the mother are among the most common, and milk, either defective in quality or deficient in quantity, is one of the most frequent, and associated with it is commonly found irregular or too frequent suckling. This generally leads to indigestion, as constant suckling tends to alter the quantitative composition of the milk, rendering it too concentrated and therefore indigestible. Although digestion in the infant is very rapid, yet it cannot be doubted that the ingestion of more milk before that of the previous suckling has been digested, must, according to all physiological laws, tend to set up indigestion. It seems therefore necessary, in order to insure healthy digestion, that suckling should take place at regular and stated intervals.

If a child is always wanting a drink, it is a tolerably sure indication of defective milk supply. Mothers, in these circumstances, are often under the impression, and will tell you, that they have plenty of milk, but the indications on the part of the child are much more reliable than the feelings of the mother. Constitutional debility, or the existence of organic diseases in the mother, leads to similar results. Diseases of the breast, or secretions from ulcerated nipples, often cause gastro-catarrh in the child. It is in artificially reared infants, however, that these disorders are most frequent and intractable. In them, although the general and constitutional causes already referred to operate with even greater effect than in breast babies, as a rule the determining cause of the ailment lies in the feeding, which is usually at fault.

CLINICAL FEATURES.—Gastro-intestinal catarrh is the ordinary result of the operation of the causes just noted. The most prominent symptoms are vomiting and disordered alvine evacuations; the former being the leading symptom in the

gastric, the latter in the intestinal form of the disease. In a large proportion of cases we have the entire intestinal tract more or less affected, and both vomiting and purging are present. In *gastric catarrh*, the infant vomits the food soon after it is taken. It is forcibly ejected in an undigested form, along with more or less watery fluid. The bowels are usually constipated, and the motions hard and costive, and of a pale clay colour; the tongue is red and coated with a white fur, and later on it becomes dry and glazed. Gripping pain and drawing up of the legs, and consequent crying fits, are generally present. The child is restless and irritable, the skin hot and dry, the belly swollen and tender, and thirst a prominent symptom. In the early stages of the disease there is a variable amount of febrile disturbance. Should the symptoms go on unrelieved, the child becomes rapidly emaciated, and with sunken eyes presents more or less of a collapsed appearance. When *intestinal catarrh* is present also, the bowels become loose and the evacuations contain undigested food, such as curd of milk along with watery fluid and mucus; and in the severest forms of the disease, when the intestinal follicles are affected, the motions are often tinged with blood. The stools are generally deficient in bile—acid, irritating, and foul-smelling, causing redness and excoriation of the buttocks. Associated with this we often meet with parasitic stomatitis. Rapid emaciation is always the result of the severer forms of gastro-enteric disease. In the advanced stages the child generally presents a characteristic appearance. Emaciation is progressive; the eyes are sunken, the skin becomes loose and can be pinched up in folds, the outlines of the bones in the limbs and hands particularly become well marked. The fontanelles are depressed, the outlines of the cranial bones become prominent, the occipital bone rides beneath the parietals from diminution of the cranial contents and atrophy of the brain. It is in this condition that we meet with an interesting group of symptoms, known as *hydrocephaloid disease*. This condition may arise as a result of great exhaustion from other causes, such as loss

of blood, but in the great majority of cases is associated with chronic diarrhœa. The symptoms are drowsiness, rapid (sometimes intermittent) pulse, subnormal temperature, breathing generally accelerated. Unlike the stupor from true cerebral disease, the child can generally be roused. A curious feature in some of these cases is a constant movement of the head, a rubbing to and fro and boring of the occiput into the pillow, often depriving the back of the head of its hair. The limbs are often more or less rigid, sometimes those of the neck are affected with tonic spasm, producing a bending back of the head when the child is laid on its side. To complete the cerebral picture of the case, vomiting is sometimes present, due to the condition of the stomach. All this group of symptoms may arise solely from the anæmic and atrophied state of the brain. Thrombosis of the cerebral sinuses, particularly of the longitudinal sinus, may complicate the condition in rare cases, but its diagnostic appreciation during life is rarely possible. Other complications are apt to arise during the progress of gastro-intestinal catarrh. I have already alluded to the erythematous condition of the buttocks and thighs. Another cutaneous complication is often met with—furuncular affection of the scalp, small boils which readily suppurate. This condition is not unfavourable in my experience, seeming to act as a cerebral derivative, as in these cases we seldom have serious brain complication. Convulsions, associated with the cerebral anæmia, are sometimes met with. More rarely serous effusions, or thrombosis of the sinuses, may ensue, and generally cause a fatal termination. Pulmonary complications may arise, the most common being hypostatic congestion of the lung bases, from prolonged recumbency, associated with feeble circulation. As a secondary result of this, hypostatic pneumonia may be set up in the congested portions. The only other complication I shall allude to is hyperplasia of the mesenteric glands, which I believe is present to a greater or less extent in all severe, especially the follicular, forms of enteric affection. The

glandular enlargement may either undergo resolution when the case ends in recovery, or remain as a chronic condition, especially in children of strumous habit, and caseous degeneration, or tubercular affection of the glands (*tabes mesenterica*), may result, and the child ultimately succumb to general tubercular infection.

ANATOMICAL CHARACTERS.—The pathological appearances in gastro-intestinal catarrh necessarily vary according to the severity of the case. In some cases there may be little visible change, except hyperæmia of the mucous surface. As a rule, however, there is more or less thickening and sometimes softening of the membrane, with infiltration of the sub-mucous tissue. If the inflammatory action passes on to a higher grade, and the glandular apparatus is affected, swelling and tumefaction of the glands is observed, especially the solitary and agminated Peyerian glands. The mucous membrane on the summit of the glandular swellings often gives way, showing small rounded ulcers, which in severe case gives rise to the streaky hæmorrhage noticed in the evacuations. In prolonged and chronic cases, with mesenteric disease and tubercular complication, the usual characteristic tubercular ulcers are present, giving rise to intractable diarrhœa.

TREATMENT must be conducted with reference to hygiene, diet, and medicine. The child should be kept in a well-ventilated and sanitarily healthy room, in which a mean temperature is maintained. All evacuations and soiled linen must at once be removed from the apartment. The clothing should be warm, but must, of course, be suited to the season of the year. The child should be sponged all over its body several times a day with tepid water. Warm poultices should be frequently applied to the belly, if it is swollen and tender. Simple sinapisms to the epigastrium, sufficient to produce rubefaction, are often useful. In the interval, a soft flannel binder should loosely encase the belly, or, if preferred, Gamgee tissue may be used as a substitute. The feet should be kept warm, and for this purpose, in winter, warm stockings should

be worn. The diet next requires attention, and the leading principle which should guide the physician is to administer such food, in quality and quantity, as the stomach is able to digest. In all these cases the digestive power is much weakened, and there is usually great thirst, and therefore a desire on the part of the child to take more than the stomach is able to digest. In bottle babies, suffering from severe intestinal catarrh, it is generally necessary to dilute the milk to a large extent either with barley or rice water, or lime water, and in many cases to stop the administration of milk altogether for a time, one or other of the mucilaginous decoctions being substituted. Discontinuing the use of milk is often alone sufficient in a few days to allay the irritation of the mucous surface. The child should be fed at regular intervals and in proper quantity. If craving occurs between the intervals of feeding, the thirst must be allayed by the administration of a little cold water, or very thin rice or barley water. In breast babies the severe forms of gastrointestinal catarrh are rarely met with. In dealing with the less serious form of the disorder, attention must be paid to the quality and quantity of the mother's milk, and the rules laid down for healthy lactation strictly attended to. The hygienic conditions under which the infant is situated must be considered, and remedied if defective.

The medicinal treatment of the various form of gastrointestinal disorder in young children requires careful discrimination and thought on the part of the physician. The beneficial effects of the use of drugs can only be attained when the child has been put under favourable conditions as regards hygiene and diet. The young practitioner is too often apt to neglect such preliminary measures, without attention to which drugs are of comparatively little service. In breast babies suffering from the gastric form of catarrh, simple remedies will generally suffice to aid us in restoring the stomach to a healthy condition. If the infant does not vomit, an ipecacuanha emetic will be useful to rid the stomach

of accumulated secretion. If parasitic stomatitis be present, the mouth should be washed two or three times a day with the following lotion :—

R Glycerini boracis 3x, aquæ rosæ 3vi—Misc.—Ft. lotio.

One to two teaspoonfuls of the liq. magnes. carbonatis should be given three or four times a day before taking the breast. Should this not succeed alone, two grains of subnit. bismuth may be added to each dose. Ten or twelve drop doses of liq. bismuth in a teaspoonful of aq. anethi is also a useful combination in such cases. When intestinal catarrh is present, with griping and disordered alvine evacuations, it is generally desirable, in the first place, to secure free evacuation of the bowels by a dose of ol. ricini, or rhubarb and soda, or magnesia, and thereafter the following mixture may be prescribed—

R Tr. camph. co. 3i, sp. chloroformi 3ss, aq. anethi 3vi, liq. magnes. carbonatis 3viiijss—Misc.—Sig. one to two teaspoonfuls thrice daily.

In bottle babies, the first cardinal rule in treatment is to rid the stomach and bowels of offending secretions or undigested food, if need be. For this purpose an emetic should be prescribed. If the bowels require attention, an aperient of ol. ricini, rhubarb, or magnesia, is indicated, and thereafter such remedies as tend to restore the mucous membrane to healthy action. In the gastric form of catarrh I am in the habit of commencing with a few doses of calomel or hydrarg. c. cretâ, in doses of one quarter to half a grain, with a little sugar, given every three or four hours till from four to six powders have been given. The effects of these drugs are very beneficial in most cases. In some cases one quarter to half a grain of pulv. ipecac. c. opio may be combined with each dose of the mercurial. There can be no doubt these old remedies have stood the test of time. I have tried to do without them, and have always been impelled to recur to their administration. An alkaline mixture, as recommended in the case of breast babies,

may thereafter be prescribed. Sometimes two or three grs. of pulv. rhei co., or rhubarb and sodium bicarb., will do very well. Lime water, mixed with the milk in the proportion of one to two or three, is also an excellent remedy, and will often control the gastric irritation, without recourse to other drugs. In intestinal catarrh, which is usually more difficult to control than the gastric affection, a variety of remedies have been of late years tried. They may be divided into eliminants, antacids, and carminatives, alteratives, sedatives, antiseptics. The good results obtained by the eliminant action of castor-oil or other simple aperients is generally admitted by most physicians, and has been already referred to. Antacids, such as lime water, magnesia, or sodium-bicarbonate—especially when combined with carminatives, such as anethum, anise, or the like—are of much service in allaying irritation and assisting to neutralise the acid state of the secretions always associated with the catarrhal condition. The alterative effects of mercurials, already alluded to, are generally of signal service in restoring the secretion, especially that of the liver, which in all these conditions is more or less interfered with, to a normal state. The sedative remedies most serviceable are the mineral ones—such as lime, or bismuth, or oxide of zinc. Bismuth and lime are useful in the acute period of the disease. Oxide of zinc is of more service, on account of its valuable tonic properties, in the chronic stages. Of the organic sedatives, opium and belladonna are the only ones that have been found of much service, and they should, as a rule, only be prescribed in the acute disease. Opium must be used with caution, and in small doses, and is generally combined with one or other of the antacid and carminative mixtures, or in the earliest stages with mercurials. It is most useful in restraining excessive mucous secretion and allaying pain and griping. Belladonna is, in my opinion, a most useful sedative in these cases, and might be more frequently used than it is. The drug is very valuable in restoring a healthy peristalsis, and, when com-

bined with opium, it appears to assist it in allaying the excited peristalsis which is so often present in intestinal catarrh, at the same time controlling the action of the drug in its tendency to unduly restrain the muscular action of the bowel. The antiseptic class of drugs has invaded the domain of intestinal catarrhal diseases of late years, and their use seems not only to be founded on rational therapeutic knowledge, but to be of real service in a curative sense. As is now well known, the secretions in this disease are loaded with micro-organisms, which seem to find in them a healthy nidus for development. In the choleraic form of the disease, most frequently met with in warm climates, it seems not improbable that the starting-point of the disease is essentially septic, and antiseptic treatment is found of signal value. The drugs of this class most useful are salicylate of soda in two or three grain doses every three hours. Salicylate of iron, given in the following way, as recommended by Dr. Braithwaite, is often useful :—

R Sodæ salicylatis, ferri sulphatis āā gr. xij, glycerini
℥ss, aquam ad ℥ij.—Sig. 3i ter quaterve die.

Salol in doses of from one-half to one grain, given every four hours, has, in my hands, been frequently successful. Resorcin, in doses of from two to four grains, is highly recommended by many physicians. Salicylic acid in two or three grain doses, along with simple syrup in an aromatic water, is also a favourite remedy of this class.

Intestinal irrigation is a method of treatment lately in vogue, particularly on the Continent. Baginsky and Monti both speak highly in its favour. From some experience now of irrigation I can confidently recommend its adoption as a useful means, therapeutically, of treating intestinal catarrh. The method is to irrigate the bowel slowly every day with warm water alone, or with a three per cent. solution of chloride of sodium. The child's pelvis should be raised and the tube passed well up into the bowel, the cistern being then raised

and the fluid allowed to flow in. I have found, in some cases, a solution of boracic acid to be of service. Other non-irritating antiseptic solutions have also been tried, according to the exigencies of the case. There is a great tendency to chronicity in all these cases of intestinal catarrh, and the treatment in consequence must be altered, as the disease tends to run on indefinitely. Iron, nux vomica, oxide of zinc, and in some cases small doses of arsenic, are very serviceable. Iron may be given in the form of sulphate or perchloride, or a few drops of the liquor hydrarg. perchlor., combined with tinct. ferri perchlor., as follows, may be tried:—

R Liq. ferri perchlor. ℥ij, liq. hydrarg. perchlor. ℥iss, syrupi aurantii ℥ss, aquam ad ℥ij.—Sig. 3i ter die post cibum.

Sulphate of iron is best given with a little glycerine and mucilag. acaciæ, in dose of from one-half to two grains. Oxide of zinc has long been a favourite remedy in the Edinburgh Hospital, having been first introduced by Dr. Brackenridge. It is best given in the following way:—

R Zinci oxidi gr. xvi, mucilag. acaciæ ℥ss, aq. cinnamomi ad ℥ij—Misce.—Sig. 3i ter die.

When this remedy fails alone, I find the addition of three or four drops of tincture of nux vomica to each dose is of great value. This combination has, in my hands, been more useful than any other in many cases.

CHAPTER XXV.

GASTRO-INTESTINAL DISORDERS—*continued.*

GASTRO-ENTERITIS.

UNDER this head I desire to refer to inflammatory conditions of the bowels, other than those treated under intestinal catarrh, of a more serious nature, and often accompanied by ulceration and hæmorrhage. In the more severe and protracted forms of intestinal catarrh ulceration may take place; the ulcers are sometimes termed catarrhal or follicular, the former resulting from a denudation of the epithelium, followed by simple superficial ulceration, as met with in stomatitis. Follicular ulcers are formed by breaking down of the follicular mucous coating from over-distension or suppuration. The ulcer is generally seen on the surface of the follicle, often over the Peyerian patches. In the large intestine, most commonly in the descending colon, often in the cæcum, similar simple ulcerations are met with. These ulcerations may be confounded with, and must be distinguished from, typhoid ulcerations. A careful consideration of the general features of the case, as well as the special characteristics and site of the ulceration, are generally sufficient to decide the question. *Typhoid* ulcers are chiefly confined to the lymphadenoid tissue of the Peyerian patches, which are involved to a much greater extent than in simple catarrhal ulceration, and there are generally a number of enlarged glands in the ileum, down to the ileo-cæcal valve, where there is usually more or less ragged ulceration. In the *catarrhal*

ulcers the solitary glands are most affected, and the lesions more irregularly distributed; the ulceration is generally most marked in the large intestine, and not in the ileum, as is the case in typhoid. As in typhoid, the mesenteric glands are generally enlarged, but not to so great an extent. Catarrhal ulcers are generally from one-tenth to a quarter of an inch in diameter, and, when present in large numbers, give the surface a punched-like appearance. Numerous ulcers often coalesce, forming a larger surface, sometimes of an inch in diameter. The ulceration, although usually superficial, may extend into the muscular coat, and even go on to perforation. When the ulcers heal, the mucous surface often presents a puckered appearance, with more or less pigmentary deposit. *Tubercular ulceration* of the intestine is frequently met with in children, and its distinguishing characters may be contrasted with the forms already mentioned. These ulcers are also met with very frequently in the solitary and agminated Peyerian patches at the lower end of the ileum, and down to the ileo-cæcal valve. They vary in size, sometimes attain large dimensions, extending to nearly the entire diameter of the bowels; the margins of the ulcer are raised and thickened and irregular, and not so undermined as the typhoid ulcer. The floor of the ulcer is irregular and often nodulated, contrasting with the smooth surface of the typhoid ulcer. Woodhead thus describes the difference in the microscopical appearance between the typhoid and tubercular ulcer:—The typhoid, “a specific inflammation of the adenoid tissue, blood-vessels distended. Dense masses of small round cells, with some larger multi-nucleated cells, the latter of which are derived directly from the endothelial cells.” On the other hand, the tubercular ulcer presents “vascularity of the mucosa and submucosa, increase of connective tissue corpuscles, lymphoid corpuscles and tubercle masses, typical or caseating. It commences in the mucous membrane, and is due to direct contagion or infection.” In typhoid the mesenteric glands are enlarged and simply

hyperplastic ; in tubercular ulceration they are caseating and tubercular.

Dysenteric Disease, though comparatively rare in Great Britain, is frequent in warmer climates, in malarial districts, or badly-drained cities. Tropical dysentery is a specific disease, and bears the same pathology and clinical features in children as in adults. The form of dysentery met with in this country sometimes develops out of an intestinal catarrh. When in a chronic intestinal catarrh the evacuations are very frequent, and accompanied by tenesmus, with the passage of mucous and small quantities of blood, with little or no fæcal matter, we are fairly entitled to describe the condition as of a dysenteric nature. The disease may be of an acute character, terminating within a week, or may run on for a much longer period, and become chronic. In acute cases the febrile movement may be moderate or absent ; there is generally tenderness of the belly and some distension, with thirst and anorexia. The child is generally weaker than in ordinary intestinal catarrh, and in some cases may become collapsed and drowsy, with low temperature. In acute cases of a severe character the local lesion generally assumes a diphtheritic character, with extensive sloughing of the mucous surface, and is commonly fatal.

SYMPTOMS attendant on ulceration of the bowels are not always well marked. Hæmorrhage is the only sign pointing directly to ulceration. Diarrhœa is almost invariably present and persistent, although sometimes it may be absent, thus masking the true nature of the case. Abdominal pain, often of a colicky and non-persistent character, is sometimes a prominent symptom, but may be altogether absent. There is often little or no pain, only slight tenderness on deep pressure. Tympanitic distension, sometimes localised in character, is generally present during the progress of the case, and is commonly met with during an attack of hæmorrhage. The character of the stools varies when constipation is present ; they are often costive and hard,

although generally pale in colour. When diarrhoea exists they may become pale and yellow, highly offensive, and mixed with glairy mucus. Sometimes they are of a darker colour and more watery, containing solid shreds of mucus and small scybala, with a little blood. In a boy aged nine, lately under my care in the Children's Hospital for several months, the stools presented during the progress of the case almost every variation from a natural, well-formed evacuation. The case was instructive in many ways, and was complicated during its progress with peritonitis, a large abscess forming in the left iliac region, which was opened antiseptically and drained, and healed up within three weeks. Peritonitis is not a common complication in these cases, but now and again occurs. The general symptoms and condition of the child vary according to the nature of the case, its duration, and the amount of diarrhoea present, and the state of the gastric digestion. When the ingestion of a fair amount of nourishment is permitted by the stomach, and there is no diarrhoea, the standard of nutrition may be fairly maintained. On the other hand, when obverse conditions obtain, and the ulceration is of a tubercular nature, the general nutrition suffers, and emaciation is often extreme.

DIAGNOSIS generally rests between simple ulceration and the tubercular variety. When the attack succeeds an ordinary intestinal catarrh in a young child, the general nutrition not much interfered with, the temperature maintaining a normal range, and there are no signs of lung disease or affection of other organs, and the duration of the symptoms moderate, and the effects of treatment manifestly satisfactory, a hopeful diagnosis and favourable prognosis is warranted. On the other hand, when the symptoms are more persistent, the child rapidly losing flesh, and lung symptoms are present, with variable temperature, tubercular disease may be suspected. In these cases we often have local indications of chronic peritonitis or enlarged mesenteric glands as a complication.

TREATMENT requires great care and discrimination. The

child must be kept in bed in a room the temperature maintained a little above the mean, a light flannel night-dress should be worn, a flannel bandage kept loosely round the belly, with or without a layer of cotton-wool. When hæmorrhage comes on, an ice-bag to the abdomen will often do good. The diet should be regulated strictly according to the digestive power of the child, and given in small quantities at suitable intervals. Care should be taken to avoid those articles of food liable to give rise to flatulence and intestinal indigestion. The digestive power of children in these cases varies greatly, and is often diminished to a minimum, especially when there is present, to any extent, gastro-intestinal catarrh. In these cases all farinaceous food and milk *per se* are contra-indicated. In many cases milk cannot be tolerated even in admixture with other foods. The most suitable diet generally consists of raw eggs, the yolk being more easily digested than the white, chicken or veal tea, with thin barley decoction, pounded raw meat finely divided. Malted farinas in limited quantities, such as Mellin's food, with barley water or chicken tea or whey, are often well borne. Wine whey or brandy-and-egg mixture are generally of much service. It is in such cases that the value of artificially pre-digested foods is so manifested. Peptonoids, peptonised jellies, and beef-tea are most useful. I have seen cases of enteritis kept alive by such preparations where ordinary foods could not be tolerated. Milk, when peptonised, is also sometimes digested, but even thus prepared requires cautious use. The medicinal treatment must be suited according to the special needs of the case. Opium is almost invariably required, and of all medicines is probably the most useful. The amount and frequency of the dose should be regulated according to the degree of intestinal irritation and tendency to diarrhœa. It may be given alone, or combined with vegetable astringents, such as kino or hæmatoxylon. Acetate of lead is also useful, combined with suitable doses of acetate of morphia. Nitrate of silver is admitted by almost all physicians to be a most valuable remedy

in these cases. In my hands it has succeeded when all other drugs have failed. It may be given in doses of from one-sixth to one-quarter grain, along with one or two drops of laudanum in water with glycerine, or may be used in the form of enema in ulceration of the colon. When the case is progressing favourably, and there is evidence that inflammatory action is abating and the ulcers are healing, nux vomica, with small doses of quinine or liq. extract of cinchona, are indicated. Later on tr. of the perchloride or pernitrate of iron may be given.

CONSTIPATION.

Constipation is a condition common to children as to adults. The causes are very various, and it is only by a correct appreciation of these that the physician can successfully deal with such cases. It must be remembered, as pointed out by Jacobi of New York, that in the infant certain anatomical peculiarities of the bowel exist which may predispose to constipation. The large intestine, from the descending colon down to the sigmoid flexure, is relatively longer than it is in the adult, and presents many more flexures and folds. The larger surface thus present probably renders absorption of fluids more complete, and the fæces more solid, and there is a greater tendency or liability to retardation of the intestinal contents in their downward progress.

CAUSATION.—Constipation may be due to diseased conditions of the bowel of an organic nature, and is therefore often *secondary*. Thus we may find intussusception, hernial twists of the bowel, fæcal or other accumulations, obstruction by worms (Lewis Smith, *Diseases of Children*), abscesses or tumours outside the bowel, peritonitis, congenital malformations of rectum or other parts of the bowel, such as sigmoid flexure (Dr. Smith, *Trans. Path. Soc. Lond.*, 1870). In ulceration of the bowel of a tubercular nature, constipation is sometimes met with. A boy, at present under my care in the Sick Children's Hospital, was treated for two months after admission for diarrhoea, with

recurrent hæmorrhage in large quantity, probably due to tubercular ulceration. The diarrhœa has ceased for the last month, and obstinate constipation is now present, requiring the use of enemata. In typhoid fever constipation is frequently as troublesome as diarrhœa. Fissures about the anus are probably the simplest organic condition causing constipation, by producing spasm of the sphincter ani, resulting from reflex irritation and pain during defæcation. In these cases the child suffers great pain during the act, and naturally dreads the action of the bowels. The fæces, although generally solid and natural, show small streaks of blood.

It is, however, to the *primary, functional*, or so-called *idiopathic* constipation that we must direct our attention. As in adults, so in children, there is a habit, some persons being naturally more constipated than others. During infancy, after the first month, the stools average three to four in the twenty-four hours. In childhood the evacuations are less numerous, gradually assuming the adult average of one or two a day. In breast babies constipation is less frequent than in hand-fed infants, and, when present, may generally be referred to some peculiarity on the part of the mother's milk. In bottle babies the feeding is almost invariably at fault. Cow's milk especially, if not sufficiently diluted, from the excessive quantity of caseine it contains, is a fruitful cause of constipation, particularly if too much lime water and too little sugar is added. Sugar has a valuable aperient effect in infants. It is generally noticed that babies fed on sweet condensed milk are less troubled with constipation than those reared on ordinary cow's milk. Farinaceous foods are well known to have a constipating effect, very much in proportion to the amount of contained starch. Dryness of the mucous secretions, from whatever cause, induces constipation. Children who habitually pass a large quantity of urine, or who perspire freely, are often thus affected. In acute febrile affections, and occasionally in catarrhal conditions of the bowels, the secretions are often diminished. All cases

of debility may be associated with constipation, and in connection with this there may be atony of the muscular coat of the bowel.

SYMPTOMS.—Sometimes children suffering from constipation present few or no symptoms, at other times the condition gives rise to obvious inconvenience and distress. The child often looks pallid and pasty, and is restless both during sleep and waking; the belly is generally full, often tympanitic; recurrent attacks of screaming from colic may be present, and this often accompanied by tenesmus. Pseudo-diarrhœa may be present—that is to say, there may be frequent loose or watery evacuations, generally small in quantity, the bowels never being emptied, and retaining most of their solid contents. In children so disposed, convulsions or night terrors may result from constipation.

TREATMENT.—In all cases careful diagnosis is necessary, and an examination of the rectum with the finger should not be omitted, as, if no other cause can otherwise be detected, we can at all events ascertain the condition of the mucous and muscular coats of the lower bowel. The general health and hygienic surroundings of the child should be attended to. Proper clothing, regular ablutions, and above all regularity in habit, should be inculcated. The very youngest infant can be taught as easily as an adult to make an effort to evacuate the bowels at stated periods. A good nurse always attends to this, as well for her own convenience as the comfort of the child. All nature's operations are conducted with regularity, and defæcation is no exception to the rule. The next point requiring attention is generally the feeding. A change of diet is often all that is necessary to attain the desired end. If the child is taking milk it may require dilution, or the addition of groat or barley gruel or sugar. Mellin's food, or lactoglycose, is one of the most useful additions to the milk I know of in habitual constipation. Infants are fond of a drink of water, and this often has an admirable effect. In children the diet should be altered and varied, soups are useful, farinaceous

food should be limited, a little fresh vegetable or fruit should be tried. Extract of malt given with meals may be of service. In infants, the fluid extract of malt, as prepared by Duncan, Flockhart, & Co. of Edinburgh, and given in teaspoonful or half-teaspoonful doses, once or twice a day after feeding, is often effectual. Simple enemata of warm water or thin gruel may be used occasionally. The addition of a little glycerine is often useful, either by itself or added to the water, or given by the mouth. Soap suppositories are a homely and useful means of securing evacuation of the bowels. Glycerine suppositories are a more elegant form, now in use. Medicines should be avoided if possible, but yet are often useful and necessary. They should be of the simplest kind. Calcined magnesia, or rhubarb and soda, or in bottle babies liq. magnesiæ carbonatis, added in tablespoonful doses to the bottle. Castor-oil is always a safe remedy. In cases where there is a catarrhal condition of the gastro-intestinal surface, and along with this you generally have pale and pasty stools, deficient in bile, saline medicines are indicated, such as Victoria water, and often along with them it is advisable to give a grain or half a grain of euonymin occasionally at night. A few drops of tinct. of podophyllin may be used, if preferred. Cascara is useful in older children as in adults. I have not found it so suitable in infants. An alkaline and bitter tonic mixture—as bicarb. of potass. and gentian—is often very useful, especially when combined with small doses of nux vomica. Trousseau recommends belladonna as a most effectual remedy in constipation, and in my experience it is useful in well-selected cases. Massage, and rubbing of the belly with olive-oil or soap liniment shortly before the natural time of evacuation, is often very efficacious. Massage over the gall bladder is often of service in acholic conditions of the stools. In very obstinate cases electricity may be tried. The galvanic current is the most useful. Jacobi says “local contractions result from the negative or kathodal opening, and peristaltic waves from the positive or anodal. For the relief

of obstinate constipation, the former ought to be applied in the rectum, the latter over the abdomen, along the colon."

DIARRHŒA.

Diarrhœa, as a symptom, is common in children. Stools too frequent and unnatural in character constitute this condition. The younger the child the greater is the liability to looseness of the bowels from trivial causes. We have already alluded to the frequency of this condition as an accompaniment of the process of dentition. The causes inducing disordered function in the bowels operate with greater effect at this period than any other. The ordinary and by far the most frequent cause, however, of diarrhœa is improper feeding, either as regards quality, quantity, or too frequent or irregular ingestion. Chills from deficient clothing, or undue exposure of the child, are a fruitful cause in sensitive children. Ordinary simple diarrhœa, lasting a few days, is doubtless due to slight catarrhal irritation; and in these cases, when an opportunity has afforded itself, death having occurred from some internal affection, no change in the mucous surface is observed. The character of the stools at first is loose and feculent, with undigested food, followed by watery evacuations, with absence partially or entirely of feculent material. Green motions are often passed, or the stools turn green soon after evacuation from oxidation, converting the biliary constituents into biliverdin. The first signs of improvement are noticed in the diminution of the mucous and watery ingredients and a reappearance of feculent matter. The longer the diarrhœa continues the greater the tendency to the establishment of a more severe form of intestinal catarrh. Sometimes the looseness assumes the so-called lenteric form, the bowels moving as soon as food is taken, and the ingesta passing away unaltered in the fæces. The milder forms of intestinal irritation are generally unaccompanied by pyrexia to any extent, the more prominent symptoms being fretfulness, griping

pains, nausea or vomiting; the tongue is generally slightly furred.

TREATMENT is mainly etiological. In the simplest cases, resulting from cold, the child should be kept carefully warm, and the skin induced to act if there is any febrile reaction. The belly should be encased in soft flannel, a warm bath given occasionally; the food should be given in smaller quantities than usual, not to tax the temporarily weakened digestion. Medicine may not be required, if the attack passes off in a few hours. A few grains of bicarbonate of soda or precipitated chalk in a drachm of aq. chloroformi will often be sufficient to subdue irritation. This should be given every two or three hours. When the feeding is faulty the diet must be regulated, both as regards quality and frequency of ingestion, according to the rules laid down for feeding in gastro-intestinal affections. It will generally be advisable to give either an emetic dose of ipecacuanha, or an aperient of castor-oil or rhubarb of soda, to rid the tube of offending material. If, after this, diarrhœa continues, sedative and antacid remedies are indicated. The pulv. cretæ aromat. c. opio, or the simple pulv. cret. aromat., in suitable dose according to the child's age, may be tried; or the following mixture:—

℞ Sp. ammon. arom. ℥xxiv, liq. morph. hydrochlor. ℥xiiij, aq. anethi ad ℥i.—℥i every four to six hours, according to necessity; or a powder containing

Carbonate of bismuth gr. ij, bicarb. of soda gr. iij—misce; given every two or three hours. Liquid ext. belæ ℥xx in one drachm of mist. cretâ, with two or three minims of sp. chloroformi to each dose, is another useful prescription. In persistent cases, oxide of zinc in gr. i doses, with or without tinct. of nux vomica in ℥ij doses, should be tried, especially in lenteric cases. Dr. Eustace Smith has found small doses of liq. arsenicalis also useful.

CHAPTER XXVI.

INTESTINAL OBSTRUCTION.

OBSTRUCTION of the bowels in children may be congenital or acquired, acute or chronic.

Congenital Obstruction is due to malformation of some portion of the intestinal tube. The rectum and anus are the most frequent sites of such conditions. The anus may be imperforate, or nearly so; sometimes the opening admits the point of a probe, which enters a blind *cul de sac* higher up. An interesting case is related by Dr. Wm. Craig,¹ in which no anal opening was found at the natural site, but the rectum opened into the membranous part of the urethra, fæces being discharged through the penis. The child lived eighteen days. More rarely congenital malformation exists higher up in the bowel, most frequently at the sigmoid flexure of the colon, or lower part of the ileum. A case of stricture of the duodenum is related by Pollock,² vomiting began soon after birth, and the infant only survived a short time. The stricture only admitted a small probe.

Acquired Obstruction may be either acute or chronic.

In *chronic cases*, the most frequent causes are fæcal accumulations, compression of some portion of the intestine from abdominal tumours, contraction of the bowel from ulceration, tubercular or otherwise. Herniæ of various kinds must be borne in mind in enumerating causes, but a consideration of these does not fall within our province.

¹ *Ed. Med.-Chir. Trans.* vol. iii., 1883-84.

² *Lond. Path. Trans.* vol. xii.

Acute obstructions are by far the most common varieties demanding our attention. Of these, almost all the causes obtaining in the adult may be met with, although some more rarely in the child. Thus impactions from foreign bodies of various kinds, twists of the bowel, strangulation by false membranes or fibrous bands, which are often met with in chronic peritonitis (cicatrising), etc., may occur. The most frequent condition, and the one demanding special attention, is intussusception or invagination, slipping of a portion of gut, almost invariably the upper part into the lower portion. This accident is one of the most serious and dangerous to which children are liable. As is well known, old persons and children are more frequently attacked than people of middle age. In one year in England intussusception caused the death of 295 people—165 being males, 130 females; seventy of this number were children under five, 111 were individuals above the age of fifty-five. In making post mortem examinations of children who have died from various causes, a simple intussusception is often found. This may have given rise to no symptoms during life, and in most cases it is believed the accident has happened *in articulo mortis*. Ordinary intussusception generally occurs in young children or infants, otherwise in comparative health, or who have been suffering from functional derangement of the bowels. Occasionally, as noted by Brinton, in cases of simple polypus, intussusception may be met with as a direct result of the presence of the growth, which, giving rise to muscular efforts to procure its expulsion, forces the upper portion of the gut containing the tumour into the part immediately below. The mechanism of intussusception is determined essentially by deranged muscular and peristaltic action. There can be no doubt spontaneous reduction of the invagination occurs sometimes. A boy aged five was lately under my care, who was attacked with obstruction of the bowels. He was suddenly seized with pain and vomiting. The lower bowel emptied itself by two evacuations, and thereafter obstinate constipation set in. The

belly became tense, slightly swollen, and tender over the cæcum, where an indistinct fulness could be made out. Injections failed to give relief. The pain was subdued by opium and belladonna, and on the fourth day suddenly the symptoms became relieved, and flatus passed the day following, and, after a small warm-water injection, a copious fæcal evacuation was procured. All the symptoms pointed to obstruction at the cæcum. In most cases, however, such a favourable result does not happen, and congestion and swelling of the constricted portions takes place, localised peritonitis being set up, gluing the adjacent surfaces of the bowel together. At first, obstruction may not be complete, and some time may elapse before inflammatory action takes place. Another and less frequent spontaneous cure may be brought about by the constricted and inflamed portion of gut becoming gangrenous, and separation taking place, the slough being expelled per anum. The site of intussusception may be (1) in the region of the ileo-cæcal valve, and ninety per cent. of all the cases met with in children occur in this situation, the ileum being invaginated into the cæcum and sometimes forced down through the large intestine into the rectum. A case of this kind lately occurred in the practice of a medical man, with whom I saw the patient, a child eighteen months old. On making a rectal examination, a tumour was felt, which, on withdrawing the finger, passed with great straining through the anus. On post mortem examination the presenting portion of the gut was found to be the lower end of the ileum. The other sites in which invagination may occur are (2) the small intestine; (3) the small intestine may pass into the cæcum (ilio cæcal); (4) the colon itself may become invaginated.

ETIOLOGY.—Of thirty-four cases noted by Lewis Smith, exactly one-half of the children were found to be in good health previous to the attack. Of those under one year fifteen were in good health. Of those above one year only two were previously in good health. Of twenty-five cases

recorded by Rilliet and Barthez, all were found in ordinary health. Among the most common predisposing causes are diarrhoea or constipation, or the presence of intestinal worms. As already stated, in rare cases a polypus may act as a predisposing cause. The ingestion of irritating articles of food, producing colic, is an undoubted cause in some cases. Strong purgatives have been known to produce invagination, by inducing violent peristaltic action and straining. In some cases a fright or a fall has preceded the accident.

SYMPTOMS.—These are generally well marked and characteristic, and can hardly be mistaken by any intelligent physician. The child is suddenly attacked with *pain*—often takes a violent screaming fit. The bowels generally move within a short time, and thereafter the child strains at intervals, and sooner or later blood and mucus is passed per rectum. *Vomiting* comes on, and recurs at intervals, generally in proportion to the amount of food given. *Constipation*, *vomiting*, recurrent attacks of *colic* and *straining*, with the passage of *blood*, are therefore the characteristic symptoms. In addition, the child's countenance is anxious, and the features pinched; and, as time goes on, it presents a more or less collapsed appearance. The tongue is generally coated; the pulse somewhat frequent; the temperature normal, or elevated after peritonitis sets in. During the collapsed state it is often subnormal. The next sign is the condition of the abdomen, and the presence of *a tumour*, which, when it can be made out, adds corroborative evidence to the diagnosis. In some cases, especially in young infants, there may not be much abdominal distension; in older children it is more frequent. When there is much distension and tenderness, it is often difficult to make out the tumour, unless chloroform be administered. The site of the tumour varies according to the situation of the invagination. It is generally felt in one or other iliac region.

TREATMENT.—The indication is to procure, by any possible means, the reposition of the invaginated portion of bowel.

The importance of early and accurate diagnosis is evident. Frequently the physician is not called in until the patient has been treated by the mother, with a view to relieve the constipation. In most cases purgatives have been administered, which only tend to aggravate all the symptoms. Purgatives are distinctly contra-indicated in such cases, and only such drugs should be administered as tend to relieve pain and relax the muscular coats of the intestine. Opium must be given in doses proportionate to the age of the child. For a child two years old, one to two minims of *tr. opii*, with five or six of the *succus belladonnæ*, may be given every four or five hours, the effect being carefully watched. Opium and belladonna, so far as drugs are concerned, are our sheet-anchors, and the only medicines likely to do good. The administration of chloroform is also useful, not only as means of ascertaining the site of obstruction, but in allowing of suitable manipulation in the shape of careful massage, with a view to procure reduction by inverse peristaltic action. This can only be effected when the belly is very lax. Should it fail while the patient is still under the influence of the anæsthetic, injections should be tried, either of warm water, or insufflation by the bellows, or with carbonic acid, by means of aerated water. When the injection of warm water is determined on, the child should be laid on its face or nearly so, with the hips raised, the belly being supported on a soft pillow; the tube, which should be a soft elastic one, is introduced as far into the bowel as possible without using force; the water may be either injected from a Higginson's or a Davidson's syringe, attached by a piece of tubing to the rectal tube, or a longer india-rubber tube may be attached to it, and the water poured in through a filler from a height. Careful and gentle manipulation of the belly may be made during the injection.

Insufflation is accomplished by means of bellows, and must be done cautiously and without much force. When gaseous injections are used, a ready means is at hand by using a siphon of simple aerated water, an india-rubber tube

being fitted on to the end of the siphon, which is held a few feet above the patient, and the tap opened. In my experience water injections are both safer and more efficacious than insufflation, but cases are recorded where the latter has succeeded when the former failed. In using injections, the pressure must be carefully regulated, otherwise rupture of the coats of intestine may occur, and fatal peritonitis ensue. Cases of this kind are recorded by Bryant. From experiments on the cadaver of infants, it has been found that a pressure of eight to nine pounds to the square inch is the limit that can be borne without rupture. In using the injection, when the reservoir is raised to the height of two and a half feet, a pressure of one pound on the square inch is obtained, and the pressure should be regulated proportionately on this principle, and should be kept up for half-an-hour to one hour, gentle manipulation of the abdomen being used meantime. In using gaseous inflation great caution is necessary; the water should be allowed to escape in small quantities at intervals. Every cubic inch of water represents about four cubic inches of gas in a well-charged siphon. Should injection and other means fail, the propriety of laparotomy or enterotomy must be considered. The earlier the operation is performed, after other means have failed, the better. If it be delayed until the child is collapsed and inflammation has set in, the chances of recovery are small. It is not possible to fix an exact time when the operation should be done, but, as a rule, at the end of from thirty-six to forty-eight hours, if other means fail, the surgeon should be called. When laparotomy is inapplicable, the bowel being gangrenous or incapable of reduction, Nelaton's operation should be performed, and an artificial anus established.

CHAPTER XXVII.

DISEASES OF THE LIVER.

THE liver in the child is functionally very active, and is correspondingly liable to temporary derangement. In infants and younger children the organ is probably proportionately somewhat larger than in the adult. Normally, it is easily felt below the costal margins in the right hypochondrium.

FUNCTIONAL DERANGEMENT AND CONGESTION.—In all gastrointestinal disorders the liver is liable to be deranged as regards its secretory function, most frequently in the way of diminished or altered secretion, as evidenced by the pale or otherwise abnormal colour of the excretions. Improper feeding, whether as regards quality or quantity, often has a similar effect, and may produce active congestion with furred tongue, slight febrile movement, loose motions with disordered bile, high-coloured urine with lithic deposits. In some children a chill is sufficient to produce all the symptoms of biliary congestion. Malaria in warm climates often causes hepatic as well as splenic congestion of an active character.

PASSIVE CONGESTIONS are common in children, as in adults, in connection with cardiac or pulmonary disease, and may be accompanied by ascites, and dropsy of the lower limbs. In hepatic congestion, whether active or passive, jaundice is infrequent, although the complexion is often sallow.

Treatment.—The cause must first be ascertained. Should excessive feeding or other error in diet be detected, the child ought to be put upon milk diet, light soups, or gruel, and if feverish, be kept in bed in a cool, well-ventilated room. An

emetic of ipecacuanha is generally serviceable, followed by a purge of hydrarg. c. cretâ and rhubarb, or calomel and jalap. The child should be sponged over frequently with tepid water and vinegar. If feverish, diluent drinks should be given, with saline diaphoretics, such as citrate of potash or liq. ammon. acetatis. When the child is able to walk about, moderate open air exercise should be advised, and an alkaline bitter tonic mixture prescribed, such as bicarb. of potass. with gentian or calumbæ, to which a few drops of liq. extract of cascara is added in each dose. Suitable hygienic and dietetic rules should be laid down for the future, to prevent a recurrence of similar attacks. In chronic congestions, due to visceral disease, purgatives are of service; and, along with this, treatment must be directed to the organ at fault, whether lungs or heart; in the latter case, digitalis is generally indicated. Most of the organic affections of the liver seen in adults are met with in children, and present essentially the same pathological and clinical features.

SCLEROSIS (*Cirrhosis*).—The causes of this disease in children are not so readily traceable as in the adult. Constitutional syphilis sometimes appears to predispose to it, so also chronic lung disease. Disease of the bile-ducts of an obstructive nature, whether from congenital causes or syphilis, is often followed by fibroid changes in the organ. Common sclerosis of the liver is thus described by Woodhead. The organ is “diminished in size, anæmic, firm to the touch, and its consistence may be compared to that of a piece of soaked leather.” The surface is irregular, from elevations and depression. On section, the tissue is firm and tough; greyish red, gelatinous-looking bands are seen running through the substance of the organ. The fibrous bands near the surface are continuous with the deeper thickened layer of the capsule. The changes essentially consist of an increased growth of the fibrous tissue of the organ, along with a corresponding atrophy of the proper cellular elements of the gland.

BILIARY OR MONOLOBULAR SCLEROSIS.—In this condition the

organ is enlarged, "the capsule is purely granular, the substance of the liver hard and frequently brittle. On section, the substance is often bile-stained. It is difficult to make out when the fibrous tissue ends and the liver substance begins." The capsule in this disease is not thickened, but the fibro-cellular tissue in the inter-lobular spaces shows considerable increase, which is really the chief characteristic of the disease, whence it has been called interlobular cirrhosis. The increase of fibro-cellular elements takes place around the ducts, and not in connection with the branches of the portal vein, as in common cirrhosis.

Symptoms.—In *common or multilobular sclerosis* we have the same train of symptoms as in the adult; jaundice is rarely present, if so, only in a very slight degree. Progressive diminution in size of the organ, hypertrophy of the spleen, ascites, and dropsy of the lower limbs, emaciation, pallor of the face, and dilated superficial abdominal veins; hæmorrhoids are sometimes present, but not so frequently as in the adult. Vomiting, with discharge of blood from the stomach, at intervals, is also a more or less constant symptom. Febrile movement is absent. In *monolobular or biliary sclerosis* the organ is normal in size or enlarged, the evidences of portal obstruction are less marked. Ascites is generally absent, or very limited in extent; jaundice is commonly present; and, accompanying it, symptoms of gastro-duodenal catarrh, furred tongue, nausea, disinclination for food, light-coloured stools, and constipation, sometimes more or less diarrhœa.

Treatment.—The diet should be suited to the digestive power, and aided, if need be, by pepsine, lactopeptine, or other adjuncts. Fats and starchy substances should be avoided. Milk, eggs, and white meats, mutton or beef deprived of fat occasionally, if digested—all being finely divided—should be given in small quantities at suitable intervals. The action of skin, kidneys, and bowels should be stimulated or maintained by tepid sponging, diluent drinks, and purgatives. Dyspeptic

symptoms should be controlled by alkalies with rhubarb, and the addition of small doses of nux vomica is often useful. Small doses of euonymin, followed by Hunyadi or Victoria waters, are often useful. Hæmatemesis must be restrained by limiting the nourishment to skimmed milk with ice, while ext. ergot. liquid. is administered in suitable doses. Small doses of opium are also generally indicated. Ascites should be treated by saline laxatives, caffeine, or infus. scoparii. Paracentesis is required when the distension is great and much physical inconvenience experienced. In all cases the abdomen should be encased in light flannel with cotton-wool.

AMYLOID LIVER is essentially the same disease as met with in the adult, and therefore does not merit very special description. It is a secondary affection, occurring during the progress or a sequel of chronic lung disease, such as phthisis, fibroid degeneration, purulent pleuritis, chronic hip disease with exhausting discharge, or syphilis.

Symptoms.—The organ in uncomplicated waxy disease is enlarged, painless, jaundice or ascites generally absent, although not invariably so. Mesenteric glands often enlarged; lymph glands in the hepatic notch, when enlarged, may compress the ducts and cause jaundice. Enlargement of spleen is usually present. Indications of waxy disease of the kidneys, such as albuminuria, increased quantity of secretion of pale colour, and low specific gravity. Signs of intestinal disease, such as diarrhœa. Albuminuria is often present, without any organic change in the kidney, being simply the result of imperfect functional power of the liver. The child is feeble and languid, and generally suffers more or less from dyspeptic symptoms with occasional vomiting, and is almost always anæmic.

Treatment must first be directed to the cure or relief of the primary disease. The diet should be as nourishing as the digestive powers will permit. General hygienic measures are of great importance—suitable warmth of the apartment and free ventilation; flannel night-dress should always be worn. In

summer the child should be taken out to the open air in a perambulator, if possible. Medicinal treatment should be essentially tonic; the various preparations of iron, but especially the iodide, are of most service. Cod-liver oil does good, if the stomach permits its administration. Ammonium chloride or sodium iodide, in bitter infusion, are often beneficial, especially in syphilitic cases. Strong purgatives should be studiously avoided.

FATTY LIVER may occur as simple infiltration or true fatty degeneration.

Infiltration is often associated with the normal process of digestion to a limited extent. When excessive, it must be considered a diseased condition. It is liable to occur from the ingestion of excessive quantities of hydro-carbon element in the food, accompanied by defective assimilation. It is also met with in phthisis and other wasting diseases. The organ is enlarged, pale, and friable, and on section presents a yellow, mottled appearance.

Symptoms are seldom well marked. There is usually some digestive derangement, but no jaundice nor ascites.

Treatment must be directed to the primary disease, if present. If due to dietetic errors, the feeding should be altered, and regulated according to the principles laid down elsewhere, suited to the age of the child.

FATTY DEGENERATION occurs under similar conditions, which predispose to amyloid diseases, chronic wasting diseases, specially phthisis pulmonalis, or anæmia. It may also develop out of the condition of "cloudy swelling," so common as a result of acute febrile affections. The organ is either normal in size or atrophied. On section it is pale and friable, and on microscopic examination the peripheræ of the lobules show well-marked fatty change, with atrophy of the liver cells.

Treatment must be directed to the primary disease and on general principles.

HYDATID DISEASE OF LIVER may be met with in children as in adults, due to like causes and accompanied by similar

clinical features. It is due to the lodgment of the embryos of the *tænia echinococcus*. The liver is the most common site for hydatids in the child, next the lung, less frequently the kidney or brain.

Symptoms and Course.—The disease is usually attended with no constitutional disturbance nor pain, unless inflammation takes place in the sac, or pressure on adjacent parts gives rise to special symptoms. Dyspeptic symptoms may be present, but they are not necessarily characteristic of the disease. When the cyst is situated deeply in the liver substance, no symptoms are present, except some degree of enlargement of the organ. When the tumour is situated near the hylus of the liver, jaundice or ascites may result from pressure. The enlargement of the liver may be partial or general. When the tumour projects anteriorly, it can be felt as a soft, elastic, or fluctuating mass; sharp percussion over it may elicit a vibrating sensation (*frémissement hydatique*). The disease may continue for months or years, without any disorder of the general health, or disturbance of the functions of adjoining organs, unless from mechanical pressure. Absence of pain or fever distinguishes these tumours from abscess of the liver. The physical character of the swelling and the absence of constitutional depravity differentiates it from malignant disease. Tumours of the gall bladder from gall stones, or otherwise, are almost unknown in the child, and therefore hardly require consideration from a diagnostic point of view. The disease may terminate in a variety of ways. Sometimes atrophy or fatty degeneration of the mass induces spontaneous cure. Inflammation and abscess may result, causing the usual acute symptoms due to such a condition. The cyst may rupture into the stomach, intestines, or peritoneum, or into the lung or pleura. Rarely, a communication has been established with the pericardium, or vena cava. Pyæmia may be the result of inflammatory action set up by the local irritation.

Treatment.—The intestine of the dog being the natural

habitat of the *tænia*, prophylactic measures should be adopted, by preventing contamination of food or water with the excrement of these animals. This is very necessary in such countries as Iceland, where the disease is common. Uncooked vegetables, cabbage, or lettuce, should be avoided. Drinking water should be boiled. It need hardly be said that medicinal treatment is valueless in this disease. The methods of treatment at present in vogue are aspiration simply, or the injection of fluids inimical to the growth of the parasite, such as tincture of iodine, extract of male fern, or antiseptic solutions, such as permanganate of potash. Electrolysis is the most recent method of treatment which has been adopted, and the results have in many cases been satisfactory. Simple aspiration is often sufficient to effect a cure; it is largely had recourse to in Iceland. Occasionally, when the cyst is interfered with, inflammation is set up, and death has resulted from peritonitis.

JAUNDICE.—Jaundice, as a sign of disease, is of such frequent occurrence in early life as to demand special reference. It is met with at any age from birth onwards. In older children, its clinical features and pathology are mainly those obtaining in adult life.

INFANTILE JAUNDICE (*Icterus Neonatorum*).—Under this title are classed several conditions differing in pathological import. Infants, during the first week or ten days after birth, show a more or less discoloured condition of the cutaneous surface. The colour varies from livid purple to a light brownish, reddish, or yellowish hue. This generally disappears in from six to ten days, the child presenting no indication of illness. The urine and *fæces* are normal in appearance. The condition is a spurious jaundice, and it is doubtful whether it is due to the liver or altered biliary secretion; more probably it is a blood-vascular condition, the result of the congested state of the subcutaneous blood-vessels during labour, and possibly the indirect influence of the changes taking place in the circulation at the time of delivery. Most

writers describe it as a purely physiological occurrence. Infants are, however, liable to suffer from true jaundice, with distinct icteric colour of the skin and conjunctivæ, high-coloured urine and acholic fæces. This is the true icterus neonatorum, a state the pathological significance of which has given rise to much discussion. It may be due to causes existing in the liver (*hepatogenous*), such as duodenal catarrh with occlusion of the bile-ducts by secretions, or congenital atresia of the common duct, or syphilitic disease, producing thickening of the duct walls. Disturbed biliary circulation due to changes taking place at birth, causing distension of the vessels, and pressure on the bile-ducts, is also supposed to cause it. Birch-Hirschfeld has shown that after tedious labours particularly, the areolar tissue surrounding the biliary ducts is liable to become œdematous, thus causing pressure and jaundice. Apart from these conditions, in which the jaundice is to a great extent mechanically produced by pressure, we find a large proportion of cases in which apparently such causes do not exist, and the prevailing theory is that many of them are truly *hæmatogenous*, or due to altered blood conditions — an icterus of resorption, according to Silbermann. He considers that after birth there is a state of biliary engorgement in the vessels and inter-lobular bile-ducts, the result of post partum changes in the circulation, and that accompanying this there are important alterations in the blood plasma, with destruction of blood corpuscles. This is more liable to occur in feeble than in strong infants. As a result of the destruction of so many red corpuscles there is a formation of biliary colouring matter, which accumulates in large quantity in the hepatic blood-vessels. Quincke considers that the icterus is often caused by post-natal patency of the ductus venosus, whereby portal blood, which contains bile, passes directly into the circulation. This condition is often met with in weakly children, and if present, might account for the production of jaundice. Ashby met with a case of this kind where the patency of the duct was proved by post

mortem examination. The prognosis in true icterus will depend on the cause producing it. In catarrhal states of the ducts recovery generally takes place. In congenital conditions or syphilitic disease the prognosis is grave, the result being generally a fatal issue. In the true hæmatogenous varieties, prognosis is more favourable, unless any untoward complication arises. One of the most fatal of these is umbilical hæmorrhage, which comes on at the time of separation of the cord. It is generally a capillary bleeding and uncontrollable, death being the result.

Treatment.—Jaundice in infants must be treated on etiological principles. In the simplest functional or catarrhal varieties, mild purgatives are generally useful, such as rhubarb and magnesia, or soda. Senna is also a useful remedy, and may be given either in the form of infusion with a small dose of soda sulphate, or the pulv. glycyrrhizæ co., with calcined magnesia in equal proportions, according to age. These remedies, by their known action on the duodenum, increase the mucous secretion, and prevent inspissation. In some cases a single dose of calomel or hydrarg. c. crêtâ may do good at first, but should not be repeated or persisted in. Euonymin also is often useful in my experience. The feeding as a rule requires no alteration, unless symptoms of gastric catarrh and vomiting are present, when it must be altered in accordance with general principles, as applicable to the age of the child. In jaundice, due to malformation or organic disease of the ducts, treatment is unsatisfactory; in the former class of cases hopeless. In syphilitic cases benefit may be expected from treatment directed to the constitutional condition. In umbilical hæmorrhage, strong styptics, especially perchloride of iron, should be tried; and if these fail, surgical treatment by transfixation with needles and ligature.

CHAPTER XXVIII.

HÆMORRHAGE FROM MOUTH OR ANUS.

HÆMORRHAGE FROM MOUTH OR ANUS.—Hæmorrhage, indicated by bloody discharges from mouth or anus, is of sufficient frequency and variety in children, as to deserve special note. Bleeding may occur from any part of the mucous surface, from the buccal and nasal cavities to the anus. The pathological conditions giving rise to it are numerous, and require careful discrimination in regard to diagnosis. Without attempting to classify the various causes in a systematic manner, it will be convenient to allude first to bleeding from the naso-oral cavities.

Epistaxis is a very common occurrence in children. In hæmophilia it is frequently met with; but, apart from the general disposition to bleed in this disease, many children are specially liable to recurrent attacks of epistaxis from unascertained causes. Blood is generally swallowed in greater or less quantity, and vomited subsequently. In the acute exanthemata and malignant fevers, in purpura, anæmia, chronic heart or lung disease, tuberculosis, atrophy of liver, hypertrophy of spleen, in whooping-cough, and other ailments, it is a common complication.

Ulcerations of the Mouth or Pharynx, whether of a simple or diphtheritic nature, give rise to hæmorrhage, generally of small amount. I recorded a case some years ago, where severe and fatal hæmorrhage occurred in an infant suffering from retro-pharyngeal abscess. During lactation, when the mother suffers from ulcerated nipples, the child has been

known to draw blood in sufficient quantity, to give rise to a suspicion of bleeding from other causes, by the amount brought up along with vomited matters.

Gastric Hæmorrhage is not common in children, but may occur from ulcer of the stomach or duodenum, or, according to Billard, in follicular catarrh. Steiner notes fatty degeneration of the blood-vessels as a cause. Landau has shown that in thrombosis of the umbilical veins, bleeding sometimes takes place.

Intestinal Hæmorrhage is met with in typhoid, tubercular, or follicular ulcerations. In intussusception it is one of the most constant symptoms, also in prolapse of the bowel from ordinary causes. Simple mucous polypus of the rectum, which may or may not be complicated with anal prolapse, gives rise to it. The bleeding is generally small in amount, and occurs either during defæcation or independently of it, when it is generally larger in quantity. This comparatively trivial source of bleeding is often overlooked, when a rectal examination has not been made, and points to the necessity of such exploration in all cases of bleeding from the bowel. In prolapsus ani, bleeding occurs from the congested and hypertrophied mucous surface. In purpura hæmorrhagica, bleeding from the gastro-intestinal mucous surface is not uncommon, along with the usual subcutaneous hæmorrhages so characteristic of this disease. It is readily curable under treatment directed to the general condition. In hæmophilia, bleeding occurs and is apt to recur again and again. In these cases, and in altered blood conditions generally, whether of a chronic or acute nature, as in malignant fevers, the bleeding is of a capillary nature, and not the result of ulceration. In intestinal worms, especially when constipation is present, discharges of blood may be met with. In the same way the presence of calculi, or other foreign bodies in the intestine, may give rise to hæmorrhage. In like manner obstinate constipation is sometimes attended by bleeding from the bowels. This may occur in the rectum or

colon, and is generally due to capillary congestion or slight superficial ulceration due to the impaction of hardened fæces. It may also be due to cracks or fissures about the anus, caused by over-stretching of the sphincter, from the passage of large masses of hardened fæces, in which case the fæces are streaked over with fresh blood.

Hæmorrhage in the New-born.—Neonati are liable to hæmorrhage from the mucous surfaces, and in the cavities from constitutional or traumatic causes. The most common constitutional cause, apart from hæmophilia or hæmorrhagic purpura, is congenital syphilis. In this disease the most common site of bleeding is from the umbilicus. Kartmann and Pigot have fully investigated this subject, both clinically and pathologically, and their conclusions have been corroborated by Kassowitz and Schultz, with the result that the blood-vessels were found to be extensively diseased. A well-marked case is recorded, in which the child, after birth, presented all the characteristic signs of syphilis. Pemphigus, with hæmorrhagic bullæ, developed itself in the course of the disease. The child ultimately died from uncontrollable bleeding from the gums, and also the intestines. Stadfeldt of Copenhagen has made exhaustive investigations in regard to traumatic hæmorrhages in infants, due to the results of parturition, whether naturally protracted or assisted by instrumental aid. The hæmorrhage in these cases is most frequently found in the cranial cavity, more rarely in the lungs or pericardium. In two out of twenty-five thousand cases hæmorrhage occurred in the kidneys. Many of these cases are associated with asphyxia after birth.

Infants are liable to more or less profuse discharges of blood from the bowels (*melæna neonatorum*), in the first week after birth, generally within a few days after delivery; and it is noted from all the collected cases, that girls are much more liable to be affected than boys. Such cases are by no means common, but yet of sufficient frequency to merit special reference. The symptoms are—bloody discharge,

generally of a blackish colour, from the anus, and this may be accompanied by hæmatemesis. The stools may be composed entirely of tarry-looking blood, or blood may be mixed with meconium or fæces. The infant may present no other symptoms, physical exploration of the abdomen and organs generally affording negative information. Several explanations of the cause of bleeding in those cases have been advanced. Suffice to say that the causes appear to be various. The result of post mortem dissection often reveals no sign of disease in the stomach or bowels. Of four cases related by Halliday Croom, who has written an excellent little monograph on the subject, one made a good recovery, a second died three months after the attack, and no post mortem examination was obtained. In the third case no trace of disease could be found in any part of the gastro-intestinal canal. The fourth case terminated fatally, and no abnormality was found, except some duodenal congestion. Billard considers the bleeding due in most cases to the congestion, normally present after birth, in the alimentary canal, and aggravated as it may be by pulmonary atelectasis, congenital heart disease, or enlargement of liver or spleen. Too early ligation of the umbilical cord is believed to predispose to it, and in connection with this Landau has shown that degeneration of the smaller arteries may exist, or thrombosis of the umbilical or other veins; and doubtless any imperfection in the establishment of respiration at birth will tend to the production of venous stasis and thrombosis. Epstein has demonstrated, by experiments on the lower animals, that suspension of the respiration will produce gastric or intestinal hæmorrhage. The cases in which ulceration is found would appear to be the exception, rather than the rule. Landau relates a case of duodenal ulcer, with thrombosis of the umbilical vein. Spiegelberg also notes two cases in which, on post mortem examination, duodenal abscesses were found. Gastric ulcerations, most notably of the follicular kind, are met with in infants without the occurrence of melæna. In

considering the etiology of these cases, the possibility of the existence of hæmophilia must be borne in mind, and doubtless many recorded cases show a hereditary tendency to bleed. The treatment of this condition cannot be considered satisfactory. Landau recommends careful prophylaxis, by avoiding the early ligature of the cord before respiration is fully established, and the child has cried vigorously. Ice may be applied carefully to the abdomen, and the child fed on iced milk well diluted, or, if able to take the breast, it should only be allowed to take small drinks. Ergot may be tried by the mouth, or ergotin given by the skin.

CHAPTER XXIX.

THE URINE AND KIDNEY DISEASES.

MORBID CONDITIONS OF THE URINE.

THE importance of a careful examination of the urine in children cannot be over-estimated. From the fact that there is often a difficulty in collecting it in infants, especially girls, an examination is often omitted, and much valuable information which would otherwise have been obtained is lost. Comparing urinary disorders in children with those of adults, we find little difference to note. Children are equally sensitive, probably more so, to temporary or functional disorder of kidney secretion. *Dysuria* is quite frequently met with, especially in infants. It may be due to irritation of the external genitals, inflamed prepuce in boys, or vulvitis in girls; a careful examination of the external parts should never be omitted. Uric acid deposits and lithiasis occur under varying conditions. In new-born children, in the kidney tubules, and on the papillæ, or lying in the calyces of the organ, these deposits are found with such frequency as to constitute the condition a normal one. They are found to consist of uric acid crystals, mixed with urate of ammonia, and generally give rise to no inconvenience, being dissolved or washed away soon after birth. If, however, they persist or remain for a longer period, or when new deposits are formed in older children, the presence of the crystals is extremely irritating, and gives rise to renal colic and violent crying fits. *Calculi* in children are generally either composed of uric acid or oxalate

of lime, which is readily formed by the oxidation of uric acid, —oxaluric acid, the product, being very easily decomposed into urea and oxalic acid, which in turn combines with any lime salts. Compound calculi of combined alkaline urates are more rarely met with. When these have remained any time in the bladder or pelvis of the kidney, they may become encrusted with phosphates. Children are just as liable as adults to turbidity of the urine from temporary causes. These lithate deposits generally give rise to no pain or inconvenience. The causes of the deposits and of renal calculi may be either hereditary or acquired. There can be no doubt that children of rheumatic or gouty tendency are specially liable to them; but those apparently with no such disposition may suffer from temporary causes, such as unfavourable hygienic or dietetic conditions. One of the most notable facts in regard to the presence of renal calculi in children is the absence of pain in many cases. Children frequently pass calculi in whom their presence has not been previously suspected. When pain is felt it presents the usual character of renal colic. Hæmaturia is as frequent a sign of uric acid gravel and calculus in children as colic. In most cases in which blood is passed, more or less dysuria is present rather than colic. As an example of an ordinary case of this kind, Mary M'G., æt. six, was under treatment for three weeks in the Royal Hospital for Sick Children, for uric gravel and dysuria. She had several attacks of pain in the groin, not of a sufficiently acute character to be classed as colic, lasting from eight to twelve hours. There was no pain in the back. During the continuance of the pain she occasionally vomited, and before micturition there was generally slight shivering. The attack of pain usually began after the act of micturition. The urine was of pale yellow colour, decidedly acid reaction, deposit of mucus in excess, with uric acid crystals of various shapes, but chiefly of the sun-fish and rosette varieties. In this case there was apparently no constitutional predisposition to gout or rheumatism, but she resided in a damp locality,

was ill-cared for, and lived under unfavourable conditions as regards diet and hygiene. Renal calculus may also induce pyonephrosis or hydronephrosis, when impaction of the calculus takes place.

TREATMENT.—It is important that the hygienic conditions under which patient lives should be attended to. Careful ventilation of the nursery and a suitable amount of open air exercise are essential. Of equal importance is diet. This should be of a mixed character, and not unequal to the digestive power of the child. Excess of nitrogenous food will no doubt aggravate the evil in some cases; but I believe excess of starchy or sugary elements is even more liable to do so, from the tendency to derangement of the primary digestion, which an excess of such foods so often induces. Sugar in excess should be prohibited. Diluent drinks such as rice water or linseed tea, alkaline waters such as Vals or Salutaris, are often most useful. Medicines which counteract acidity and favour digestion, such as rhubarb or gentian, with alkalies or citrate of potash or lithia, will often be found invaluable. In debilitated or anæmic children, a tonic course of iron, with quinine or strychnia, will do good. When renal colic supervenes, hot fomentations or poultices to the loins, hot baths with massage downwards along the ureter, is often of service, and the administration of opium and belladonna or even chloroform, if need be.

Hæmaturia may be due to a variety of pathological conditions. Blood may be present in a corpuscular form, or the discoloration may be due to hæmoglobin (*hæmoglobinuria*). When the blood has remained long in the urine, or its source has been the kidney or ureters, or in any case where it has remained a certain time in acid urine, the bright red colour changes to dirty brown (*smoky urine*). Solutions of blood in urine are dichroic, showing a green colour by transmitted and a reddish tinge by reflected light. Apart from nephritis, renal calculus is one of the commonest causes of hæmaturia. Cystitis or urethral polypus are often accompanied by bloody

urine; the blood not being much altered presents a fresh bright colour when recently passed. In altered blood conditions, such as purpura, bloody urine is not uncommon. In malignant fevers, small-pox, measles, scarlatina, or diphtheria, hæmaturia, apart from inflammatory kidney disease, may be present. In tropical countries, the parasite known as *Bilharzia hæmatobia*, which infests the kidneys and urinary passages and also the portal system of veins, is a constant cause of hæmaturia. The hæmorrhage is often so persistent as to debilitate the child greatly.

Albuminuria as a functional derangement is liable to occur in children, from similar causes to those obtaining in adults. In fifty cases of chronic disease in the Royal Hospital for Sick Children, in which a sample of the urine in each case was sent to Dr. Grainger Stewart, he found albumen in the urine in seven cases, or fourteen per cent. This compared favourably with observations made on adults in the Royal Infirmary in 150 cases, albuminuria being detected in seventy-four, or about forty-nine per cent. In the Orphan and Craiglockhart Hospitals, the examination of a series of cases showed a percentage of seventeen in presumably healthy children. This result in the children's cases was much more favourable than had been anticipated, and, as a single observation, can only be credited with a relative significance regarding the question of the frequency of transient albuminuria in children. My own impression is that a plurality of observations over a more extended period would show a higher proportion of cases of albuminuria. Children are liable to transient albuminuria from dietetic errors. Thus, a girl lately under my care in hospital suffered from albuminuria for five days, after eating a quantity of cheese, which had been surreptitiously brought in by the mother. In ordinary cases of gastric catarrh, with deranged biliary function, temporary albuminuria is of not infrequent occurrence. The late Dr. Murchison conclusively showed the hepatic origin of many cases of functional albuminuria. School children often suffer from it as a result of over study. In hospital patients the temporary excitement and crying induced

by the visiting night often produces temporary disturbance in the children, the most common of which is a rise of temperature, which is occasionally accompanied by transient albuminuria. During the progress of acute disease and chronic heart and lung disease it is a common symptom. I have lately met with two cases of transient albuminuria and hæmaturia during the progress of tonsillitis. The first case was that of a girl who was admitted suffering from tonsillar abscess, which was opened, and a discharge of foetid pus escaped, the abscess being evidently of a septic character, with general systemic infection. On admission the urine contained blood, and a large quantity (2·8) of albumen, and the temperature range for about a week averaged 102·5. The throat affection and general symptoms gradually declined, and the albumen disappeared. On the tenth day the note in the ward journal stated—"Albumen a trace; throat nearly well. No tube-casts or any renal elements were found in the urine." The second case was that of a girl, aged ten, who was admitted with a history of sore throat five weeks before; the urine was highly albuminous, and also contained blood, no tube-casts. Five weeks after admission the albumen had disappeared. There can be little doubt that in both these cases the albuminuria, which was transient, was due to altered blood-conditions of a septic character, such as we meet with in diphtheria and other malignant fevers. In 250 urinary samples examined by Binet,¹ albuminuria was detected as a transient feature in seven cases of pneumonia and broncho-pneumonia. In measles it was noted in a similar manner, in thirty-three out of thirty-four cases; in scarlatina, in thirty-four out of forty-three; in erysipelas, in four out of five; in diphtheria, in thirty-six out of forty cases; in pulmonary tuberculosis, in five out of ten cases; in tubercular meningitis, in four out of six cases. In six cases of pertussis it was only found in one case. In twenty-one cases of chronic suppuration there were eleven cases.

Peptonuria.—In this connection Binet examined samples

¹ *Rev. Mens. des Malad. de l'Enfance*, Oct. 1890.

of 248 urines, with the result that peptones were found in thirty-four. Of these it occurred in five out of twenty-eight cases of pneumonia, in one out of two of purulent pleurisy, in ten out of thirty-seven cases of diphtheria, in three out of twenty-one of suppuration, in thirteen out of twenty-three of nephritis. In thirty-four cases of peptonuria there was also albuminuria. It was specially noted that it rarely occurred in general infectious diseases. Binet considers it may be urogenic, nephrogenic, hæmatogenic, pyrogenic, enterogenic, or hepatic. Peptones, being hydrated albumens, are non-coagulable by heat, nitric or acetic acids, and potassium ferrocyanide, but precipitate readily on the addition of citropicric, iodo-mercuric, or phospho-tungstic solutions.

Diaceturia is common in diabetes, and is a grave sign—usually the precedent of diabetic coma. In other diseases its presence is not usually of serious import. This condition of the urine is commonly met with in acute febrile diseases, specially scarlatina. Thus it occurred in nineteen out of twenty-three cases of pneumonia, in sixteen out of twenty-six cases of measles, and in twenty-seven out of thirty-four of scarlatina. The condition, as described by Jaksch, is due to the elimination by the urine of acetic acid, its salts and ethers. The test employed by Jaksch is the addition in excess of a solution of perchloride of iron, which redissolves the precipitate at first thrown down, leaving the urine of a dark amber or port-wine colour.

Glycosuria.¹—Transitory glycosuria is more common in children than diabetes mellitus. Some of the cases reported as diabetes mellitus have afterwards been found to be of this nature, and some cases of glycosuria have been quoted as such when in reality the condition did not exist. Fehling's solution, or Pavy's modification of it, has been the chief test employed; and it is now known that other substances than sugar reduce the cupric oxide of these solutions. Hence many fallacies.

¹ For this paragraph, and the subsequent one on polyuria and diabetes, I am indebted to my former resident, Dr. G. P. Boddie.

Thus it has been shown the urine of a person taking salicylate of soda, salicylic acid, or allied substances, has frequently something (the chemistry of the subject one need not discuss here) in it, not dextrose, capable of reducing copper. Glycuronic acid ($C_6 H_{10} O_7$) is the substance which, more than others, is likely to give rise to fallacy. It appears in the urine after the exhibition of chloroform, morphia, camphor, chloral, curara, bromides, and probably other drugs. Its presence is not of any great importance save as leading to fallacy. It can be differentiated from dextrose by the fermentation test, which ought always to be used as confirmatory.

Transitory glycosuria may occur in tubercular meningitis, tubercular disease of mesenteric glands, cerebro-spinal meningitis, typhoid fever, scarlet fever, diphtheria, intermittent fever, cholera, diseases of the liver, stomach, lungs, and heart, and sometimes in the children of gouty parents. One or two cases have also been noted where apparently it appeared concurrently with the onset of menstruation.

Polyuria (Diabetes Insipidus).—A disease characterised by thirst, persistently increased flow of pale urine of low specific gravity, which contains neither albumen nor sugar.

Standing in marked contradistinction to diabetes mellitus, diabetes insipidus, while it may be and is found at any age, is rather a disease of early life. Children may even be born with it. Polyuria is always to be carefully distinguished from frequency of micturition. In the latter there may be no increase in the total amount of fluid passed per diem.

ETIOLOGY.—Very little can be said with certainty. The most important fact appears to be its *heredity*. Weil¹ has recorded a curious group of cases, where twenty-eight members out of a family of ninety-one showed polyuria. Despite the existence of this ailment, many of the members of the family lived to and beyond seventy years. Gee has referred to a family where the disease ran through four successive generations.

Injuries to or diseases of the brain, nervous diseases

¹ Virchow's *Archiv*, xcv.

(organic and functional), fright, shock, etc., have been referred to as causal. Gout, syphilis, and insanity in parents must be looked upon as predisposing factors in the children. The copious flow of pale urine at the close of an epileptic convulsion indicates the intimate relation between the nervous system and polyuria.

MORBID ANATOMY.—Various conditions of the brain have at times been said to be found post mortem in children who have died during a course of diabetes insipidus—*e.g.*, tubercular lesions (nodules or ulcerations), syphilis, glioma, myxoma, exostoses, etc. Where the disease persists for a long time, secondary changes are liable to be set up in the bladder, ureter, and kidneys.

As regards *sex*, it is much more frequent in male children than female. Some writers say twice, others thrice as frequent.

As to *chemistry*, the specific gravity varies from 1001 to 1008 or more. The total amount of urea per diem is generally not diminished. On the contrary, an actual increase has been found in many cases. Willis, however, states there is distinct diminution in the polyuria of young children. The urine sometimes yields a small proportion of *indican* and *inosite*, and the chlorides and phosphates are as a rule increased. The total quantity of urine passed is sometimes enormous, and this does not necessarily bear a definite relation to the amount of fluid taken.

DURATION.—This is quite indefinite. It may last throughout life, without apparently affecting its length, as Weil's cases have shown. If *urea* alone or along with the other solid urinary constituents be excreted in increased quantities, the course is much more definite.

PROGNOSIS.—As to cure, the prognosis is not very favourable. But few, if any, children actually die of diabetes insipidus. If it be caused by, or associated with, tubercle or syphilis, the prognosis depends on these conditions. If the solids of the urine are persistently excreted in increased quantity, the con-

dition may pass into diabetes mellitus, or to some other wasting disease.

TREATMENT. — Valerian and valerianate of zinc are very helpful. Ergot, belladonna, antipyrin, acetate of iron, syrup of the iodide of iron, nitro-hydrochloric acid, nux vomica, have all been used with advantage. Children often improve on cod-liver oil, even if there be no evident tubercular lesion. In tubercular conditions, this remedy, along with eucalyptus, balsam of Peru, etc., should be pushed. In syphilitic cases, mercury and iodide of potash will of course suggest themselves. Opium has been found injurious in many cases. The diet should be liberal, and more frequent than in health. Alcohol does not appear to be beneficial. Baths—vapour, plunge, and douche—sometimes give relief. Nothing is to be gained by diminishing the amount of fluid ingesta.

DISEASES OF THE KIDNEYS.

Nephritis.—Inflammatory disease of the kidneys is most commonly secondary to one or other of the acute infectious diseases of childhood. Scarlatina is the most frequent offender in this respect, so much so that some physicians believe that acute Bright's disease in children rarely if ever occurs apart from scarlatinal poisoning. My experience does not confirm this. Not infrequently cases are met with when scarlatina may positively be excluded from the causation of the attack. There can be no doubt that exposure to cold, or other causes tending to produce temporary congestion of the kidneys and arrest of cutaneous excretion, will, under unfavourable conditions and when unrecognised and untreated at the outset, give rise to acute nephritis. Septic nephritis, such as is produced by scarlatinal poison, generally develops an acute attack, in which the symptoms are well marked and easily recognised. Nephritis, due to exposure, or other and more simple causes, is often less acute in its onset, and in fact latent in its course, running on for a considerable time before

recognition of the true nature of the case is apparent. As an example of an acute attack, with all the usual signs well marked, Mary R., æt. eleven, was sent into hospital suffering from anasarca. A fortnight before admission, on a cold night with keen east wind, she had stood for some time at a meeting-house door with a number of other children. She felt very cold, and the next day was unable to get up, complaining of "pains all over her" and slight sore throat. Her tonsils had been hypertrophied for several years. The face became puffy, and the urine scanty and of a dark colour. Examination of urine showed ten ounces, smoky reddish colour, acid, flocculent precipitate, chlorides abundant, albumen one-third, specific gravity 1020, epithelial and blood casts. She had been otherwise a healthy child, never having suffered from any ailment of a serious nature, except whooping-cough when two years old. There was no history of scarlatina and no desquamation of cuticle. There had been no case of scarlatina in the orphanage for a considerable time. Under treatment she got steadily well, and in six weeks was dismissed cured. Another case, in which scarlatina as a cause of the attack may be excluded, was that of W. M., æt. five. When two years old he had suffered from a well-marked attack of scarlatina. In the interval he had enjoyed good health till four weeks before admission to hospital, when he is reported to have got cold and suffered at first from slight bronchial catarrh; this was followed by "swelling of the face," for which he was admitted. On examination there were a few scattered rhonchi over the chest. All the other organs appeared normal, except the kidneys. The urine was, specific gravity 1025, nine ounces, neutral, pale colour, coagulable by heat and nitric acid one-sixth. He made a good recovery and was dismissed cured in four weeks. A third case was that of D. F., æt. twelve, a well-developed, healthy-looking boy. There was no history of scarlatina, but he had measles when three years old. There was no desquamation of the skin, and all the organs appeared healthy except the kidneys and bronchi,

which showed slight catarrh in the large-sized tubes. The urine was, specific gravity 1026, sixteen ounces, acid, amber colour, albumen one-fourth, tube-casts with fatty granules; slight œdema of legs but not of face. He was dismissed cured in five weeks. In excluding scarlatina from the causation of nephritis in children, it must be admitted that in the class of patients met with in hospitals, where the statements of mothers are frequently neither accurate nor reliable, the absence of a history of scarlatina does not always exclude the possibility of its occurrence, yet in many cases we are enabled without doubt to arrive at the conclusion that the disease has been the result of other and simpler causes. Good clinical observers, such as Ashby, Lee, and Goodhart, all agree in this. Emmet Holt records a series of twenty-three cases of primary nephritis in infants, showing the frequency of its occurrence and the inconstancy of the symptoms in many cases, which might mislead even the most careful clinical observer, and obscure the diagnosis if careful and systematic examination of the urine had been omitted. In many of his cases dropsy was not a prominent symptom, indicating the latency of the affection in young children in regard to one of its usually pronounced signs. The pathology and clinical features of Bright's disease in the child does not differ materially from the same disease in the adult, and therefore requires no special note here. Cloudy swelling is an exceedingly common condition. It occurs most notably in acute disease, with high temperature, such as pneumonia, scarlatina or typhoid, but also in wasted children who have been affected with chronic intestinal catarrh, tuberculosis, or similar affections. The kidneys are more or less enlarged, the cortical substance somewhat increased and of a greyish colour. The condition may pass insensibly into fatty degeneration, and this often occurs in the wasting diseases. Acute parenchymatous nephritis, the large flabby kidney, is characterised by the ordinary pathological appearance seen in adult life. When the disease becomes chronic, the organ

gradually develops all the characteristics of large pale kidney of chronic Bright's disease. The scarlatinal kidney is referred to under that disease, and presents its own special features.

TREATMENT.—In acute Bright's disease, the child should be kept in bed in a room well ventilated and of mean temperature. The indications are to relieve the kidneys from as much work as possible, by maintaining the action of the skin, bowels, and lungs. The clothing should be warm, fine flannel worn next the skin, and a pad of fine cotton-wool should be kept over the loins, covered by jaconet. The diet should consist chiefly of milk, either alone or with light farinaceous food occasionally. Plenty of bland mucilaginous drinks—such as barley water, linseed tea, or pure spring water—should be ordered. The bowels should be kept freely open, and an occasional purge of pulv. scammon. co. or pulv. jalapæ co. given. No medicine as a diaphoretic gives better results than the liq. ammoniæ acetatis in full doses. Sometimes acetate of potash may be added in doses of from ten to fifteen grains. No stimulating diuretics should be given, but sometimes digitalis or strophanthus help to control the kidney congestion and promote the flow of urine. Pilocarpine acts well in some cases, but not with sufficient certainty to warrant its habitual use. Some children become very much depressed during its action, and in one case treated in hospital fatal syncope ensued. Hot-air baths are eminently serviceable. Linseed poultices fortified with mustard, 1 to 4, applied occasionally to the loins, often afford much relief. Dry-cupping is often very useful, and a simple flannel and jaconet poultice, continuously worn over the loins, at the same time, is one of the best local applications. The patient should be kept in bed till convalescence is well established. Relapses may take place if the patient is allowed out of bed too soon.

In chronic Bright's disease, the child need not necessarily be kept in bed, but great care must be taken to keep the cutaneous surface free from exposure to chill, flannel being

always worn next the skin. Moderate open air exercise in fine weather may be allowed. In winter the walks should be restricted to fine days. A sojourn in a warm climate during the winter months is desirable, if the circumstances of the patient admit of it. The diet should be of a light nourishing description, the proteid elements being restricted in quantity. Skim milk is a suitable drink; light soups, farinaceous solids, white fish, fowl, or game, in moderate quantity, are admissible. The gastric digestion should be carefully guarded, and if necessary, bitter tonics with alkalies and other stomachic medicines, according to special requirements, may be administered. The bowels should be regulated by mild aperients, if need be. Fluid extract of cascara, with bicarbonate of potash, in a bitter infusion, is often very useful, or the occasional use of Hunyadi or Victoria water. Strong purgatives are not indicated. Iron in form of liq. ferri perchlor., or the neutral salts, is useful, especially if there be anæmia, the addition of a drop dose of liq. strychnine added being often beneficial. In many cases where iron is not specially indicated, liq. arsenicalis seems to do good. I know of no medicine which has any special action in restoring the kidneys to a healthy condition, apart from those already mentioned, which act more by their general tonic and hæmic influence than in any other way. When there are indications of great arterial tension, nitro-glycerine in drop doses of the one per cent. solution often diminishes the amount of albumen and promotes the flow of urine. I cannot say, however, that this remedy has any permanent effects on the kidney lesion, neither has my experience of the effects of fuchsine been more favourable. The coloration of the urine seems to impress the friends that the remedy is acting on the kidneys, but I have found no further advantage from its use. It is desirable in all kidney cases, but especially in chronic ones, to estimate the quantity of urea excreted from time to time, in order that the occurrence of uræmic poisoning may be guarded against. Dropsy should be treated by confining the patient

to bed and restricting the diet to milk and diluent drinks, administering purgatives, dry-cupping to the loins, vapour baths, and unstimulating saline diuretics, such as acid tartrate of potash. Diuretics, such as digitalis, which act as circulatory stimulants and raise the blood-pressure, should not be given. Saline purgatives, given after the method recommended by Professor Matthew Hay, are often useful in draining the fluids away by the intestinal tract.

Malignant disease of the kidney is notably most commonly met with at the extremes of life. In recent years, much has been written on these diseases in early life. Lancereaux was one of the first to insist on the frequency of sarcoma of the kidney in infants, and Jacobi has shown that it is not uncommonly met with as a foetal condition. Dr. Taylor has written an elaborate article, in which he details 140 cases of primary malignant degeneration in infancy. His paper is not only highly interesting from a pathological point of view, but notably from suggestions and facts brought forward with regard to the advisability of removing the kidney, when the disease has been recognised at a sufficiently early period for extirpation. He states that the results of radical treatment show a higher percentage of recoveries than in malignant degeneration of other organs. Several cases of recovery are recorded, and in others the effects of operation succeeded in prolonging life for a time. Sarcoma may either be solid or cystic. The kidney is enlarged, sometimes to an enormous size, weighing many pounds. Cases are on record where the organ weighed over thirty pounds. Male children are more frequently affected than females. The growth of these tumours is generally slow. Constitutional cachexia is usually absent for a time, the children presenting a healthy appearance otherwise. The disease, as a rule, is not accompanied by metastasis. The healthy kidney often becomes hypertrophied. Complications are not always met with, at all events in the early stages of the disease; but when present, the most common are ascites, anasarca, peritonitis,

pneumonia, more rarely nephritis. On microscopical examination of the tumour, the sarcoma is generally found to be of the round or spindle-celled variety.

DIAGNOSIS is of much interest and importance, and not unattended with difficulty. The tumour may be mistaken for hydronephrosis, abscess (psoas, or of the abdominal wall), peritonitis, enlarged spleen or liver, mesenteric disease, or accumulated fæces. *Abscesses* or other *inflammatory conditions* may generally be distinguished by the presence of pain, or, at all events, tenderness on pressure over the part; they are usually lower down than the kidney, in the region of the cæcum of sigmoid flexure; intestinal symptoms are often present. *Glandular enlargements* are only liable to be mistaken for kidney tumour when they exist in the lumbar region. When the mass is large the diagnosis is difficult; the recognition of isolated hypertrophied glands in the neighbourhood gives presumption to the probability of the general swelling being of a malignant nature. *Fæcal accumulations* may exist in the cæcum or sigmoid flexure, and in either case have been mistaken for kidney tumours. The presence of colic and abdominal pain, with flatulent distension, and the removal of the tumour by enemata and laxatives, will establish the diagnosis. *Enlarged spleen.*—In this case the sharp edge and notch of the spleen can generally be made out. There is no bowel in front of the tumour. Behind, the percussion is more or less resonant between the spine and the tumour. Splenic tumours are moveable, renal ones rarely so. *Enlarged liver.*—Enlarged downwards from beneath the ribs, the tumour moves with the diaphragm. The bowel is rarely, if ever, in front of the tumour; jaundice may be present, which lends additional probability to the hepatic origin of the swelling. The positive signs of kidney tumour are its *situation* in one or other lumbar region; in the right kidney the ascending colon lies in front, and in the left the descending colon. The percussion behind is uniformly dull from the tumour to the spine. Renal tumours never protrude behind, but to the front. In abscesses

and other diseased conditions in the loins, we generally have swelling behind and obliteration of the natural hollow in the lumbar region. Kidney tumours do not present any sharp margin, but are rounded on all sides. They are generally fixed, and rarely show any movement with the diaphragm. The fixation is equally marked on palpation. This sign, however, is not invariably pathognomonic; as under certain conditions kidney tumours are known to be, to a certain extent, moveable, even downwards. On pushing the tumour from behind, a degree of backwards and forwards movement can be made out. Enlargement of the inferior mesenteric or spermatic veins is sometimes associated with kidney tumour, giving rise to varicocele. This does not obtain in splenic or hepatic enlargements. Evidence obtained from the examination of the urine is usually of a negative character in this disease; when, however, hæmaturia or pyuria is present, they are valuable corroborative signs of kidney lesion.

Hydronephrosis signifies over-distension of the kidney, from whatever cause. Mechanical obstruction to the outflow of urine may exist in the urethra, bladder, or ureters. The disease may be either congenital or acquired. It is much more common in girls than in boys. The foetus is liable to various malformations, which produce hydronephrosis in intrauterine life, or soon after birth. Cases of hydronephrosis are met with in later life, due to the existence of some congenital cause, which has not operated to produce its full effect until the lapse of many years. Closure of the ureter, partial or complete, is one of the commonest causes. The ureter may be congenitally absent altogether. In a case published by me, one ureter was impervious, and the urethra was so small as hardly to admit the point of a probe. The bladder was distended, and held forty ounces of fluid. The kidney was enormously distended on the left side, the sac filling up the entire belly, which contained ninety-five ounces of fluid. Puncture of the abdomen had to be performed before

delivery could be effected. Imperforate urethra, or stenosis of the canal, is a common cause. Membranous bands or cysts of the urethra have also been met with. In double hydronephrosis the cause is found either in the urethra or bladder, very often at the vesical orifices of the ureters. These cases of congenital hydronephrosis are of much interest, and are evidence of the fact, now undisputed, that during the latter months of utero-gestation at all events the fœtus excretes a considerable amount of urine, which probably escapes into the amniotic sac, the fluid of which is partly derived from the urine of the fœtus. As pregnancy advances, the amniotic fluid is known to contain a diminished amount of albumen, which is no doubt partly due, at all events, to its admixture with the urine of the fœtus. Urea, in greater or less amount, is always found in the liquor amnii, thus lending additional corroboration to the fact of its admixture with urine. In many cases of hydronephrosis there is very little, or even an absence of, urea from the fluid, this probably being due to the obstruction and atrophy of kidney substance, as a result of which only the watery and saline constituents of the urine are secreted. The association of hydronephrosis with other congenital deformities is very frequent. Hare-lip, talipes, congenital malformation of the external genital organs, or of the anus, are not uncommon.

Acquired Hydronephrosis, in which are included cases due to congenital causes not operating for some time after birth. The cause may exist in urethra, bladder, or ureters. Obstruction in the ureter may be due to the impaction of a calculus, or to narrowing or occlusion of the tube from other causes, such as inflammation or ulceration. Compression of the ureter may be caused by fibrous bands, the result of peritonitis, or by pelvic or abdominal tumours, or enlarged glands. Silbermann relates a well-marked case of hydronephrosis caused by fibroma of the bladder blocking up the orifice of one of the ureters. In children suffering from incontinence of urine, due to excessive action of the detrusor, with relaxation

of the sphincter vesicæ, in which the bladder is more or less constantly in a contracted state, hydronephrosis may be gradually induced by the obstruction thus produced to the onward flow of urine through the ureters into the bladder. Dr. James has related an interesting case of hydronephrosis, where micturition was very frequent, and due in his opinion to phymosis. A similar case lately occurred in my own hospital practice.

SYMPTOMS.—There are no characteristic symptoms of this condition, apart from the presence of a tumour. Occasionally the child may suffer from pain in the back, frequent micturition, partial or in rarer cases total suppression of urine for a time, but yet such symptoms can hardly be said to be pathognomonic of the disease, although they may give rise to suspicion of its presence. When the disease affects both kidneys, uræmic symptoms may be present, with nausea and vomiting. Constipation of an obstinate character is sometimes present when there is pressure on the colon. Hydronephrosis is often found after death when the disease has been unsuspected during life. It is to the cases where a palpable tumour is present that we must allude to the physical signs. The tumour is situated in one or other lumbar region; the colon can be made out in front of it, the small intestines, when the swelling is large, being often pushed over to the opposite side. As the tumour enlarges it presses forwards, and gradually may occupy the entire belly; it is dull on percussion, and of irregular outline, and fluctuation is often distinct. Pressure on neighbouring viscera often gives rise to inconvenience. Besides the distress attending constipation from pressure on the colon, already alluded to, the action of the heart and lungs may be interfered with from upward pressure on the diaphragm. Variation in size of the tumour, when present, is very characteristic of hydronephrosis. When its size diminishes coincidently with a copious discharge of urine, this sign may be said to be pathognomonic of the disease. The tumour is generally

attended with pain when large—often free from it when small.

DIAGNOSIS.—When the tumour is of moderate size it may be confounded with nephritic or perinephritic abscess. When of larger size it may be mistaken for pyonephrosis, hydatid, or serous cyst of the kidney, or enlargement of liver or spleen. Abscesses present more acute symptoms, running a quicker course; they press backwards as well as in other directions, causing fulness in the loins behind; the skin is often œdematous, sometimes red. In perinephritic abscess, the matter may find its way downwards, pointing in the groin. Hydatid and serous cysts are not accompanied by symptoms of urinary obstruction, and are often associated with hydatid disease in the liver or other organs. Hydatids may be found in the urine, which makes the diagnosis clear. Splenic or renal tumours are generally more or less moveable, hydronephrotic ones usually fixed during respiratory movement.

PROGNOSIS is hopeless in double hydronephrosis. In single cases, and when the opposite kidney is not affected, prognosis is much more favourable, and although a fatal result may be ultimately looked for, in many cases life may be indefinitely prolonged. Sometimes the disease undergoes spontaneous cure by gradual atrophy and subsidence of the swelling. The tumour may rupture into the peritoneum, and if surgical treatment is promptly resorted to, the cavity being washed out and drained, a cure may be effected. Dr. Taylor has related a successful case of this kind in which the cyst was stitched to the abdominal wall, and a urinary fistula established.

TREATMENT must be essentially surgical. Aspiration is useful when much distension occurs and inconvenient pressure results. Manipulation of the tumour has been successful in causing the passage of large quantities of urine, and in a case related by Dr. Roberts the swelling did not return. It must be carried out with care and caution, as there is obviously danger in the possible rupture of the cyst. When aspiration is resorted to, it should be performed in the loin,

posteriorly between the last rib and the iliac crest. When successful, the cause is generally of an acquired and simple nature, such as torsion of the ureter, or obstruction from local inflammatory mischief. In moderately-sized cysts injection of iodine or other irritating fluids, with a view of setting up inflammatory action and obliteration of the cyst, has been tried, but I am not aware of any successful case; on the contrary, the practice must be considered a dangerous one. Nephrotomy has been attended with a fair amount of success. It is generally resorted to in those cases where aspiration fails. As soon as the fluid has been drawn off, the puncture is enlarged with a probe-pointed bistoury, and thereafter edges of the cyst stitched to the abdominal wall. Drainage and antiseptic irrigation must then be kept up. Occasionally the cyst becomes gradually obliterated and a cure effected. Nephrectomy is the last resort in these cases, but should never be attempted till nephrotomy and all other means have failed. The results of the operation are not very satisfactory, although some successful cases are recorded.

CHAPTER XXX.

INCONTINENCE OF URINE.

INCONTINENCE of urine is as common in children as retention is rare, very much the converse of that which obtains in adult life. In the physiological act of urination, the natural stimulus to evacuation of the bladder is a degree of mechanical distension of the organ. When this attains a certain point, a centripetal impulse passes up to the spinal cord, which is transmitted again to the bladder, bringing into play the natural muscular mechanism, permitting the expulsion of urine, provided the inhibitory influence of the cerebral centre is withdrawn voluntarily, or otherwise. In considering the causation of enuresis, we have to look to (*a*) bladder and genito-urinary organs, (*b*) contents of the bladder, (*c*) the nerve mechanism which governs urination, and through the nervous system the condition of other organs and more distant parts.

Bladder and Genito-urinary Organs.—An atonic condition of the sphincter vesicæ in spinal disease, or in general debility, or during the progress of acute febrile diseases, is a fruitful cause of incontinence. Cystitis is not common in the child, but when present always gives rise to involuntary discharge of urine. Malformations—one of the commonest of these is small meatus. The defect may be in the bladder—thus, extroversion of the bladder, epispadias or hypospadias, may exist. Smith relates a case in which the bladder above the urethra was found deficient, the mucous membrane being exposed to the extent of an inch, so that the finger could be passed

into the bladder. Long or adherent prepuce are common causes. In girls a small vascular polypus may be met with at the urethral orifice, which gives rise to incontinence. Giraldés mentions the occurrence in a female infant, of a polypoid tumour of the bladder, which protruded through the urethra, and gave rise to it.

Contents of the Bladder.—The condition of the urine should be investigated in all cases. Over-acidity is a common exciting cause. Lithiasis also operates in the same manner. Vesical calculus, or deposits of uric acid, gravel, and oxaluria phosphaturia, may also predispose to it; in fact, qualitative alterations of the urine in any way act as exciting causes. Increased quantity as well as quality of urine, as exists in diabetes or nephritis, may likewise be associated with this condition.

Other Organs and Parts.—Disordered stomach and bowels often give rise to urinary irritation. Intestinal worms, foreign bodies in the bowel, and scybalous masses, may also operate in a similar manner. Skin eruptions about the vulva or anus, cracks or fissures likewise produce it.

The Nervous System.—Goltz has demonstrated the existence of a reflex centre for micturition in the spinal cord, and this is liable to be excited reflexly from a variety of causes acting peripherally. Altered nerve action in the brain influences the bladder in various ways through psychical causes. Thus fright is one of the most common conditions, acting through the brain, which may give rise to incontinence, either diurnal or nocturnal. Imbecile or idiotic children, whose brain power is congenitally defective, almost invariably suffer from incontinence. Epileptics are often affected in a similar way. Diseases of the spinal cord, involving the reflex centre—such as myelitis, hæmorrhage, traumatism, lesions of the brain or of the conducting paths from the cord to the cerebral centre, whereby the natural inhibitory power is destroyed—give rise necessarily to want of control over the bladder. Locally, the effect may be due to paralysis, partial or complete, of the

sphincter vesicæ, or undue contraction of the detrusor. In many cases of incontinence in children, no pathogenetic lesion exists to account for the symptoms, nor yet any peripheral or reflex cause. In such cases we are forced to take refuge in the theory of disturbed or altered nerve-action from unascertained causes. The normal balance between the expulsive and retentive powers, and their relation to the inhibitory cerebral influence, is lost, and incontinence is the result. Such disturbed nerve-action may occur in delicate children, or those otherwise in apparently robust health.

TREATMENT must be obviously etiological. Any malformation, if present, must be rectified if possible. A small meatus should be opened up. Phymosis must be dealt with surgically, but not until every other possible source of irritation has been excluded, otherwise the result of the operation may be purely negative. Urethral polypi should be removed. Vulvar eruptions, cracks or fissures of the anus or rectal polypi, must be treated. The general health, and especially the state of stomach and bowels, may require attention. Intestinal worms must be looked for and got rid of, if present. Incontinence, associated with disease of the central nervous system, cannot be met by any special treatment directed to the symptoms, apart from the primary disease. Ordinary cases of incontinence, due to no ascertained cause, but presumably the result of causes connected with the neuro-muscular apparatus of the bladder, require careful discrimination in regard to treatment. They are often of an intractable nature, and do not yield readily to therapeutic and other measures. Careful attention to regular habits of micturition is essential. Neglect of this from early infancy often induces the habit. From the very earliest infancy the child can be taught to micturate at regular periods, using each time the "chamber" in the ordinary manner. It ought always to be the boast of a good and watchful mother or nurse, that the infant should never be allowed during the day, at all events, to wet its napkins. Thus, from

the earliest period, the child can be taught the use of its cerebral inhibitory powers. I am satisfied that want of training in this respect often lays the foundation of incontinence in after life. Careful regulation of food and drinks is essential. Too much animal food often favours incontinence. A great improvement sometimes takes place when animal food is stopped, or strictly limited in amount. The child should not be allowed, if possible, to lie on its back. The dorsal position seems to favour enuresis. The head should be low, the pelvis as high as possible. The drug treatment must be directed to subdue irritability of the nerve apparatus, and regulate its reflex activity. No drug has equal power in this respect to belladonna. It should be given in full doses till the physiological effects are produced. Ten drops twice a day, and a double dose at bed-time, for a child three years old, often acts like a charm, especially if the detrusor is acting more powerfully than the sphincter vesicæ. In the opposite condition, strychnia, in doses of one to two minims of the liquor, every eight hours, will often do good. I have tried ergot of rye, empirically in some cases, when various remedies have failed, and with good effect. Presumably it acts by regulating or controlling blood-vascular action in the nerve-centre, and appears to be a remedy worthy of more extended use. Dr. Dominguez speaks highly of the efficacy of tincture of *rhus toxicodendron*, in three or four drop doses after meals. Dr. G. H. Fenwick has met with great success in treatment from the tincture of the *lycopodium clavatum*. In some cases of nocturnal incontinence, with great restlessness, a few grains of chloral hydrate at bedtime, combined with tonic doses of tincture of the perchloride of iron after meals, is useful. Bromide of sodium or ammonium given in a similar manner sometimes does good, but in my experience is less reliable than chloral. Of other methods of treatment, the one I have found more successful than any other is the cold douche to the spine. Dr. Littlejohn of Hanwell school has met with great success in this treatment;

and, acting on his recommendation, I have for many years employed it with satisfactory results. The child before being put to bed should sit in a bath or tub, and from one to two gallons of cold water poured down the spine from the nape of the neck. It is then rubbed dry, and put to bed. Blistering or other counter-irritation over the sacrum does good in some cases. When other means fail, the use of the constant current may be tried, and sometimes with good results. The positive pole should be applied over the lumbar spine, and the negative to the perineum.

Vulvo - Vaginitis — Leucorrhœa.—In girls, the vulva and vagina may, together or separately, be affected with catarrhal, aphthous, or gangrenous (diphtheritic) inflammation. In the ordinary *catarrhal* affection the mucous surface is red, sometimes slightly swollen, and discharging a muco-purulent secretion of a yellow or yellow-green colour. The discharge is eminently contagious, and may be communicated to other children by direct contact through the medium of the fingers, or by being washed in the same bath, or using the same sponge or towels. Conjunctivitis may be set up in a similar manner. The disease generally affects children who are naturally of weakly constitution, such as the scrofulous, or those suffering from acquired debility, the sequela of some acute disease, such as measles or scarlatina. Children suffering from ascarides are also liable to be thus affected. Want of cleanliness, or the habit of introducing foreign substances into the genital passages peculiar to some children, may also give rise to it.

Aphthous Vulvitis is a more severe form of the disease, attended by some constitutional disturbance. It generally affects the labia majora in the first instance, and is apt to spread either internally or to the nymphæ and clitoris. Small roundish spots first make their appearance, generally in groups. These tend to become confluent, and form larger patches presenting a greyish colour. The epithelial surface becomes denuded, forming superficial ulcerations. The inguinal glands

generally sympathise with the irritation, but they rarely become inflamed or suppurate. This affection is liable to merge into the *gangrenous* form — diphtheria vulvæ; more rarely it is met with as the primary affection. The gangrenous surface shows a disposition to spread rapidly and generally externally, extending into the fold of the groin or on to the thighs. This variety is also contagious, and may be communicated to other children, or other mucous surfaces in the same child. In a girl lately under treatment in the Royal Hospital for Sick Children, on account of superficial gangrenous vulvitis, both conjunctivæ became affected with well-marked diphtheria. In older girls affected with vulvo-vaginitis, the question of criminal interference may arise. The history of the case and the presence of bruising or laceration of the genitals will determine the nature of the disease. The late Sir James Simpson believed that vulvo-vaginitis may assume an epidemic form. Judging by analogy, there seems no reason why this should not occur, as we know how infectious conjunctival and other catarrhal affections are. I know of no epidemic in Edinburgh, and none of the leading authorities on the subject, so far as I am aware, make any reference to epidemic visitations.

TREATMENT.—The constitutional and hygienic conditions of the child must be considered. In most cases a liberal diet should be ordered, and careful attention to the state of the digestive system is necessary. Worms, if present, must be got rid of. Should the child be scrofulous, the usual treatment applicable to the constitutional condition must be put in force; a mixed diet, with plenty of animal food and ferruginous tonics, with or without iodine and cod-liver oil, should be ordered. In other children, liquid extract of cinchona, or the citrate of quinine and iron, will likely do good. Locally, great cleanliness is needful; soap should be avoided; frequent washing with boracic lotion, or dilute mercuric chloride lotion, or sulpho-carbolate of zinc, are the most useful applications. In the early stages, when inflammatory action is acute, lead and

opium lotion gives great relief. In diphtheritic cases, when the disease tends to spread rapidly, glycerine of carbolic acid should be painted once or twice over the whole surface, or nitrate of silver may be lightly applied to the surface and edges of the patch. In all cases, no remedy gives more effectual relief than iodoform, freely dusted over the part, a pad of salicylic wool being kept between the labia.

Balanitis is occasionally met with in boys, and is almost invariably associated with phimosis. It may be the result of injury or malpraxis, boys sometimes being in the habit of introducing foreign substances within the prepuce. Urethritis sometimes accompanies it. A boy lately under treatment in hospital for phimosis suffered from an acute urethritis, with thick purulent discharge complicating phimosis. Circumcision should be performed without delay in these cases.

CHAPTER XXXI.

PERITONITIS.

PERITONITIS is not uncommon in children. In foetal life it is generally the result of syphilis, and associated with premature birth. As a post-natal condition it may be due to septic poisoning, through the mother or other causes. True jaundice, or icterus neonatorum, is sometimes complicated with it. Umbilical abscess and fistula is accompanied by or due to localised peritonitis. Perforation of the bowel, from the presence of lumbrici, sometimes sets it up. Invagination of the bowel, if not speedily reduced, always causes peritoneal inflammation. In typhlitis and enteritis, especially typhoid ulcerations, it is met with as a complication. Fæcal accumulations or rupture of hydatid cysts have been known to act as an exciting cause. Trauma is sometimes liable to produce it. A boy lately under my care in the Royal Hospital for Sick Children, for severe hæmorrhage from a tubercular ulcer of the cæcum, suffered from a secondary localised suppurative peritonitis. The abscess was opened and drained, with antiseptic precautions. It healed well, but he subsequently died from meningitis and general tubercular infection. When peritonitis occurs after the period of early infancy, it obeys the same laws, etiologically and clinically, as obtain in adult life. The eruptive fevers, more particularly measles, typhoid, and scarlatina, may be followed by peritonitis. As a primary disease it is less frequently met with than as a secondary result of some such causes as those alluded to. Acute tubercular peritonitis may occur in peritoneal tuberculosis. Suppurative or septic inflammation of adjacent serous cavities,

such as the pleura or pericardium, are often complicated with peritonitis. The possibility of such an occurrence should always be remembered clinically. The intimate anatomical connection between the lymphatic vessels supplying the serous cavities very readily favours its occurrence.

SYMPTOMS.—One striking peculiarity of acute peritonitis in children is the variation, and often complete latency, of the symptoms. Extensive recent peritonitis may be found post mortem that has not been detected during life. Nevertheless, as a rule the symptoms are sufficiently well marked, and the usual train are met with as in adult life,—pain, vomiting, tympanitic distension and constipation, accompanied by fever of a pretty regular and generally not very high type, ranging from 100° to 103° . In typhoid, when peritonitis occurs from perforation, the temperature suddenly runs up to 104° to 105° , forming a marked contrast to the sudden dip which takes place in enteric hæmorrhage. In idiopathic cases, or those from injury or occurring during the progress of or subsequent to one or other of the acute diseases, the symptoms are generally regular and progressive, sometimes of a subacute character. Acute tubercular peritonitis occurs in general tuberculosis or in localised peritoneal tuberculosis. The symptoms are often quite latent, as in cases hereinafter related. One striking contrast between acute peritonitis and pleuritis or pericarditis is the relative infrequency of purulent effusions, however this may be explained. *Localised peritonitis* is more often chronic in its nature. The most common acute form is *perityphlitis*, which is usually associated with some enteric irritation in the cæcum or appendix, from fæcal accumulation or otherwise. As a result, ulceration or perforation may occur, with the formation of an abscess. The symptoms are the usual ones, as met with in adult life—localised swelling, which is sometimes difficult to make out on account of the tense state of the abdominal muscles, pain, vomiting, and diarrhœa. *Umbilical abscess* and *fistula* may occur in children who have suffered from enteric irritation. A localised peritonitis occurs, with adhesion

between the visceral and parietal peritoneal surfaces, at the umbilicus, an abscess subsequently forming. A fæcal fistula generally although not always results. The general peritoneal cavity is not necessarily affected on account of the surrounding adhesions and the escape of the pus externally. In infants, a rarer form of fæcal fistula may be the result of a prolapsed piece of intestine either being included in the umbilical ligature at birth, or spontaneous ulceration taking place during the healing of the stump.

TREATMENT cannot be too carefully carried out when the disease has set in. The child should be kept very quiet and in bed, and hot fomentations or turpentine stupes applied to the abdomen. In some cases ice-bags may be preferred, when the disease is met with at an early period. I am satisfied the inflammation may often be arrested in this way. If no relief is obtained from the cold treatment within a few hours, it should not be persisted in. Nourishment should be given in small quantities at a time—strong beef-tea or beef essence or chicken jelly. Milk must not be given alone, but mixed with lime water or thin gruel. Raw egg, with a few drops of brandy and mixed with a little water, is often useful. Purgatives should be avoided, the action of the bowels being solicited by a simple water or glycerine enema. As to medicines, opiates are the sheet anchor. The child should be kept continuously under their influence by suitable doses, according to age, of liq. morph. hydrochlor. given by the mouth or subcutaneously. The combination of opium with belladonna is excellent. Children with acute peritoneal inflammation bear opium better than under most other conditions. Tympanitis is best relieved by turpentine stupes. A soft flexible catheter, introduced well up into the colon, is often successful in relieving for the time being the distension.

Chronic Peritonitis is more frequently met with in children than the acute disease, and is of great clinical interest and importance. In past medical literature, chronic peritonitis, in its clinical relations, has been mixed up and confounded with a

condition with which it is often associated—tubercular disease of the mesenteric glands, the so-called *tabes mesenterica*, a term which properly is now disappearing from medical nosology. The typical cases (described under this term by the older authors), with big bellies, wasting, and hectic, were no doubt mostly cases of chronic tubercular peritonitis, associated with mesenteric disease as a local expression of general tuberculosis. If the term *tabes mesenterica* means anything at all, it must be chronic disease (tubercular) of the mesenteric glands. When this exists *independently* of chronic peritonitis, the belly is more frequently retracted than distended, and there are probably no special symptoms present indicating glandular disease, apart from those referable to general tuberculosis. Chronic peritonitis may be the result of an acute attack (Bauer), or it may occur from injury, as in cases related by Heno¹ and Stiller.² It may succeed a subacute attack after measles, or other acute febrile disease. Most cases are undoubtedly of a tubercular nature. Peritoneal tuberculosis may exist without tubercular peritonitis—that is to say, scattered miliary tubercles may exist all over the peritoneal surface without giving rise to sufficient irritation or inflammation to produce clinically any symptoms. Tubercular peritonitis is recognised clinically by effusion of a serous, more rarely of a purulent nature, or by exudation of a lymph character, in which, however, there is generally a limited amount of serous or it may be sero-purulent fluid. This has been sometimes called the *cicatrising* form, from the tendency to the formation during the process of recovery of fibrous adhesions, while the exudation is being absorbed. This form is one of the commonest, and of great interest clinically, especially from the fact that recovery often takes place. The comparative infrequency of purulent chronic peritonitis in contrast with chronic pleuritis is noteworthy, as in acute effusions. Peritoneal tuberculosis may be an abdominal expression of the general disease which has originated primarily in some distant part, but recent researches tend to show that,

¹ *Diseases of Children*, p. 224.

² *Deutsch Archiv*, xvi. s. 413, 1875.

not infrequently, it would appear to be primary in its localisation in the belly. Dr. Kümmell of Hamburg has recorded a number of cases which seem to prove this, and Dr. Woodhead¹ has also formed a similar opinion from his observation of the disease in the post mortem room of the Edinburgh Royal Hospital for Sick Children. The poison in such cases, it may be presumed, enters the system by the ingesta, whether in poisoned milk or other food, and finds a suitable nidus in the unhealthy intestinal mucous surface, with its diseased epithelial covering. Its transference into the mesenteric glands and peritoneal membrane readily follows, and there apparently the disease may remain, so far as we know, from the absence, in many cases, of symptoms referable to disease in other organs, and the fact that recovery may take place.

SYMPTOMS.—These vary infinitely, according to the local conditions and nature of the inflammatory action. The only constant ones that I know are—constitutionally, progressive *emaciation*, and locally, *swelled belly*, with impaired percussion and the palpable evidence of fluid or solid masses, and *distension of superficial abdominal veins*. Pain and tenderness may be present, or entirely absent. Inflammatory symptoms, both constitutional and local, may be well marked; on the other hand, there is often complete latency of symptoms, the child going about, or even attending school, with advanced peritonitis. The general clinical features of the disease will be best described by reference to one or two well-marked cases.

Tubercular Peritonitis—Intestinal Obstruction—Gastrotomy—Recovery.—H. C.,² æt. six, had been subject to constipation and tendency to bowel derangement for some time, but was otherwise in good health, although he had passed through the ordinary acute diseases of childhood. The family history showed tendency to tuberculosis. Being previously in apparent good health, he was one day seized with intense pain, vomiting, and obstruction of the bowels. On the fourth day Mr. John

¹ *Laboratory Reports, Roy. Col. of Phys. of Edin.* vol. i.

² I have to thank Mr. John Duncan for notes of this and a subsequent case.

Duncan opened the abdomen, and found the intestines matted together with soft lymph, and the abdominal cavity showed well-marked tubercular peritonitis. The adhesions were broken down with the finger most readily where the bowel was collapsed, but in the pelvis, where the matting together was more dense, this could only be imperfectly accomplished. A glass drainage tube was inserted and the wound closed. On the fourth day after operation fæces passed by both anus and glass tube. In a week the passage of fæces per anum was fully established, and the escape of fæces by the tube gradually diminished. The tube was taken out in the fourth week, and the wound closed in seven weeks. Since then, four attacks of obstruction (the first with some vomiting) occurred at intervals of about a month. He has now been quite well for more than two months, the bowels being regulated by a daily dose of castor-oil. General health much improved. The case is interesting, as showing the ordinary character of exudative lympho tubercular peritonitis, with the accidental complication of intestinal obstruction, which in these cases is of exceptional occurrence, being met with less frequently than might be expected from the physical condition of matters in the abdomen. The case is further noteworthy as showing the apparently localised nature of the tubercular disease, there being no evidence of general tubercular infection. Lastly, the recovery of the patient is evidence of the ability of the system successfully to cope with extensive and far-advanced tubercular inflammation. Another case of a similar nature, with unfortunately unsatisfactory results, is also recorded by Mr. Duncan.

A. B., æt. ten, was in his ordinary health immediately before the attack. The day before, he had been at school as usual, showing the painless and latent character of the disease. He was suddenly attacked with pain and vomiting, and all the symptoms of intestinal obstruction. On the third day the abdomen was opened. General tubercular peritonitis was found, with adhesions so firm that they could not be broken down, and after careful trial the operation was

given up. He died in two days, unrelieved. The following

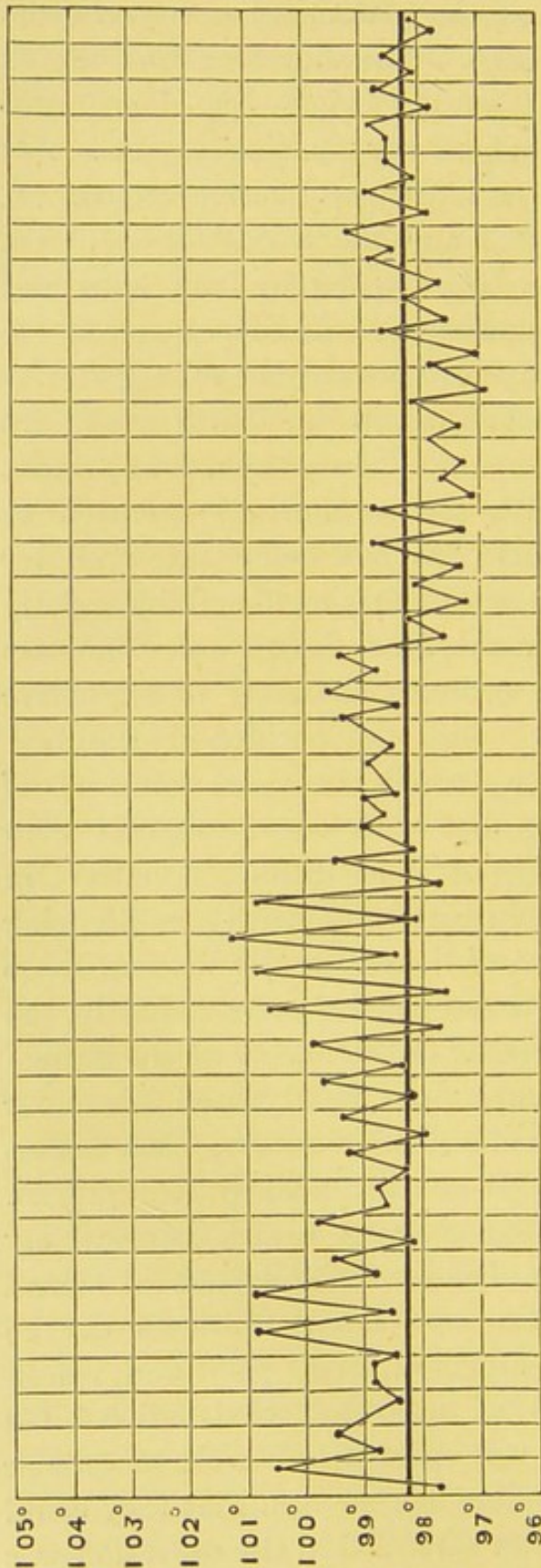


Chart 30.—Chronic Peritonitis—D. F., æt. 11—Recovery.

cases are illustrative of the same diseased conditions, in which recovery took place:—

D. F.,¹ æt. eleven, a well-developed boy, had been quite well until two months before admission to hospital. He had whooping-cough four years ago, measles when eighteen months old, and "kidney disease" three years ago. He had been subject to occasional slight attacks of diarrhœa. Mother healthy. Father subject to chronic cough. One child died of congestion of brain, another is delicate and suffering from chronic cough. Two months ago patient began to be troubled with a short cough, and his belly became gradually more and more swollen and tender. He fell off in flesh, and had a bad appetite. On admission he weighed fifty-five pounds. Examination of thoracic organs ne-

¹ Case Book, vol. vii. p. 177.

gative. Pulse 110, respiration 30, temperature 99° . On examination, the abdomen was found enlarged, and of a somewhat irregular globular shape, no bulging of either flank. On palpation no fluctuation could be made out, the whole belly being tense and resistant, and an indistinct feeling of hard masses could be made out; percussion generally dull, except over a limited area in umbilical and epigastric regions. He was ordered hot fomentations to the abdomen, and subsequently, when the tenderness was relieved, twenty per cent. of oleate of mercury to be applied locally; iodoform, gr. iij, in pill thrice daily. For several weeks the belly remained much the same, and was too tender to admit of further examination, and there has been an irregular febrile movement of a tubercular type, variation from $97^{\circ}\cdot8$ to $102^{\circ}\cdot4$, evening exacerbations, morning remissions. Five weeks after admission an improvement began, the temperature became more regular (average range being 99°), the abdominal tenderness had almost disappeared, and the belly was now examined under chloroform. A large, irregular, hardish mass was found in the left iliac and lumbar regions, three and a half inches in its long diameter, and extending about one inch above the transverse line of the umbilicus. A similar but smaller mass could be felt on the right side. The belly was dull on percussion all over, except in the umbilical area. From this time onward till his dismissal at the end of four months, he made uninterrupted progress, the temperature being normal, the belly becoming softer, and the general health much improved. Four months afterwards he was brought to hospital in excellent health.

Wm. Mc., æt. six. Patient's illness began ten months ago, after an attack of measles. Family history good. Some weeks after measles, the mother noticed the belly began to swell, and the child became languid and listless. He had been more or less troubled with diarrhœa, but had never suffered any pain. On examination, the belly was large, and there was a slight hernial protrusion at the umbilicus, and on palpation there was considerable tension. On percussion of

the flanks there was distinct dulness, although not absolute.

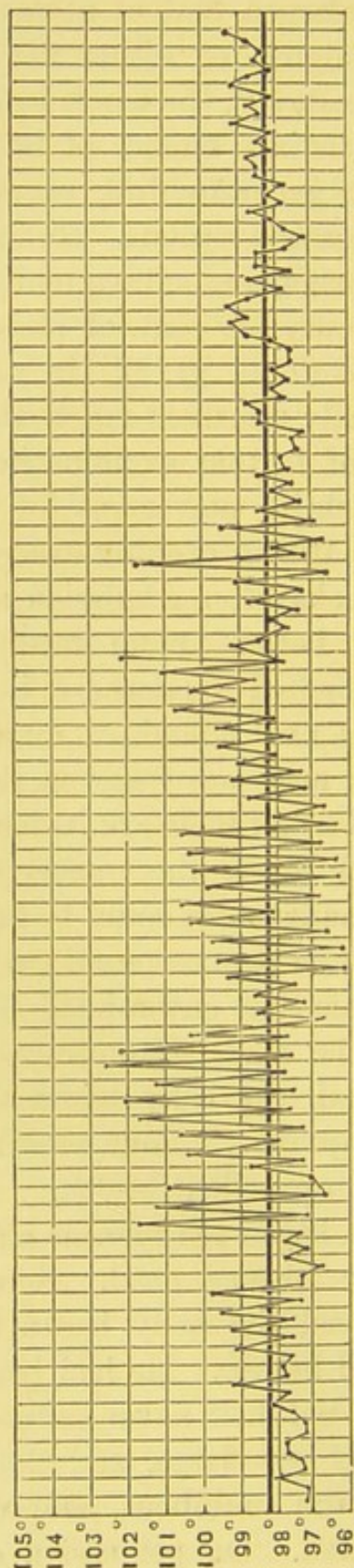


Chart 31.—Chronic Peritonitis—Wm. Mc., *et.* 6—Recovery.

On change of position the dulness on the dependent flank became absolute. Fluctuation could be made out, indicative of a limited amount of fluid. The umbilical region showed normal tympanitic resonance. Girth at umbilicus, twenty-two and a half inches. On examination of the chest, dulness was noted at the left apex, anteriorly, extending outwards to the axillary line; the respiration was feeble, the expiration somewhat prolonged, but there were no accompaniments. Examination of the other organs, including the kidneys, afforded negative results. The child was put upon milk, farinaceous and white meat diet, with cod-liver oil; and twenty per cent. of oleate of mercury was applied to the abdomen, which was encased in cotton-wool with a flannel bandage. A fortnight after admission, it was noted that for the last week he had not been so well; the temperature had been gradually rising, with an average range of from about 98° in the morning to 100° to 101° in the evening. The abdomen was not so tense, but a distinct hardness could now be felt in the left iliac region, with dulness on percussion. The condition of the left lung

apex remained the same, and posteriorly over this lung there were scattered crepitations from the scapular angle to the base, with prolonged and harsh expiration. The further progress of the case showed persistence of pyrexial symptoms, with increased solid swelling in the abdomen; the mass now extended from the left iliac region upwards and towards the middle lines in the region of the umbilicus, and became continuous with the splenic dulness above. The abdomen again became more tense, and was hard and resistant, and very little clear percussion could be elicited except in the umbilical region. He continued much in the same state for about seven weeks, and then a gradual amelioration took place, the belly becoming less swollen and hard, and the temperature falling to a pretty normal range. Four months after admission he was dismissed with the following note:—"The belly is now soft and of natural size, little swelling can be felt. Lung signs absent, except slight dulness of left apex. General health excellent. He is getting fat, and in excellent spirits, having increased eight pounds in weight since admission." He remained well, and now, eighteen months after dismissal, is in excellent health. This is a pretty typical example of a case of chronic effusive peritonitis, with limited ascites at first, followed by an acute inflammatory exudative peritonitis of a lymphic character, which became gradually absorbed as recovery took place.

PATHOLOGY.—The clinical features of chronic peritonitis have been sufficiently indicated in the description now given of the disease. Suffice to say, as a rule, it is presumably of a tubercular nature. Peritoneal tuberculosis is not necessarily, or indeed usually, associated with any local signs, except in some cases of serous effusion (ascites). Tubercular peritonitis generally gives rise to sero-fibrinous exudation, which may or may not become purulent. More commonly the amount of fluid is small, the exudation being of a plastic or lymphic nature, tending to form fibrous tissue and cicatrize (peritonitis deformans). The result of such pathological processes is the formation of fibrous bands and adhesions in the abdominal cavity, matting together

the great omentum, mesentery, and intestines, and often causing adhesion to organs, such as the liver and spleen. As would naturally be expected, such physical conditions may give rise to intestinal obstruction.

PROGNOSIS.—The curability of chronic peritonitis, even of a tubercular nature, is placed beyond doubt, in the light of the clinical experience, especially in abdominal surgery, of the present day. The abdomen has been opened again and again, and extensive peritoneal disease discovered, and yet recovery has taken place. The rarer cases of non-tubercular peritonitis are more hopeful, as regards prognosis, than tubercular ones, in which the prognosis depends first on the nature of the local condition, but more particularly on the question of general tubercular infection and the involvement of other organs in the tubercular process. All these points require consideration before an opinion is expressed, which in every case at first should be guarded. Kümmell of Hamburg records forty cases of chronic peritonitis, in thirty-five of which recovery took place, a wonderfully large proportion. Professor Gairdner, in his lectures to practitioners, holds the opinion that not an insignificant number of such cases get well. My own experience leads me distinctly to corroborate this.

TREATMENT.—In the light of recent experience, recovery in such cases is rendered more hopeful, especially when the disease is localised in the abdomen. The patient should be kept in bed in a well-ventilated room, of mean temperature. Strict attention should be paid to the digestive functions. As much nourishment of a light and easily digestible character should be given as the stomach can bear. Strong soups, raw eggs, milk cooked and with lime water or gruel added, minced chicken, white fish, bread and butter, according to the digestive power, should be given in suitable quantities and at proper intervals. Little medicine should be given, except such as is required to assist digestion and control catarrhal complications; thus, small doses of hydrarg. c. cretâ may be required, or rhubarb and soda, or some preparation of bismuth.

Pepsine or trypsin are often useful in these cases, and so also the artificially digested foods, when ordinary nourishment cannot be taken.

Local Treatment is always required. If there is pain or tenderness, fomentations, either simple or opiate, should be applied. Dilute iodine liniment or ointment is often serviceable. I have seen more benefit from mercurial applications than any others in these cases, and I much prefer the oleate of mercury, twenty per cent., with an equal quantity of lanoline. This should be applied once or twice a day with a compress of cotton-wool and a light flannel bandage. In all cases the abdomen should be encased in flannel. During convalescence, and when the digestive system permits, tonics, such as quinine, or the citrate of quinine and iron, or cod-liver oil, may be given. Iodide of iron is a favourite remedy in most hands, but I have not found it so generally serviceable as might be expected. The stronger preparations of iron often disagree. I have only to refer to surgical treatment in these cases. Simple effusions may require tapping. Purulent collections should be evacuated by incision, and the cavity drained. In fibrinous exudative cases, where there is much tension, there is usually a certain amount of fluid; and the insertion of a glass drainage tube, with antiseptic dressing, hastens the process of cure by relieving congestion and allowing absorption and cicatrisation to go on.

ASCITES.

Peritoneal dropsy and effusion are so common in the child, as to deserve special attention. The frequent use of the term "idiopathic ascites" indicates the difficulty in any given case of assigning the true cause of the effusion. A few cases will illustrate the clinical features of the affection, and form a text for some remarks on causation and treatment.

Chronic Simple Effusion—Recovery.—C. S., æt. four, was placed under my care, suffering from peritoneal dropsy. She

was reported to have always been a healthy child, with the exception of an attack of measles followed by whooping-cough a year ago. Three months before she came under observation she had suffered from diarrhœa, which lasted two weeks, and lately the mother noticed her belly gradually becoming more and more distended. The child presented no constitutional symptoms whatever, pyrexia being absent. Physical examination of all the organs afforded negative results. The signs of ascites were well marked. The effusion was absorbed at the end of five months, and she has remained well and strong ever since, now six years ago.

Acute Effusion—Recovery.—C. L., æt. four and a half, a remarkably healthy child till six months ago, when she suffered from measles. When I saw her the abdomen was much distended, and fluctuation distinct. Examination of all the organs negative. She was irritable, fretful, and feverish. Temperature ranged between 101° and 102°, and five days after my first visit the belly had become greatly distended, the child distressed and restless, and unable to lie down (orthopnœa). No relief having been obtained from purgatives, diaphoretics, diuretics, and fomentations, I decided to tap. Forty ounces of clear ascitic fluid were removed by a medium-sized canula. The child made an excellent recovery. After tapping there was a slight reaccumulation of fluid, which became speedily absorbed, and in three weeks she was convalescent. The patient called for me some months ago on the eve of her marriage—a stout, healthy young woman of three-and-twenty.

K. M'N., æt. six, was admitted into hospital on account of distended abdomen, which had been increasing in size during the previous six weeks. She was a thin and delicate-looking child, and had suffered from chronic diarrhœa for some time, but no other reported ailment. The parents were healthy, two other children alive and well, two infants had been still-born, and a third died of "bowel hives" a few weeks old. Examination of internal organs revealed no evidence

of disease, the only other abnormality being a slightly albuminous condition of the urine, which only lasted a few days, and a small sinus, the result of an abscess in the left axilla, which rapidly healed under treatment. On examining the belly, fluctuation was distinct, the fluid being moderate in amount. She was kept in bed, and all signs of fluid had disappeared in less than a fortnight.

Dr. Wolff, in the year 1837,¹ detailed an account of one hundred cases of peritoneal dropsy in children, in which the effusion is described as of a primary nature. He drew attention to a peculiar sign detected in these cases, and which was afterwards confirmed by Professor Nase—a degree of tumidity at the root of the nose. This sign I have observed, but not apart from a general puffiness of the upper facial region. Trousseau has described one hundred cases of ascites in the *Gazette des Hôpitaux*, all of an acute nature. Bouchut² also alludes to cases of a similar kind in his clinical treatise. Trousseau, in discussing these cases, says he considers them strictly analogous to acute hydrothorax, depending on pleuritis. In his experience the very acute febrile cases are often fatal, the chronic ones ending favourably. Goodhart says, “It would appear that simple dropsy of the peritoneum is of more frequent occurrence in children than in adults.” “Very little is known about it, save the fact that ascites comes and goes without any definite cause.” Eustace Smith says, “An accumulation of fluid is sometimes met with in the peritoneal cavity as a result of various causes, and it is not always easy to refer the symptom to its true origin.” Dr. Max Hirschberg³ has collected and recorded a number of cases of chronic exudative peritonitis. Most of them were examples of tubercular disease. In several the cause was doubtful, and recovery took place. Quincke, Vierordt, and Galvagni have all described cases of a similar nature.

ETIOLOGY AND PATHOLOGY.—The etiology of primary or

¹ *Analek. über Kinderkrankheit.*

² *Diseases of Children.*

³ *Archiv f. Kinderheilkunde*, ix. 2, 1887.

idiopathic ascites has given rise to much discussion among pathologists. Rehn and Galvagni are of opinion that *chill* of the *surface* of the body, in association with rheumatism, accounts for its production in many cases. Henoch considers *trauma* a common cause. Seiler believes that, excluding tuberculosis, *syphilitic gummata of the liver* are among the most frequent causes. Baginsky attaches great importance to the pre-existence in many cases of *digestive derangements*, such as intestinal catarrh, inducing long-continued diarrhœa. Vierordt is of opinion that it is commonly a sequela of *measles*, *typhoid diarrhœa*, or *ulcer of the stomach*. In regard to the pathology of the complaint, there can be little doubt, according to our present knowledge, that in most cases we have to deal with an *exudative peritonitis*, and the question in any given case turns upon the point as to whether the peritoneal disease is of a simple or tubercular nature. Bouchut and Trousseau believe in the existence of simple peritoneal effusion of an inflammatory nature, similar in causation to simple pleuritic or synovial effusions. The difficulty of diagnosis between simple and tubercular effusion is by no means an easy matter, as we know that in either case recovery may take place. Two of the cases we have alluded to, that of C. S. and C. L., showed no evidence of tubercular disease, and presumably were simple effusions. An interesting question regarding the etiological pathology of peritoneal effusions, is the possible occurrence in some cases of adhesive pylephlebitis, giving rise to thrombosis of the vena portæ. Portal obstruction, from whatever cause, almost invariably gives rise to dropsy of the peritoneum. Such cases are known to occur. Litton and Cohnheim¹ have described the pathology of portal thrombosis, which is admittedly very difficult of diagnosis, from the fact that symptoms of biliary disturbance are rarely present. Jacobi gives as a cause of ascites as well as hepatic congestion in children, *constriction of the inferior vena cava* from adhesions, the result of diaphragmatic pleurisy. Many of the cases of

¹ Virchow's *Archiv*, Bd. lxxviii. p. 153.

chronic peritoneal effusion in children occur in debilitated conditions of the system, more especially as a *sequel of chronic diarrhœa*, and there seems no reason to doubt that, associated with such a state, you may have portal thrombosis. Analogically, we know that a similar state of the blood in wasting disease causes thrombosis of the cerebral sinuses, giving rise to ventricular effusion, and death from intracranial pressure, and there would seem to be a strong presumption in favour of the occurrence of portal thrombosis under like conditions. Independent of portal obstruction, however, the occurrence of simple dropsy or non-inflammatory effusion into the peritoneum (metastatic transudation) would be quite consistent with ordinary pathological laws, regulating the transudation of fluids in cases of chronic diarrhœa, where there is a large amount of fluid drained away from the adjoining intestinal mucous surface.

According to our present knowledge, it may be affirmed that the so-called idiopathic ascites is common in children. Its cause is not easily ascertained, and it frequently occurs independently of disease of any internal organs. It would appear to be most frequently associated with peritonitis of a tubercular or non-tubercular nature. The effusion may be acute or chronic. *Acute Effusions* are sometimes traumatic, or may succeed one or other of the eruptive fevers, such as measles, scarlatina, or typhoid. Such cases generally end favourably. *Chronic Effusions* are frequently, although not invariably, tubercular in their nature. Tubercular peritonitis may occur without any sign or definite symptom of general tubercular infection, and may apparently be localised in the abdomen. Abdominal surgery has proved this, the abdomen having been opened, and miliary peritoneal tuberculosis found, the patient making a good recovery. Certain cases of ascites are neither of an inflammatory nor tubercular nature, being simply due to peritoneal dropsy, from causes referable to the circulation, especially in the portal system. Thus, pressure from tumour or enlarged glands upon the portal vein, or portal thrombosis

from adhesive pylephlebitis, will inevitably cause hydro-peritoneum. The exact pathology of certain chronic cases occurring in debilitated children, it is probable, may or may not be associated with portal thrombosis, the diagnosis of this condition being difficult. Ascites may occur independently of portal obstruction, often as a sequel of gastro-intestinal disorders or chronic diarrhoea (metastatic transudation).

TREATMENT must have reference to the cause. In acute cases the result of traumatism, confinement to bed, with attention to the digestive functions, and the application of an abdominal flannel bandage, is all the treatment necessary. In simple inflammatory cases, occurring after measles or other acute diseases, tapping may be necessary if the effusion is large. Confinement to bed, fomentations to the abdomen, diaphoretic and diuretic salines and purgatives, are the means indicated. In chronic cases, tubercular or non-tubercular, confinement to bed is also necessary. The constitutional treatment must have reference to the general condition of the child. Nourishing, unstimulating diet, consisting of milk and strong soup, with occasionally the use of white meats or fish, may be allowed. Strict attention to the digestive functions, both primary and secondary, are of the first importance. To this end the diet must be regulated, as regards quantity and quality, by the digestive ability of the child. The bowels should be regulated if necessary by gentle laxatives—Hunyadi or Victoria water suits well, or drachm doses of equal parts of compound liquorice powder and acid tartrate of potash, or Rochelle salts. Carlsbad salts are also good as a laxative. The kidney functions must be regulated, and means adopted to increase the secretion. The action of diuretics in these cases is admittedly uncertain. The "changes must be rung," in order to find out which will best suit the particular case. In some cases the salines, as acetate or bitartrate of potash, with small dose of iodide of potassium, will succeed; and in others the vegetable diuretics, such as scoparium, juniper, or caffeine, will act better. In many cases, when no other

diuretic has any effect, the results of the administration of copaiiba are most satisfactory. I have seen several cases evidently cured by this drug. In tubercular cases, liquor of the perchloride of mercury, in from ten to twenty drop doses, along with a grain of hydrochlorate of quinine, made up in a mixture, with fluid extract of liquorice and peppermint water, often acts well. This mixture regulates the action of the bowels, but should be stopped if diarrhoea comes on. Glycerite of the iodide of iron, with one grain of iodide of potassium added to each drachm, is also a combination from which I have seen good results. The local treatment of the abdomen is important. It should be covered with cotton wadding, and encased in a soft flannel bandage, whether any other local application is used or not. Alterative and resolvent liniments and ointments are indicated. Equal parts of iodide of lead ointment and lanoline, or the same proportion of iodine ointment and lanoline, or the iodide of potassium liniment with soap. Mercurial applications are perhaps the most valuable of all. Oleate of mercury, twenty per cent., with an equal proportion of lanoline, is an excellent application, producing after a few days mild counter-irritation. The internal administration of cod-liver oil should be used with caution, as in patients confined to bed, especially delicate tubercular children, it is not always easily digested, but, if borne by the stomach, it generally does good.

CHAPTER XXXII.

DISEASES OF THE LYMPH GLANDS.

LYMPHADENOMA (*Hodgkin's Disease*)

Is one of the rarer forms of lymph gland disease. It affects the lymph glands and adenoid tissue of the body generally, and is of an infective nature. It is rarely met with in very young children, but usually commences in the interval between the first and second dentition, or at a later period.

ETIOLOGY.—The causes of this disease are not well made out. Probably one or other of the acute diseases is in many cases the most frequent antecedent. Children of the poorer classes, who have been brought up in unfavourable hygienic and dietetic conditions, are often among its victims. Syphilis in the parents is credited by some writers as a predisposing cause, and so is tuberculosis.

SYMPTOMS may be divided into constitutional and local. The constitutional symptoms are emaciation, anæmia, and generally debility, with a varying amount of pyrexia. The patient is generally dull and apathetic, and rarely suffers any pain. The average temperature range is between 100° and 101°, with occasional exacerbations or remissions of greater or lesser degree. In rarer cases the range is persistently higher through the course of the disease. The skin is usually dry and harsh, sweating being rare. The digestive system is almost invariably deranged, and the appetite bad. The tongue is sometimes coated with a yellowish-white fur, at other times raw and denuded of epithelium. Stomatitis often

complicates the unhealthy state of the mouth and stomach. The bowels are often loose, less frequently constipated. The belly is sometimes swollen and tympanitic. The respiratory system shows no abnormal signs, unless the disease has spread to the lungs, in which case cough is an early symptom, and, on examination, evidence may be obtained of serious lung lesion, local consolidations, or the formation of cavities. The urine is generally normal, but in some cases hæmaturia has been met with. The blood, on examination, will be found deficient in red corpuscles, no increase of leucocytes. The *local signs* in this disease are in the lymphatic glands and internal organs, particularly the spleen and liver; but the kidneys, lungs, intestines, heart, and suprarenal capsules may all be infected. The lymphatic glands in the groin, axilla, and in the neck are enlarged. If the case is seen in an early stage, only a few glands in one or other of these situations may be found affected; gradually but surely the disease spreads to the other glands. The lymph glands in the cavities are affected in a similar manner, and, when the enlargement is great, symptoms of pressure show themselves in the form of local œdema and dropsy of serous cavities. The glandular enlargement affects first single glands, and then groups, which, as they enlarge, become united together into solid masses. The consistency of the glands is generally hard and fibrous, but sometimes they are of soft consistency. Suppuration and caseation are rare. From the lymphatic glands the infective process goes on so as to involve the various viscera, in which secondary tumours are formed. In the viscera the diseased tissue is of the same character as in the lymph glands, but shows a greater tendency to soften and caseate.

MORBID APPEARANCES.—In the lymph glands, on section after hardening, a great increase in the number of endothelial cells is noticed, and likewise marked thickening of and general hypertrophy of reticular tissue, which gradually assumes more and more the character of fibrous tissue. As this process goes on the lymphoid cells decrease in number. These

characters serve to distinguish lymphadenoma from, on the one hand, lymphoma—in which we have essentially ordinary lymphoid tissue, the relation between the endothelial plates, reticulum, and cells being normal—and lymphosarcoma, where there is atrophy of the reticulum and fewer endothelial plates, with great increase of cellular elements.

Spleen (Hodgkin's Disease) is enlarged, but not to such an extent as in leucocythæmia. The surface of the organ is dark, with purple spots frequently scattered over the surface. The consistency of the organ is firm and tough. On section, Woodhead describes the appearance of the surface as “of a deep red colour, with numerous small angular translucent yellow masses, almost like small masses of suet. Some of these are rounded, but others are elongated, branching masses.” These are altered Malpighian bodies. “In place of these small yellow masses, there may be present large tumour-like masses of tissue, in all respects similar to that of which the altered adenoid sheaths are composed.” Microscopically the true nature of the morbid change is at once apparent in the enormous increase of fibrous tissue elements, with the large number of endothelial plates and small number of lymphoid cells.

Liver (Hodgkin's Disease).—The organ is enlarged, and the disease shows itself by small pinkish or grey nodules in the neighbourhood of the portal canals, which gradually encroach on the lobules. The masses are most frequently small in size, more rarely larger and of tough consistency, tending to caseate in the centre. They are usually surrounded by a plexus of venous radicles. On microscopic examination the growth presents all the lymphoid characters described already in other organs. It gradually encroaches on the lobules, by spreading along the minute blood-vessels, the endothelial plates of which are much increased. The growth gradually causes atrophy of the liver cells.

Kidneys.—In them the disease likewise causes enlargement of the organs. The adenoid tissue increases around the glomeruli and tubules, and passes along the blood-vessels,

which are generally filled with leucocytes. Other organs, wherever lymphoid tissue is present—as in the intestines, serous membranes, lungs, suprarenal capsules, heart and skin—suffer in a similar manner, showing the intensely infectious nature of the morbid process.

DIAGNOSIS.—The disease is only difficult to diagnose in the early stage, when few glands are affected. The fibrous and elastic character of the glands generally serves to distinguish them from the harder caseating scrofulous glands, which are soon attended with softening and surrounding inflammation. The constitutional conditions and general symptoms are also different. The general characteristics of the scrofulous cachexia contrast markedly with the peculiar pyrexial symptoms, the great pallor and languor, and the condition of the blood in lymphadenoma.

PROGNOSIS.—The disease being essentially of a malignant character, renders the prognosis very hopeless, although cases in which life has been prolonged, and even recovery taken place, have been recorded. In these cases the disease has generally been arrested at an early stage, sometimes by extirpation of the diseased glands.

TREATMENT must be essentially tonic and supporting. Good hygienic conditions are necessary. The diet should be carefully regulated according to the digestive powers, and as nourishing as possible. Cod-liver oil may be given by mouth, or by inunction if the stomach refuses it. Arsenic, quinine, and iron are the best tonic remedies, and in my hands have been found useful in the order of mention. Chloride of calcium I have found useful in some cases, not so the iodides, which I agree with most physicians in discarding altogether.

Anatomical and Physiological Relations of the Lymph Glands.

—In children probably no class of diseases is of greater importance than those of the lymphatic glandular system, whether from their frequency or far-reaching effects in endangering the health and life of the patient. It is only in recent

years that due attention has been given to these affections, chiefly in connection with the progress made in our knowledge regarding scrofulous and tubercular diseases. In the clinical examination of the child, a careful consideration of the state of the lymphatic glandular system is of the greatest importance, and should never be omitted. This system, so intimately associated with the nutritional processes, is relatively in a state of greater functional activity in the child than the adult. It must ever be remembered that in the child, in addition to the ordinary processes of waste and repair, growth and development are going on apace, and, in proportion to the greater physiological activity of the lymphatic system, so is there a tendency to disturbance of its function and disease. A knowledge of the anatomy and physiology of this system must form the basis of a study of the morbid conditions met with. The function of the lymph vessels distributed generally throughout the organs and tissues of the body, it is believed, is, along with the capillaries, to return the waste products of the tissues into the venous system; their purpose principally being that of elimination, partly also that of elaboration. The lymph in its progress onwards, passes through the glands, which are situated at varying intervals along the routes. The exact function of these glands themselves is not exactly known. It is believed that they act as filters, passing on the lymph in a purified condition, possibly elaborating part of it for nutritional purposes. The lymphatic vessels are of various sizes, the larger ones being visible to the naked eye along the course of the great blood-vessels. There are two sets, a superficial and a deep, in the organs and other parts of the body. In addition to the vessels and glands, there are interstitial lymph spaces in the connective tissue, as well as lacteals and follicles in the intestinal canal. Among the largest lymphatic areas in the body are those in the serous surfaces, where there are large plexuses along with the capillary blood-vessels. The vessels lie under the endothelial coating, and communi-

cate through open mouths (stomata) with the serous cavity. The larger lymph vessels have three coats similar to the veins; the capillary vessels essentially consist of an endothelial layer on a basement of elastic tissue. Connected with each gland are two sets of vessels, afferent and efferent, the former opening into the alveoli of the cortical part of the gland, the efferent vessels originating in a plexus in its medullary portion. The glands themselves anatomically consist of a capsule of connective tissue, which sends partitions inwards. A few involuntary muscular fibres are generally found both in the sheath and partitions. The alveoli formed by the partitions of connective tissue contain lymph corpuscles embedded in a retiform network of fine tissue. Such being an outline of the anatomical facts connected with the lymphatic system, its intimate connections with the nutritional processes will be evident, and still more so its pathological relations. The changes taking place between the lymph and blood in the glands is favoured by the slowness of the circulation of fluids in the various vessels and in the glands themselves. In addition to the fluid relations in the glands, of equal interest and importance are the changes which go on in the cellular elements. The fact that larger numbers of corpuscles are present in the efferent than the afferent vessels, points probably to a continual production of these protoplasmic elements in the glands themselves. As a matter of fact, there can be no doubt that the lymphatic system is the channel through which morbid poisons are most readily diffused through the body. Such poisons may pass readily through the glands, others are arrested and the poison elaborated, forming focuses of infection for diffusion throughout the body.

ANATOMICAL SITES.—A knowledge of the topography of the lymph glands is essential to an appreciation of the special symptoms which may be produced when they are diseased. I find as a rule that students have no accurate knowledge in this respect, and I have therefore deemed it necessary to refer to the anatomical facts involved in a discussion of this subject.

For clinical purposes, the glands may be roughly divided into those on the surface of the body and limbs and in the cavities connected with the viscera.

Head and Neck.—The *superficial glands* in this region are divided into—1. *Occipital Group*, lying behind the ear, over the occipital attachments of the sterno-mastoid and trapezius. They are connected with the vessels supplying the posterior half of the scalp, and are liable to disease in connection with cutaneous affections of this portion of the head, eczematous and impetiginous eruptions, whether caused by pediculi or otherwise. 2. *Parotid and Sub-maxillary Group*.—Four or five glands are generally situated in the cellular tissue over the parotid. They receive their afferent vessels from the middle and anterior portion of the scalp, and that side of the face. Other glands lie in the substance of the parotid, and receive their vessels from the orbit and nose, and probably a few branches from the mouth and pharynx. The superficial glands, like those in the occipital region, are liable to be irritated from cutaneous eruptions on the face and scalp; the deep set from ocular, nasal, or buccal affections. The sub-maxillary glands lie along and beneath the line of the lower maxillary bone, from the angle to the symphysis. They receive the vessels from the lower part of the face and mouth, and are liable to enlargement, either from skin eruption in this area, or from buccal irritation in teething or stomatitis. 3. *Cervical Group*.—The superficial glands of the neck are situated in the posterior triangle in the course of the external jugular vein, between the platysma and the sterno-mastoid. Their vessels are derived from the side of the neck, and many of them from the afferent vessels of the occipital and superficial parotid glands. The *deep glands* of the *head and neck* are much more numerous than the superficial. They form a continuous chain beneath the muscles and external to the sheath of the carotid and internal jugular, extending up to the base of the skull and downwards along the side of the pharynx, where they are continued along the œsophagus and trachea

into the thorax and axilla. They receive vessels from all the deeper structures of the head and neck, including the pharynx, larynx, and back of the tongue, nasal fossæ, and interior of the cranium. In the posterior wall of the pharynx are situated generally one or two small glands which receive their vessels chiefly from the nasal fossæ and upper part of the pharynx. Their pathological importance is demonstrated by their liability to enlargement and inflammation, often forming the starting-point of retro-pharyngeal abscesses in children, which may originate from a nasal catarrh or ozæna, which in their turn may have been set up by coryza or an attack of measles or scarlatina.

Thorax.—The glands in this cavity may be grouped into *parietal* and *visceral* sets. The *parietal* are situated in the anterior mediastinum and along the course of the internal mammary vessels, some being found in the diaphragm and around the pericardium and great vessels entering and leaving the heart. The posterior mediastinum also contains a number of glands, which lie along the side of the œsophagus and aorta, and communicate with the intercostal and lumbar glands below. Clinically, the most important glands in the thoracic cavity are the bronchial, which are situated at the roots of the lungs and bifurcation of the trachea, and along some of the larger divisions of the bronchi; they receive their vessels from the lung itself, and also from the pleura. They are liable to disease in connection with bronchial and pulmonary catarrh, especially when set up by specific irritation, as in measles and pertussis. They are specially prone to tubercular infection, and often form focuses for the further spread of this infective disease. When much enlarged, these glands are apt to cause pressure on important structures.

Abdomen and Pelvis.—In these regions are numerous glands. There are two sets of *iliac glands*, lying respectively along the external and internal iliac vessels. The *lumbar glands* are numerous, and are situated along the vertebræ and the common iliac vessels. They communicate and form a continuous chain with the iliac and sacral glands below. All these

glands receive their vessels from the abdominal and pelvic viscera, and partly from the lower limbs. They unite into several large trunks, which, joining with the lacteals from the intestines, form the thoracic duct. In disease, especially malignant, of the abdominal or pelvic viscera, or of the lower limbs, they are liable to enlargement and degeneration. Clinically speaking, probably the most important glands in the abdomen are those connected with the intestine (mesenteric). They are very numerous, probably from a hundred to a hundred and twenty, or more. The average size is about that of a small pea, and they are situated between the layers of the mesentery. Those connected with the duodenum and the ileum are generally the largest. Most of the mesenteric glands are thus connected with the small intestine. Those connected with the large intestine are situated near the larger mesenteric vessels and along the colon, chiefly the transverse. The mesenteric glands are liable to be affected most frequently in connection with the ordinary intestinal diseases of childhood, in the same manner as the bronchial glands suffer from bronchial affections.

Upper Limbs.—The glands in this situation are divided into superficial and deep sets. The superficial ones are only four or five in number, being situated in front of the elbow and just above the internal condyle of the humerus. The deeper glands are also few in number, one or two being found in the course of the radial and ulnar vessels, others on the inner side of the brachial artery. The *axilla* is richly supplied with glands. They lie in the loose areolar tissue, in close relation to the large vessels. Their interest is mainly surgical.

Lower Limbs.—Here we have superficial and deep glands, inguinal, tibial, and popliteal. The *superficial inguinal glands* are divided into two sets, one lying along the line of Poupart's ligament, and receiving vessels from the abdominal parietes, scrotum, penis, perineum, and gluteal regions; the other extending horizontally along the saphenous veins. These receive their vessels from the lower extremity, and are liable to be affected in children from cuts or neglected pustular

eruptions on the feet and legs. The *deep glands* are the anterior tibial (sometimes absent), the popliteal, deep inguinal, gluteal, and ischiatic. They receive the lymph supply of the deeper structures of the lower limbs, and the deep inguinal communicate freely with the femoral through the saphenous opening.

ADENITIS.

Apart from the conditions of lymphadenoma, lymphosarcoma, and simple lymphomata, the secondary or inflammatory conditions of the lymph glands are, I think, best classed under the term adenitis. Included in this designation I shall refer to simple glandular hyperplasia, simple adenitis, scrofulous and tubercular adenitis.

Hyperplasia, or numerical hypertrophy of the constituent elements of the glands, is usually the first step in the various chronic pathological processes due to irritative material circulating in the afferent vessels of the glands. The normal cellular elements gradually become transformed into large celled tissue, composed of round or spindle-shaped cells, the proper lymph adenoid tissue gradually disappearing. The starting-point in the process is the accumulation of leucocytes in the gland tissue, and the subsequent formation of epithelial cells with large nuclei. The result of all these changes is enlargement of the glands, which become firm and hard. On section, the gland has a translucent appearance, which on exposure to air changes colour, and presents a brownish appearance. Another form of hyperplasia is that of the adenoid reticulum, which, along with disappearance of the lymphoid elements, may become partly hyperplastic, with the formation in parts of dense fibrillated connective tissue. This is also produced by the deposition of foreign substances in the glands. The only other form of hyperplasia requiring notice is that produced by inflammation. This results in the formation and increase of fibrous tissue, causing often great enlargement of the glands.

Simple Adenitis is the result of irritants circulating in the lymph. The glands are enlarged acutely, and on section are red and congested, often showing hæmorrhagic patches; later on, the section shows a paler appearance, from increase in the number of leucocytes and diminution of the red corpuscles. Acute inflammation of the glands may end in resolution, suppuration, fibroid degeneration, or caseation. When suppuration takes place we have a true suppurating bubo. Caseation does not result unless the inflammatory process assumes a chronic type.

Scrofulous Adenitis may result from acute adenitis in a scrofulous subject. The glands remain swollen; on section they are opaque and cheesy-looking. The capsule is often thickened. The earlier changes are found, on microscopic examination, to consist of accumulations of leucocytes in the adenoid reticulum. Large epitheloid cells often appear, and sometimes giant cells. When caseation takes place, coagulated masses and fat cells are noticed, and gradually the whole gland may become transformed into a homogeneous caseous mass.

Tuberculous Adenitis, it is believed, results from the access of the tubercle bacillus to the gland, *viâ* the afferent lymphatics. It is a common disease in children. The bacillus generally finds entrance to the lymphatic vessels on an unhealthy mucous surface, which has been partly denuded of its epithelial coating. Either the buccal mucous membrane, or the tonsils, or some part of the gastro-intestinal mucous surface, or, in the case of the lungs, the pulmonary mucous membrane, may be the point of entrance of the tubercular virus. The poison may set up tubercular changes on or in the neighbourhood of the mucous surface, in which case the glands become secondarily affected; or, as more frequently happens, the bacillus first finds its nidus in one of the glands, in whichever way, the infection may take place. It is believed that a healthy gland, under favourable conditions, may dispose of the bacilli; if not, certain changes are soon set up. The

gland enlarges, and becomes firm and fleshy. Small translucent tubercles become scattered through it. The formation of the tubercles is generally preceded by the increase of leucocytes in the alveoli and follicles, and the gradual formation of large nucleated epitheloid cells. The giant cell formation becomes soon developed, and ultimately the usual process of caseation takes place. The danger resulting from tubercular gland is the spread of infection throughout the various organs of the body, but it is pretty certain that this does not always take place, and that the disease may remain a purely local one.

CAUSATION.—In considering the causes of adenitis, I prefer to class them under the terms predisposing and exciting, rather than constitutional and local. The term constitutional is often associated, or sometimes considered synonymous with idiopathic, a word often used as a cloak for ignorance, which ought to fall more and more into disuse, as our knowledge of pathology increases. As regards the constitutional element in these non-malignant lymph gland diseases, I have no wish to minimise its importance, believing that it is one of the most frequent factors in this class of diseases. I regard the so-called constitutional causes only in the light of a predisposition to disease, and as having important bearings on the progress and ultimate results of morbid processes in the glands. The teaching of Treves and others quite coincides with my own experience, that the existence of the so-called idiopathic glandular enlargements from constitutional causes alone is unproved. After many years of careful clinical observation on this point, I have satisfied myself that it can be almost invariably demonstrated that some local peripheral irritation has preceded the glandular enlargement. If in scrofulous subjects the constitutional element were sufficient alone to cause the glandular disease, we would expect it to arise in different parts of the body at the same time; but clinical experience negatives this altogether, as it can generally be demonstrated that some local cause, possibly very trivial,

and often, I believe, overlooked, has existed and been in operation as an exciting cause. Some years ago, in a communication to the Edinburgh Medico-Chirurgical Society, in referring to the subject of bronchial and mesenteric adenopathy, I expressed the opinion I now hold, and detailed some illustrative cases bearing on the subject.

Enlargements of the lymph glands being of secondary origin, the primary disease must be looked for in the areas drained by their afferent lymph vessels. Thus in the occipital glands we meet with cutaneous eruptions on the scalp. In the sub-maxillary glands, dental or buccal irritation always precedes the disease. In the bronchial glands, a bronchitis or some pulmonary affection has existed, either immediately or remotely. So in the mesenteric enlargements we have gastro-intestinal catarrh. In a previously healthy child, without constitutional taint, the probability is that the gland disease will be cured on the removal of the exciting cause. In a scrofulous child, on the other hand, the course of events is different; the glandular enlargement becomes chronic, and shows a tendency to spread along chains of glands, and seldom becomes cured, the glands tending to undergo caseation or tuberculisation. It will thus be evident that although the constitutional element is probably never the sole cause of the origin of these diseases, yet it plays a most important part in their evolution and ultimate results. In the strumous subject, the course of the disease tends to chronicity, extension, degeneration, and caseation of the glands, whereas in a healthy subject the gland disease partakes more of a simple inflammatory nature, pursues a more acute course, and tends either to resolution or suppuration.

SYMPTOMS.—The *symptoms* referable to enlarged glands are peculiar to the part affected, and to the amount of inflammation, whether chronic or acute, that accompanies them. The glands alone may be swollen and hard, and each gland distinctly made out, or they may be matted together by diffuse cellular inflammation in the neighbourhood. In the

cavities, particularly the chest, the enlarged masses may give rise to symptoms of pressure on important parts.

TREATMENT.—Hygienic, dietetic, and medicinal means must be adopted in all cases, surgical treatment in many. The first step in all cases is to ascertain the cause, which may be existent or pre-existent, and long since removed. If any source of peripheral irritation remains, treatment must be adopted for its removal. Local or constitutional means are comparatively useless, so long as the primary cause remains. The child should be housed in a light and airy apartment, and if there is no contra-indication, should be taken out to the open air in fine weather. Careful regulation of all the functions should be attended to, especially as to the diet and state of the digestive system. As to diet, the food must be as nourishing as possible, and must be regulated, both as regards quantity, quality, and time of ingestion, as the digestive powers permit. Great care must be taken not to over-feed the child. The public are under the impression, often prompted by medical advice, that the child should be “fed up,” and unless the patient is constantly under the eye of the medical attendant it is very apt to be “killed by kindness” in this respect. Such cases are so common in my experience, even in consulting practice, where the child is found to be suffering from a more or less chronic condition of gastro-intestinal catarrh, the result of improper feeding, which inevitably keeps up the glandular irritation, that I cannot refrain from calling special attention to it. The same remark applies to tonic medicines, such as iron and cod-liver oil, especially the latter. No remedy requires more care in its prescription than cod-liver oil in these cases. The power of digestion and assimilation of the oil is relative, and varies greatly in different cases. Some children cannot digest it at all, and if administered, it should only be by inunction. In any case, the condition of the gastric digestion should be carefully watched during its administration. I find that cod-liver oil, with liquid extract of malt, can often be taken

when either the oil alone or emulsion are not tolerated. Ferruginous tonics, as the tartrate or ammonio-citrate of iron, combined with an alkali, are very suitable in many cases. Glycerite of the iodide of iron I prefer to the ordinary syrup, as agreeing better with the stomach. Liquor of the chloride of calcium, in fifteen to twenty drop doses, given with each meal in milk, as pointed out by the late Dr. Warburton Begbie, often has a wonderful effect in chronic glandular affections in children. Glycerite of the lactophosphate of lime is also a preparation worthy of extended trial. It should be given after food, in doses of half to one drachm.

Local Treatment.—This must be conducted on ordinary surgical principles, according to the condition of parts. In acute adenitis soothing applications should be applied locally, such as fomentations, and the head should be kept at rest as much as possible. The only satisfactory means of accomplishing this is by using a leather or light poroplastic support, which fits loosely on to the neck, shoulders, and head. Beneath this is a soft padding of cotton-wool. If such an apparatus is not procurable, the neck should be encased thickly in cotton-wool, and over all a soft woollen muffler, put several times round it so as to give it as much support as possible. In more chronic cases, instead of hot fomentations, iodide of lead ointment may be applied on lint, underneath the support. Iodide of potassium liniment with soap, is also a good application. In some cases, oleate of mercury twenty per cent., diluted with five parts of lanoline, will be found useful. When any cutaneous irritation is produced, the application should be discontinued. All stimulating and irritant medications, such as mild blisters, tincture of iodine, and such like, are, in my opinion, worthless. When abscesses form, either in the glands alone or in the surrounding cellular tissue, the pus should be evacuated, with antiseptic precautions carefully carried out. The abscess should be thoroughly emptied and squeezed out, especially if

the pus is mixed with caseating masses. In chronic cases, when no improvement takes place under constitutional treatment and the use of such local measures as already indicated, and especially if there is reason to believe degeneration of the glands has resulted, the sooner they are removed the better. This may be affected by simple enucleation, excision, or scraping with Volkmann's spoon. When the glands are superficial and isolated, excision should be practised, if possible. If they are numerous and matted together, whether situated superficially or deeply, free incision should be made, and all the necrotic material thoroughly removed by Volkmann's spoon. Objections have been brought forward to this method of treatment, on the grounds that it is not always easy to remove all the caseous material, and that the irritation produced may set up general tubercular infection. So far as my experience goes, it seems to be the only method of treatment available in a large proportion of cases, when it is impossible to excise the glands *in toto*. In these cases, when the child dies subsequently from general tuberculosis, probably the system has already been affected. At all events, with large masses of caseous or tubercular material within easy reach of surgical treatment, it is quite consistent with sound principle to give the child a chance by their removal, on the possibility of the disease being local.

Cautery Puncture is recommended strongly by the French surgeons, but I have had no experience of it.

Electrolysis, or the *injection of irritants* into the substance of the gland with a hypodermic syringe, has also been recommended and used with success in some cases.

CHAPTER XXXIII.

RHEUMATISM.

RHEUMATISM is a common affection in children. Pathologically it is the same disease as that met with in adults, liable to affect the same tissues and organs, very specially the heart. Its clinical features, however, are much more varied, and to those unaccustomed to treat children its manifestations are apt to be overlooked. In adults it is essentially a polyarthritis of an acute or subacute character, the joint affection, sweating, and lithate deposits in the urine, presenting distinct and unmistakeable clinical features. In children the same clinical type of disease is met with, but much more rarely at all events in young children. The older the child, the more nearly does the disease approach the adult type in all its features. In general, it may be said that in children the disease presents less acute characters, the joint affection being less marked, and often subordinated to other and more prominent symptoms. Sometimes cases are met with presenting simply the character of a continued fever with absence of pain or other local signs, other perhaps than slight muscular aching of an indefinite character. I have met with such cases from time to time; the fever running on from four or five to eight or ten days, no positive diagnosis being assured until signs perhaps of endocarditis or pericarditis developed themselves. A girl of nine years, pupil in a boarding school, after playing in the garden on a wet afternoon, was seized on the second day with vomiting and headache, with chilliness, succeeded by continued pyrexia, 101° to 102° , without any

special symptoms. On the fifth day the left ankle became swollen and painful, with tenderness along the sheath of the extensor tendons. On the seventh day all signs of the joint affection had well-nigh disappeared, but the temperature rose to 104° . She was restless and distressed, with anxious expression, and a loud to-and-fro murmur was heard over the heart, followed by rapid effusion. The next day left pleuritis came on, and she died on the thirteenth day. The disease may occur at almost any age, but is more frequent during the second dentition than before it. Of seventy-six cases noted by Chapin, three occurred before the end of the second year, one being at the age of six months.¹ Pocock relates a case in a child immediately after birth. The mother was attacked with well-marked acute articular rheumatism in the eighth month of pregnancy. Labour came on, and after the birth of the child it was affected with violent fever and arthritis in the right shoulder-joint, which yielded to anti-arthritic treatment by salicylates. The child got well. There was no heart or other complication. Lewis Smith says, with regard to rheumatism in children, "I have examined many children with rheumatism, or the cardiac lesions resulting from rheumatism, and ordinarily I found that few joints were affected, and that there had been but little swelling of them, or redness, and that the patients were almost never confined to bed, or even to the sitting posture, but had been able to walk about, though with restraint and complaint of pain and soreness. The parents in many instances supposed that their children were suffering from 'growing pains;' at the same time, with this mildness of symptoms, the heart was becoming seriously and permanently crippled." This statement is so apt, and so much in accord with universal experience, that I have taken the liberty of quoting it. A large proportion of cases of endocarditis in children show a history of rheumatism of this indefinite and mild type. In inquiring into the history of an adult patient, it will suffice to put the question whether

¹ *Rev. Mens. du Mal. de L'Enfants*, September 1884.

he has "suffered from rheumatism," not so in the child. Specific questions must be asked in regard to special symptoms, and a history will often be obtained of what has been considered a trivial illness, for which probably no medical man has been consulted—variously called "growing pains," "feverish cold," "bilious or stomach attack," "sore throat," "stiffness in the legs or muscles," erythematous rashes. Rheumatism is generally a primary affection, but sometimes succeeds so closely one or other of the acute febrile diseases, such as scarlatina or small-pox, that it may be called secondary. The rheumatic diathesis is one of the commonest hereditary predispositions. It indicates a liability under certain predisposing causes—such as exposure to cold and damp, associated with disorder of secondary digestion, to the evolution of definite morbid processes in the blood and sero-fibrous tissues, which is termed rheumatism—the intimate pathology of which is still *sub judice*.

CLINICAL FEATURES.—I cannot better illustrate the symptoms than by a short reference to a few cases, not specially selected, but quoted in the order of their occurrence, in the Royal Hospital for Sick Children.

J. F., æt. seven years, admitted June 2, convalescent June 7, discharged June 20; illness began four days before admission, with vomiting and pains in the knees. He had been slightly ailing a week previously. His father was very rheumatic, mother not so; other children healthy. He was a well-nourished, healthy-looking boy. Both knee-joints were stiff and painful. The tongue was moist, the filiform papillæ prominent, a yellowish-white fur, pulse 100, temperature $100^{\circ}\cdot2$. He was treated with $\mathfrak{z}\text{i}$ doses of liq. acet. ammonia and gr. x of soda salicylat. every four hours, and gr. vi of hydrarg. c. cretâ two successive nights after admission. The temperature became normal and pain disappeared at the end of five days.

Jessie B., æt. ten, admitted September 14, convalescent September 17, discharged September 26. Had been ill a week

before admission with "pain in all her joints." Family history does not show rheumatism. She is of fair complexion and rheumatic diathesis. She lies motionless on her back, and the slightest movement causes pain. The left ankle is specially tender, and also the dorsum of the foot along the extensor tendons. There is no effusion into the joint. Tongue moist with a white coating, pulse 104, temperature 101° ; heart's impulse is diffuse, area of dulness not increased. The first sound in the mitral area is rough and prolonged, second sound in the aortic area accentuated. In three days the temperature became normal, and pain in left ankle and foot disappeared.

A. G., æt. twelve, admitted March 31, convalescent April 4, discharged April 20. She was ill two days before admission with pains in wrists, knees, ankles, neck, and back; was feverish and perspired freely. She had pains in her joints two years ago, but never any other illness. Family history does not show rheumatism. On admission temperature $100^{\circ}2$, pulse 118. She could not move any of her limbs. Both wrists were very tender, but not swollen. The knees were also painful and swollen, but there was no evidence of synovial effusion; heart normal. The tongue was coated with a yellowish fur, and moist; the fauces were red, and both tonsils were swollen and red, presenting the characteristic appearance of follicular tonsillitis. The urine was highly acid, specific gravity 1030.

T. A., æt. six and a half, admitted July 20, convalescent July 28, discharged August 11. This little boy had been ill three weeks before admission with swelling of both knees and ankles, fever, sweating, breathlessness, and præcordial pain. On examination temperature $101^{\circ}2$, pulse 108, respirations 38. There was no swelling in any other joints, but stiffness and inability to move the legs. Heart showed a diffuse impulse and slight increase of dulness over the præcordia. On palpation a well-marked systolic thrill. On auscultation a loud blowing systolic murmur is audible at the apex, heard with

almost equal intensity over the lower part of sternum and towards axilla. It is also distinctly audible in the interscapular region behind. A week after admission the temperature became normal, and he slowly convalesced, and was afterwards dismissed very much improved as regards general condition, but heart murmur still distinct.

A. E., æt. seven, admitted November 29, discharged December 8; had been ill three or four days before admission with sore throat. Suffered from measles when eighteen months old, but otherwise healthy. His temperature was $99^{\circ}8$, pulse 120. Both tonsils were red and swollen, some croupous exudation on the left one. Tongue was red, and covered with yellowish fur. Urine was high-coloured, specific gravity 103.3; heart showed a presystolic murmur at apex, running into a rough systolic murmur replacing first sound, second sound accentuated. Locomotory system was normal, and there was no history of joint affection.

J. M., æt. seven and a half, admitted December 13, discharged January 5; about two weeks before admission complained of pains in the wrists and arms. A week before admission the knees became painful and swollen, and red blotches appeared on the legs. On admission her temperature was 99° , pulse 110; she had pain in the right elbow and wrist. On the extensor aspect of both legs was a well-marked erythematous rash, one or two spots were also noticed on the arms about the elbow and wrist. Heart was normal. She made a good recovery.

J. D., æt. seven, admitted February 21, discharged March 4; had been ill four days before admission with pain and swelling of the left ankle-joint, which disappeared, and the ankle and both wrists became swollen, and on the wrists were large red spots. On admission there was no joint affection, but some erythema of the right arm. Heart, a soft systolic murmur in the mitral area, conducted into the axilla. It is not audible at the base of the heart.

Such cases as the above show the comparatively mild

nature of this disease in children, also the absence of severe joint affection. Although the skin is generally moist, such profuse sweating as occurs in the adult is rare in children.

Heart Complication is no less frequent—probably, I think, more so than in adult life. It is difficult to estimate exactly the frequency of heart complication, from the fact that its incidence is often unnoticed, being in the original rheumatic attack undiagnosed or untreated by a medical man. Of recorded cases, Chapin met with twenty-six cases of organic heart disease in seventy-six cases. Of sixty-nine cases mentioned by Goodhart, twenty showed signs of cardiac disease. Endocarditis is more common than pericarditis. The occurrence of cardiac complication is often unaccompanied, especially in the case of endocarditis, by any marked symptom. There may or may not be a slight rise of temperature or præcordial uneasiness. The existence of a soft apical murmur, with some little disturbance of the heart's action, may be the only noticeable signs. Rhythmic irregularity of the heart's action, or reduplication of the sounds, may be associated with endocarditis. In pericarditis the symptoms may be of the same latent character, but more frequently than in endocarditis there are signs which attract the attention of the observant physician—such as change in the expression of the face, præcordial pain, alteration in the character of the pulse. The auscultatory phenomenon of the friction sound may, however, be the only sign to indicate inflammation of the pericardial sac. The subsidence of joint affection or other symptoms, along with a persistence of pyrexia, should always lead to suspicion of cardiac or other complications.

Chorea is very commonly associated with rheumatism. Its exact relation to the disease is not well understood. It is most frequently a sequela, but sometimes precedes it or may alternate with it. Further reference is made to it in another chapter.

Other signs of rheumatism in the child are of interest, and deserving of notice. In two of the cases already noted

tonsillitis was a prominent symptom, and its occasional occurrence in children who develop endocarditis, and show other signs of rheumatic poisoning, has given rise to the term "rheumatic sore throat." I am not aware of any clinical difference between catarrhal or follicular tonsillitis, occurring in children who show other confirmatory evidence of rheumatism, and the ordinary form of angina, but I think in all cases of simple inflammatory sore throat we should bear in mind the possibility of its association with rheumatism.

Erythematous Rashes.—These are common in children of rheumatic diathesis, or hereditarily predisposed to rheumatism. Diffuse erythematous rashes, urticaria, or nodose erythema, are the most common forms in which the cutaneous eruption presents itself. More rarely the eruption may be of a purpuric character (rheumatic purpura), or fibrosis rheumatica.

Subcutaneous Nodosities are almost invariably a sign of rheumatism. They occur during the progress of the disease, and are of a multiple nature. In my experience of rheumatism in children in the Edinburgh Hospital and district, rheumatic nodules are by no means so frequently met with as in the London Hospitals. In fact it seems that their occurrence is the exception rather than the rule, as in London. One of the best-marked examples I have met with occurred in the practice of my colleague, Dr. John Thomson, to whose kindness I was indebted for seeing the case, and permission to state the leading facts in connection with it.

D. M., æt. seven, came under observation 7th Nov. 1887. There was no family history of rheumatism or chorea.

Oct. 21.—He had pains in the joints, and shivering.

„ 25.—Erythema all over body and face.

„ 26.—Nodules appeared.

Nov. 7.—Soft systolic murmur, rash disappearing, right carpus swollen, other joints better. Large number of nodules on scalp, a few small ones on back of thorax, and larger ones over sacrum, others over flexor tendons of both wrists, one on left outer malleolus.

Nov. 15.—Nodules all increased in number and size, choreic twitchings of face and fingers.

Nov. 17.—Chorea well marked, could not stand.

„ 20.—Some swelling on right knee and ankle, nodules still increasing, and were now found on tendons of muscles of neck, over scapulæ, and all over the sternum, clavicles, iliac and vertebral spines, at elbow, over tendons of all extensor muscles of fingers and back of hands, also round the patellæ, both ankle-joints. It was estimated there must have been about a thousand nodules in all, ranging in size from a pin-head to a very large pea; those on the scalp being much the largest.

Nov. 27.—Finger-joints of right hand painful and flexed, could not be straightened. Chorea still present.

Dec. 5.—Still many nodules remain; cardiac murmur distinct.

Jan. 1, 1888.—Nodules gone; chorea still present.

„ 13.—Convalescent, up and going about.

Feb. 1.—Erythema again appeared.

„ 3.—Pain in thighs and knees.

„ 5.—Ankles and finger-joints swollen, pain in various joints, a few nodules on scalp, no chorea, slight systolic murmurs. This attack lasted till the end of March; not nearly so many nodules as during first attack.

June 22.—Quite well till a fortnight ago, when he got a fright and gradually developed chorea. Mitral systolic murmur still distinct, no other rheumatic symptoms.

July 17.—Chorea disappeared.

Oct. 23.—Child has seemed quite well since last note. Heart sounds quite clear, no murmur whatever for weeks.

March 31, 1889.—Well till yesterday. Now a little erythema on legs and neck, very slight choreic movements; numerous nodules on the scalp and limbs.

May 5.—Attack still going on. Nodules have come and gone; slight chorea; cardiac murmurs disappeared. Effusion in the sheaths of extensor tendons of both wrists.

May 14.—Rows of small nodules on both ears.

May 28.—Sore throat last week ; mitral systolic and reduplication of second sound ; nodules disappearing.

June 7.—Nodules disappeared. Mitral systolic and pre-systolic.

Aug. 17.—Headache and cross.

„ 18.—Feet painful.

„ 19.—One nodule on left patella.

„ 20.—Nodules on scalp and hands ; no joint affection.

Sept. 13.—Nodules increased in number, and numerous.

Oct. 1.—Urticaria with erythema marginatum ; screaming fits at night without localised pain ; nodules the same.

Nov. 12.—Nodules same as last note ; erythematous rash appearing occasionally ; loud systolic murmur.

Dec. 17.—Feverish attack (temperature $108^{\circ}3$), accompanied by swelling of wrists and feet ; pericardial friction and aortic systolic as well as mitral murmurs ; during fever, nodules rapidly disappeared till only a few left.

Sept. 1, 1890.—Has been in bed ever since last note ; heart the same ; occasional joint pains ; nodules varying in number from time to time, never fewer than a dozen, nor more than fifty ; severe muscular pains follow slightest exposure of limbs.

Sept. 9.—Up for a week ; back to bed to-day with pains in knees.

Sept. 12.—Patch of nodular periostitis on posterior surface of right ulna.

Oct. 2 to 7.—Endocarditis.

„ 11.—Mitral murmurs loud, systolic, diastolic, and pre-systolic ; a number of new nodules since yesterday.

Oct. 18.—Proximal phalanx of both ring fingers enlarged and painful, apparently from nodular thickening of the periosteum ; nodules increasing in number.

Nov. 8.—Slight chorea ; nodules numerous (218 counted).

Jan. 1891.—Still numerous nodules ; muscular and joint pains ; heart murmurs distinct ; heart considerably dilated.

April 2.—Little change since last note.

This interesting and remarkable case, a compendium of rheumatic manifestations, is not only interesting from the well-marked nature of the signs, but as showing a peculiar feature of child's rheumatism,—the alternation and recurrence of the various manifestations in a cyclical manner.

Frorich¹ was one of the first to describe rheumatic nodules. Jaccoud² also mentions them in his pathological treatise. Lately Drs. Barlow and Warner have written a valuable joint paper describing twenty-seven cases. These nodules are generally multiple, varying in size from a large pin's head to an almond. They are subcutaneous and freely moveable, firm and elastic, and free from pain. They are attached to the sheaths of the tendons, deep fasciæ, and periosteum; very frequently to the pericranium; the back of the elbow, the margins of the patellæ or the malleoli being favourite sites. Dr. Barlow describes fibrous nodules in the pericardium, and he also believes them to be pathologically similar in their nature with the fibrous thickenings on the heart valves.

COMPLICATIONS AND SEQUELÆ. — The other serous sacs, especially the pleura and pericardium, are prone to attack, more rarely the arachnoid. Under the head of *Simple Meningitis* I have noted a well-marked case of this kind. Fibrinous pneumonia is also a less frequent complication. Scarlatinal or secondary rheumatism is also alluded to in another chapter. Debility and anæmia are frequent after prolonged attacks.

DIAGNOSIS is sometimes difficult. Those cases in which local manifestations are late in appearing are necessarily obscure. I have seen cases of typhoid or meningitis in the early stage, where there is hyperæsthesia, simulate rheumatism for a day or two. The generally diffused nature of the pain, not localised to the joints, and the ultimate development of symptoms characteristic of these diseases, will suffice to indicate the true nature of the case. A painful and swollen condition of joints sometimes occurs in hæmophilia from sanguineous

¹ *Die Rheumatische Schwiële*, Weimar 1843.

² *Pathologie Interne*, ii. 546, 1871.

effusion. Dr. Barlow draws attention to the possibility of mistaking the pain and tenderness of the limbs in acute anterior polymyelitis with fever, for rheumatism. Acute necrosis or periostitis in the early stages may be mistaken for it. A little boy, aged four years, died under my care from pyæmia, the result of acute necrosis of the femur. During the first four days of the attack there was a close resemblance to rheumatism, and he had tenderness and pain in all his limbs. In all these inflammatory affections of bones in children, it is a question to my mind open to debate, whether rheumatic poisoning of the system has not been a predisposing cause. Clinically, I have always expressed this view, which I find is shared by Dr. Goodhart and others. The joint affections of syphilis and rickets may, but I believe rarely, be mistaken for rheumatic polyarthrititis. In either case the previous history will be a guide to correct diagnosis.

PROGNOSIS in uncomplicated cases is very favourable. It is the complications in this disease which kill. The heart is the organ which must be credited with the largest mortality, then probably the pleura and lung, less frequently the brain. Heart clot giving rise to sudden death is rare, but sometimes occurs from the fibrinous condition of the blood.

TREATMENT.—Children of rheumatic diathesis, and those hereditarily predisposed to the disease, should be carefully watched by the family physician. In how many cases can we predict the occurrence of rheumatism in such, and in how many are our predictions fully verified at some future time. Children so disposed are very liable to disorder of secondary digestion, tonsillitis, headache, and languor; and timely treatment will often ward off an attack. They should be carefully fed with a judiciously mixed diet. An excess, whether of starchy or saccharine or proteid elements, should be avoided, as in either case indigestion may be produced. Careful clothing is needful, flannel next the skin at all times, with avoidance of chills. Regular open air exercise should be recommended, over-exertion or over-heating carefully avoided.

In treating the disease itself it is all-important to recognise it early. Probably no ailment of childhood is more apt to be overlooked by parents, or young physicians who have not been accustomed to the disease as manifested in early life. The child should be kept in bed between blankets. The room should be well ventilated, of mean temperature, and draughts carefully avoided. Diet in the acute stage should consist chiefly of milk with *farinæ*, and chicken or veal tea. The bowels should be regulated by mild aperients, if need be. Painful joints should be wrapped in cotton-wool, and occasional alkaline fomentations with bicarbonate of soda may be used. If pain is severe, opium should be given in suitable doses, particularly at bedtime. No preparation is better than the good old Dover's powder. In simple sleeplessness, in nervous or excitable children, bromide of potassium alone or combined with chloral acts remarkably well. Sulphonal I have found equally useful. So much for prophylaxis palliatives and symptom treating. The curative treatment must be decided on, and the choice lies between the alkaline treatment and salicin, salicylic acid salts. I much prefer salicylate of soda, or potash, or salol. For a child of seven or eight years old I give eight to ten grains of either salt, every three or four hours, till the pain is relieved and the temperature comes down, when the drug should be remitted as to frequency of dose. When the skin is not acting well, liq. acetate of ammonia, given in drachm doses along with either drug, generally acts well. Antipyrin is a drug largely recommended in rheumatism. Fränkel and also Clément of Lyons speak highly of it. My own experience is not large enough to warrant a definite general conclusion of its merits. I have never given it continuously for more than two or three days, fearing depression from a more prolonged use. In some cases I have seen marked relief to the symptoms, especially pain. It also generally acts on the skin, and in this way gives relief when there is no perspiration. I look upon it as an alternative remedy to salicin and the salicylates, but its use requires more caution. As to the alkaline

treatment, I am fond of commencing with this, especially in cases where there is limited joint affection and scanty loaded urine. I generally order a mixture of either citrate or acetate of potash, six or seven grains of the former and ten or twelve of the latter, sometimes combining with it drachm doses of the liq. ammon. acetatis. When the urine becomes more copious and alkaline, I order salicin or salicylate of soda or phenol. Prolonged alkaline treatment is apt to cause more than usual subsequent anæmia in children, and I think is only beneficial for a limited time in the manner already indicated. As soon as the acute stage of the disease is over, the use of quinine in grain doses three or four times a day is of great service. At the end of a week, if there be no relapse, half grain doses of citrate of quinine and iron should be given four times a day. Arsenic is often of great value instead of quinine, and even for a longer period. It seems not only to have a specific effect in helping the system to rid itself of the rheumatic poison, but is a valuable blood tonic, arresting the tendency to anæmia which is always present in children after rheumatism of any degree of severity.

Complications must be treated on general principles as they arise. Pericarditis is relieved by rubefacients and emollient poultices, and afterwards applying cotton-wool over the præcordia, and later on blistering with liquor epispasticus. I have little faith in local treatment for endocarditis. A pursuance of the specific drug treatment, keeping the patient carefully at rest, both bodily and mentally, seems to be the most appropriate method of treatment. Pleurisy must be dealt with in much the same manner as pericarditis, by local emollients and rubefacients. In all heart cases prolonged rest in the recumbent position is by far the most important element in treatment. A word requires to be said in conclusion as to diet. As soon as the acute symptoms have passed, and the digestive and excretory functions are restored, a gradual return to ordinary diet may be permitted; white fish or chicken should be given for some weeks before the

heavier animal foods are allowed. All the while milk should form a large portion of the dietary. In chronic joint affections after rheumatism, the ordinary principles of treatment as applied to adults must be adhered to. Cod-liver oil, iron or arsenic, with iodide of potassium, or the use of alkaline natural waters, are indicated. Careful regulation of diet and attention to hygienic measures is of equal importance. Douching and massage of the joints is of great value during convalescence.

CHAPTER XXXIV.

THE NERVOUS SYSTEM.

THE physiological characteristics of the nervous system in early life influence all the diseased conditions and disturbances of functions occurring at this period. From birth onwards the processes of growth and development go on rapidly, and the progressive evolution of nerve function is probably more prominent or apparent than that of any of the other systems. The life of the child naturally divides itself into definite periods, marked by distinct and progressive evolution of functional activity. The first six months, or the pre-dentitional period, is characterised, as regards the nervous system, by comparative dormancy, especially of cerebral functions, the spinal activity predominating. At this time the functions are essentially vegetative, involuntary, instinctive, and reflex. With the commencement of dentition the nervous system is roused into further activity, and the influence of the cerebral function begins to manifest itself. The assertion of the cerebral function manifests itself in various ways, and the child begins to give expression to its feelings by attitude, gesture, and cry, and in this way by a language of its own, although inarticulate, conveys to an observant mother or educated physician, with wonderful distinctness, its desires and wants, its feelings of pleasure or pain. It is, therefore, very necessary that the young physician should make a special study of the physiognomy of early life both in health and disease. As so many of the signs and symptoms, both physiological and pathological, are referable to the nervous system, it may be convenient to

allude to them here. By simple inspection of the child, a deal of valuable information is afforded, and often a probable diagnosis arrived at, which stands verified by further examination. *Expression of the face* often affords valuable information to the observant physician. In young children it may be said to be always natural, never assumed, as may be the case in the adult. Flushing and heat of the head indicate a pyretic condition; and knitting of the brows along with it, probably headache in addition. If, besides knitting of the brows, there is altered expression, a wild or unnatural or vacant stare, cerebral disease may be suspected. Dilatation of the alæ nasi, and rapid movement of them, points to chest affection of heart or lungs, probably the latter. If the mouth is slightly open, and the cheeks hollow and sunken, abdominal disease is probably present. A rude generalisation is often made, which in the main is correct, that altered expression of the upper part of the face (brow and eyes), points to cerebral mischief; the middle of the face (nose and cheeks), to chest affection; the lower part of the face (mouth, lips, and cheeks), to abdominal disease. Strabismus is an important sign in children; and the question to be determined is, whether it is primary or symptomatic. It is extremely common in young infants, simply from want of education or practice in using both eyes, the habit gradually being overcome as the child gets older. The ordinary congenital or acquired form, occurring without any other symptom, is of no serious or general import. When squinting comes on suddenly, with other symptoms and signs of disease, it is often of grave significance. In general convulsions it is frequently noticed, and generally disappears with the fit. If it occur along with inequality and insensibility of the pupils, the indication is serious. Dilated pupils occur in cerebral effusion, and the advanced and final stage of inflammatory cerebral attacks. Contracted pupils are met with during the active stage of inflammation of the brain, or meninges, or from over-dose of opium. The eye is a most important index in cerebral affections, taken

along with the expression of the face. A flushed face alternating with pallor, with suffused conjunctivæ and staring eyes, and accompanied by strabismus or ptosis, are sure indications of cerebral affection. The sunken eye is met with in emaciation or marasmus. A slightly sunken and dark look about the eyes is often seen in sickly children with worms. In acute chest affections, more especially of the lungs, the face is full, and more or less of a dusky or livid hue, the cheeks often flushed, the alæ nasi in free movement, the mouth often a little open. In severe attacks the child looks more or less cyanotic, with livid lips and anxious countenance. In abdominal disease the features are sharp and pinched, the lips often dry and cracked, the mouth slightly open, the child is fretful and looks anxious. The *general demeanour and gestures and attitude* of the child give important indications. When a child is ill, it loses its natural vivacity and sharpness, and does not play, but becomes cross and peevish, or listless and apathetic, and likes to be constantly nursed. The way a child moves its hands should be noted. A healthy child seldom raises its hand above its mouth. In cerebral cases the hands are frequently raised up to the head, which may be moved or rolled about, giving the impression of pain or uneasiness. In chest or throat diseases, the child is sometimes noticed to press its hand up to the throat or mouth. If a child's thumbs are grasped in the palm of the hand by the fingers, cerebral affection or convulsions are probably threatened. There may be similar tonic spasms of the toes. In abdominal inflammation the child assumes the same attitude or decubitus as the adult—supine position, and legs drawn up. The attitude of a rickety child is very characteristic. It sits very quiet, and does not care to move, with the legs crossed in tailor-like fashion, and often supports the body by keeping one or other hand on the bed. When lying down, a rachitic child generally lies on its back, and often burrows in the pillow with its occiput, and kicks the bed-clothes off with its feet. One rickety child,

lately in hospital, was a persistent occiput borer when lying down, and when sitting up was fond of rocking its head and body backwards and forwards—constant bowing movement. This is exceptional, but I have seen it in other cases. A great deal of information can be obtained from a study of the *cry in children*. It is an important factor in the language of infancy. As a dog expresses its feelings by bark or whine, so does a child by the cry. The practitioner is sent for, perhaps in the middle of the night, because a child is crying and cannot be appeased. He is expected to know what is indicated. The most natural cry is that of *hunger*. It is difficult to describe, but is of an impatient, often whining character, and is permanently appeased by food. Other cries may be relieved, but only temporarily, by feeding. The cry of *discomfort* is a common one. Cold, and particularly cold feet, is a frequent cause. It is a whining, long-continued, miserable cry, which is at once relieved by applying warmth to the feet or belly. Other cries of discomfort arise from tight clothing, ill-arranged dress, or being laid in an awkward posture. Wet or dirty napkins are often a cause of crying in children, especially when, as a result of carelessness on the part of the nurse, the child's buttocks are excoriated (intertrigo). A watchful mother or nurse knows perfectly well when her child micturates or defæcates—if she does not, she is careless and unobservant. It is desirable that a child from its birth should be taught regular habits, particularly with regard to defæcation. A good nurse prides herself on having as few soiled napkins as possible. As soon as a child wakes in the morning, she sits down before the fire, placing "the chamber" under the child's nates, and so on at different periods during the twenty-four hours. It is wonderful how a child can be trained in this respect. It adds to its comfort, as well as the convenience of the nurse. One of the commonest cries is that of *passion*. Infants begin to show temper at an early age, and if uncomfortable or hungry, often take violent passionate fits of

crying (the tearless cry of passion). Infants do not shed tears until they are about five months old, as observed by Trousseau, who attached importance to this fact. In acute disease, he considered if the child shed tears its chances of recovery were good; if not, and if the eyes were sunken, the chances of recovery were not so good. All these cries may be termed physiological ones. In disease the cry is modified, or absent, which is always an unfavourable omen. In *laryngeal disease* the child may be unable to cry, but if it is able to do so it is a ringing, metallic, hoarse, or muffled sound. In *bronchitis*, when severe and extensive, it may be absent; if present, it is smothered and reserved. In *cerebral inflammation* the cry is very often characteristic—a loud, sharp, single cry at long intervals. In *abdominal disease* the tone is moaning, wailing, and piteous. One of the commonest morbid cries is that of *colic* or flatulence. It comes on suddenly. If a child takes a sudden fit of crying—and no other cause can be assigned for it, and there are signs of dyspepsia, or the history of the ingestion of indigestible food—we may assume that it is from colic.

Sleep is an important function to observe in the child, and often affords valuable information. We are able during repose to note with accuracy the character of the respiration and the pulse. Restlessness is generally a sign of disease, functional or organic. In the febrile condition, the child, besides being restless, generally moans. Jerking of limbs, knitting of brows, and grinding of teeth, generally indicate gastro-intestinal disorder. In the diagnosis of laryngeal affection much may be learned by watching the breathing during sleep. In membranous laryngitis the breathing is stridulous and similar in character to the breathing when awake. In catarrhal spasmodic laryngitis it is quiet and natural, contrasting with the noisy character during waking.

CONVULSIONS.

“Tell the doctor to call immediately, as baby is in a

fit," is one of the commonest of urgent messages which comes to a practitioner. On visiting the patient, the whole household will be found in a state of alarm. The parents, some of the servants, and female friends or neighbours, are probably in the room. If the child is still in the fit, it will be found to present probably the following symptoms:—It is in a state of epileptiform spasm, and insensible. The face when the attack commences is generally pale, will be found red or somewhat livid; the facial muscles, one side often more prominently than the other, are in a state of clonic spasm, giving rise to most unnatural expression, and drawing the mouth by twitches to one side. Saliva or froth, sometimes mixed with a little blood, is escaping from the mouth, which is generally in a state of trismus. The eyeballs are rolling about, and lachrymation is increased. The respiration is probably much interfered with from spasm of the muscles of the chest. Glottic spasm may be also present. The limbs are in a state of tonic spasm, very often more marked on one side than the other, the thumbs being turned in upon the palms of the hands, and the toes often presenting similar signs of tonic rigidity (carpo-pedal spasms). The head is thrown back or twisted laterally from spasm of sterno-mastoid, trapezii, and other muscles; the tongue is sometimes bitten. The urine or fæces may be discharged involuntarily. The attack may last a few minutes or for a longer period, or there may be a series of attacks with slight remissions between. The child generally recovers, unless the fit or series of fits are very prolonged, when cerebral congestion and venous stasis in the sinuses is apt to take place, producing a fatal result. The other danger is prolonged and tonic rigidity of the respiratory muscles, producing death partly by asphyxia, partly by coma from defective blood aeration. What is the practitioner to do when called to the child? If he have any previous knowledge of the patient, probably he may know the cause of the fit. If so, all the better; but generally he is in ignorance, and must therefore be content to *treat the fit*. The first thing to be

done is to order every one out of the room except parents and nurse, or any one else who may be of service. Loose the child's clothing, or, better still, take it off and roll it in a blanket, and attend to the ventilation of the room. If the child is very hot, with a quick strong pulse and prominent beating fontanelle, indicating hyperæmia, apply cold to the head by cloths wrung out of vinegar or whisky and water; place a sinapism on the epigastrium, or over the cervico-dorsal region posteriorly. If the feet and legs are cold, put them in a warm pediluvium with mustard. If the child is cold and livid, and signs of anæmia are present, put it up to the neck in a bath of warm water, 102° , with a little mustard added; at the same time giving, if it can swallow, a few drops of *sp. ammon. arom.* or brandy in water, especially if there be any tendency to syncope. The warm bath is probably the most favourite general remedy for convulsions, and although its beneficial effects are most noteworthy in the second class of cases mentioned, it may be used on almost all cases with benefit on account of its sedative action. Should the fit not speedily pass off, after recourse has been had to these simple measures, a dose of five grains of potassium bromide, with an equal quantity of chloral hydrate, should be given by mouth or rectum. If within ten minutes the fit shows no signs of abating, chloroform inhalation should be had recourse to. This seldom fails, and in my experience is generally a safe remedy. I know of no contra-indications to its use when the convulsions are violent, unless the child be in a state of exhaustion with tendency to collapse, in which case a subcutaneous injection of ether should first be tried, or a brandy and beef-extract enema. One other method of treatment deserves notice, in extreme and persistent cases, where the other means have failed. I refer to depletion, which may be carried out, either by the application of one or two leeches behind the ear or to the temple, or by external jugular venesection, to the extent of one or two ounces. The latter means is generally the more ready and efficient. The indica-

tions for its employment are—persistency of the fit, which will not yield to other means, and evidence of interference with the respiratory and circulatory functions, with congested right heart and venous system. I am confident of the success of this method of treatment in extreme cases, in saving the life of the patient. In two cases of uræmic convulsions and another of meningitis, an apparently impending fatal result was averted, the fit ceasing with the flow of blood. After the fit, treatment must be directed to prevent its recurrence; and to this end the cause of the attack must be sought, and indications for further treatment will be evident.

ETIOLOGY AND PATHOLOGY.—This leads us to consider the numerous causes which may predispose to or excite convulsive attacks in children. The natural excitability of the nervous system in early, as compared with adult life, renders children specially liable to eclamptic seizures, often of a purely reflex character. It may be truly said that in the child any condition of abnormality (the undefined term “irritation” is generally used) of the nervous system, blood, or organs, or tissues of the body, may excite sudden discharges from the motor centres. It must be remembered that, as proved by the researches of Fritsch, Hitzig, and Simonoff, the excito-motor and so-called moderative centres of the anterior cerebral lobes in infants are absent or in an undeveloped state, and it is believed with good reason that their absence goes far to explain the frequency of such seizures in early life. For the sake of brevity and convenience we may summarise generally the various causes, and thereafter make some further allusions to them with reference to pathology and treatment.

Diseases of the Central Nervous System in various of its parts are fruitful sources of muscular spasm. The intimate pathology of the production of these attacks, or the nature of the so-called “discharging process,” is not well ascertained. In some way or other the functions of the motor centres are so perverted by central or peripheral irritation, as to produce

through the pons medulla or motor tracts of the spinal cord these sudden and violent agitations of the muscular system. In this way inflammation of the brain or its membranes, or any lesion of the cerebral cortex, particularly in the parietal and posterior frontal regions, are fruitful causes of such attacks ; so also are tumours or morbid formations in different parts, likewise injuries and wounds of the brain. In children there is no more common cause of convulsions than meningitis, and the practitioner called to a case of convulsions must always consider the possibility of the existence of such a condition. The disease may be of a simple or tubercular nature, more frequently the latter, and the convulsive seizures, in their clinical characters, may exhibit the greatest variation, depending on the part of the brain involved in the inflammatory process. Associated with meningitis we generally have more or less effusion into the lateral ventricles, which in itself, apart from the meningeal affection, and produced as it may be by other causes, often gives rise to fits. These may be of a slight nature, often recurring frequently, and are usually general in character, and believed by M. Pitres to be due to pressure on the fibres of the anterior ventricular walls, which communicate directly with those of the internal capsule, of which they go to form a part. Cerebellar disease, particularly lesion of the middle lobe, are not uncommon in children, whether of a tubercular, syphilitic, or other nature ; and the convulsive seizures are generally of such a character as to point to central lesion as the cause of the attack. The symptoms are usually of a tetanic character, often unaccompanied by loss of consciousness, the posterior cervical muscles and those of the limbs being thrown into a state of spasm. Lesions of the Rolandic area are associated with symptoms grouped under the term Jacksonian epilepsy, in which the convulsions are rarely general, but localised in particular groups of muscles, such as those of the hand, foot, or face, either singly or collectively, constituting monospasms, hemispasms, and often followed or accompanied by more or less paresis of the

affected muscles. The only other causes directly connected with the central nervous system deserving mention here are so-called psychic ones. Terror, fright, or other marked emotions may bring on fits in some children.

Morbid States of the Blood.—In this connection we find that either a *plethoric or anæmic condition of the blood-vascular system* may be closely associated with convulsions in children. In many of the most common class of cases of convulsions which we meet with, those which occur in otherwise healthy children from over-feeding, the former cause would appear to be in operation. On the other hand, in anæmia there is an equal if not greater liability to such attacks. Thus children who have suffered from hæmorrhage or diarrhœa are specially prone to be affected. Here must be mentioned the most common constitutional condition giving rise to spasms of various sorts—rachitis; I allude to it here, because, apart from the nerve irritability common in this disease, it is frequently accompanied by an altered blood state, anæmia.

Septic Blood Conditions of Fever.—Almost any of the fevers may be symptomatised by general convulsions in the child, and in these cases the attacks are often simple, seldom frequent, and not usually of serious import. The occurrence of a convulsion at the commencement of an attack of scarlatina or measles is generally considered of comparatively little moment, and often serves to usher in the disease, in the same way as a rigor, which indeed itself is a form of convulsive seizure. The association of uræmia with convulsions is too well known to require comment. Rarer cases of blood-poisoning may result from ingesta, whether in the form of food or medicine.

Peripheral Irritation is one of the most frequent causes in enumeration. It may exist in any of the organs, in the mucous surfaces, or the skin. Probably abnormal states of the digestive tract, anywhere from mouth to anus, are the most common causes of the ordinary convulsions of children; thus stomatitis, dentition (difficult), gastro-intestinal catarrh, which may be associated with the presence of indigestible food, or too

great quantity of food, or worms. Inflammatory or irritative conditions of the skin act in a similar manner. It is well known that children with eruptions, particularly on the scalp, are liable to fits. Burns and wounds and the application of blisters also produce them. A child two years old, suffering from an apex lung catarrh, lately under my care in hospital, had two violent convulsions on the application of a blister. In like manner, acute visceral diseases—as pneumonia, pleuritis, bronchitis, or hepatic congestion—may excite convulsions in children so disposed.

Congenital or Hereditary Convulsions.—Children whose nervous system is congenitally defective, imbecile, or idiotic, are specially prone to convulsions, apart from any other special cause. Chronic hydrocephalus is a disease usually accompanied by convulsive seizures, more or less frequent and severe. Convulsions often develop epilepsy later on in life, whether in congenital or acquired cases.

Internal Convulsions or Inward Fits is a peculiar form of spasm liable to occur in delicate or debilitated children, often rachitic, during the first dentition. Unhealthy hygienic or dietetic conditions generally favour their occurrence. The peculiarity of these seizures is that the spasm, which is of a tonic nature, affects chiefly the respiratory thoracic muscles and diaphragm, sometimes also the glottis. Fits come on suddenly, generally lasting a few minutes. The child lies motionless, with its eyes closed, breathing very slightly or hardly at all. The face at first is pale, and if the attack is prolonged it soon becomes livid. The return to consciousness and natural respiration is sometimes accompanied by laryngismus stridulus. In bad cases the fits may occur frequently, with lividity and persistent stupor, accompanied by spastic rigidity of the muscles of the limbs and balls of the thumbs. Fright or temper may often bring on an attack. The causes of these attacks seem to be very much those of ordinary fits.

Trismus Nascentium or Nine-day Fits is an affection happily rare in this country, more common in the tropics. It occurs

in infants soon after birth, generally within the first week and during the separation of the umbilical cord. It is not unlike tetanus in the adult. The leading feature seems to be the child's inability to swallow, from spasm of the deglutitory muscles. The disease occurs in unhealthy and badly-drained houses, sometimes in lying-in hospitals under bad hygienic conditions. In one year, in the Dublin Lying-in Hospital, one-sixth of all the children died from this disease. In recent years, under more favourable conditions, it is practically unknown, since greater attention has been paid to antisepsis in puerperal women and their surroundings. The trismus, which is always a prominent sign, prevents the child from sucking. General convulsions may come on, with foaming at the mouth, and a fatal result may occur in from six to twenty-four hours. The septic conditions under which the disease seems to occur may be due to poisons generated during the separation of the umbilical cord. A mechanical cause has been supposed to operate in some cases, namely, depression of the occipital bone, causing pressure on parts in the neighbourhood of the medulla oblongata. The epidemic nature of the disease, however, would seem to disprove this. Alcoholism in the mother is generally considered to have a predisposing influence on the production of the disease. On post mortem examination in these cases, evidence is generally found of irritation and congestion of the cerebro-spinal axis, and not unfrequently meningeal sanguinous effusions. It need hardly be said that curative treatment in this disease is of little avail. Prophylaxis is the only plan likely to be attended with satisfactory results.

PROGNOSIS AND TREATMENT.—The prognosis depends on the cause. In meningitis, or gross cerebro-spinal lesions or kidney disease, the outlook is grave. In acute fevers or inflammation, such as pneumonia, the prognosis is hopeful. The more common reflex convulsions from intestinal irritation usually terminate favourably. In any case, where the fits are prolonged or frequently recurrent, internal congestions are apt to

give rise to permanent effects, especially in the brain, causing paralysis; thus hemiplegia sometimes results, whether from serous or sanguineous effusions, thrombosis, or embolism. Ashby has recorded the case of a child, *æt.* twelve, who suffered from hemiplegia after convulsions, in which, after death, several small old blood cysts were found in the neighbourhood of the corpora striata on both sides.

I have indicated the treatment to be adopted during a fit, and that prophylactic treatment, directed to prevent a recurrence of the attack, must be conducted on general principles, according to the cause of the fits.

CHAPTER XXXV.

THE NERVOUS SYSTEM—*continued.*

TETANY.

TONIC contraction of muscles, generally of the limbs, less often of neck or face, is an affection not unfrequently met with in children. It is not so common in this country as abroad. Nosologically it may be classed along with convulsions from reflex causes and laryngismus stridulus. In fact, such contractions often occur in children subject to convulsions or laryngismus, either alternating or accompanying these conditions. Tonic contraction, especially of the extremities, is met with symptomatically in meningitis or other brain affections, but those we are now to consider are the so-called idiopathic contractions, depending on causes apparently outside the central nervous system. Sometimes the disease assumes an epidemic form. This was long ago noticed by Bouchut, who described epidemic visitations, both in France and Germany. Congenitally defective children, who are liable to fits, may be affected with a tetanoid condition.

ETIOLOGY.—It is probably most common in young children during the first three years of life. It is also met with, although less frequently, in youth about the period of puberty, and more rarely in later life. Cases have been recorded in patients as old as sixty. It occurs pretty equally in both sexes, and heredity does not seem to influence its production. Children the subjects of this disease are generally out of condition, debilitated from some previous disease, such as typhoid,

measles, rheumatism, or other febrile maladies. A lowered state of bodily nutrition, from whatever cause, favours its occurrence. In many cases some source of peripheral irritation can be discovered, on the removal of which the recovery takes place. Irritation of the gastro-intestinal mucous surface is noted by most physicians who have written on the subject as one of the commonest causes. Trousseau, Erb, Gowers, and Lewis Smith all agree in this; Lewis Smith and Janeway relate a case in which difficult dentition was the only assignable cause. Improper feeding, giving rise to intestinal irritation, or the presence of worms, seem to act in a similar manner. Eustace Smith mentions uric acid calculi as a cause. Cases are also described as having occurred symptomatically during the progress of pleuritis or pneumonitis and Bright's disease. Rachitis is a disease during the progress of which tetany is frequently developed.

SYMPTOMS.—These are, essentially, tonic contraction of voluntary muscles, most commonly those of the upper or lower extremities, generally of the hands or feet. The muscles of the trunk and abdomen, causing rigidity of the walls of the belly or of the thorax, producing dyspnœa, are occasionally affected, sometimes the muscles of the neck, more rarely those of the face or jaws. The attack comes on as a rule without premonition, or after a fit of convulsions. The contractions give rise to great pain, when attempts are made to straighten the limb. The distortion of the limb varies in appearance, according to the muscles affected. In the hand the distal phalanges of the fingers are often flexed, while the first and second are extended. The thumb may be flexed also or adducted. In the foot similar contractions may occur. The leg may be extended or flexed, or present the characteristic appearance of talipes equinus. The contractions are generally bilateral, and continue during sleep. The electrical reaction of the muscles is normal or sometimes increased, that of the nerve supplying the muscles is always increased. Erb found, on closing the circuit, contractions first occurred at the positive

pole. The muscles contract more powerfully than in health, at both the opening and the closing of the current. Sensation and reflex action are unimpaired. Trousseau noticed that occasionally increased contraction, or renewed contraction in cases where it had ceased, was produced by compression of the artery and nerve supplying the affected muscles. There are no constitutional symptoms referable especially to this disorder. The temperature is generally normal. In chronic or persistent cases, atrophy of the affected muscles may take place. The disease is of uncertain duration, from a few days to some months. The attack may intermit at varied intervals.

PATHOLOGY.—No definite morbid anatomy has been made out in this disease, although certain changes in the affected nerves and the motor cells in the cord with which they are connected have been observed in some cases. Whether these are initial structural changes in the neuro-muscular apparatus, or whether any structural alterations that take place are the secondary result of long continued increased functional activity, has yet to be decided. Gowers has paid some attention to the pathology of this disease, and believes that it is primarily due to derangement of the nerve-cells of the cord and medulla, and that there is ultimately a tendency to structural changes and degenerations.

DIAGNOSIS is not difficult, and mainly rests between cerebral disease and tetanus infantum. In cerebral contractions we have other cerebral symptoms, delirium or coma, and probably psychical phenomena; the contractions are usually unilateral. The disease requires to be distinguished also from cerebral spastic paralysis. This condition generally exists from birth, or has been associated with internal convulsions or asphyxia neonatorum. The arms and legs are generally both involved, and the contractions are painless and continuous. There is absence of rachitis and laryngismus. In tetanus the disease occurs in early infancy, the contractions are not only tonic but continue without intermission, tris-

mus being a marked and early symptom. In tetany the site or peculiar nature of the spasms, along with the age of the child and the existence of rachitic or peripheral sources of irritation, are sufficient to distinguish the case. Tetany generally ends favourably; tetanus is usually fatal.

TREATMENT.—Careful constitutional treatment is indicated, according to the peculiar state at the time existent. Any disorder of the stomach or bowels must be carefully treated by suitable dietetic and medicinal means. If the child be rickety, the principles of treatment laid down for this disease must be adopted—such as attention to hygiene, diet, and the administration of tonics and cod-liver oil. Medicines specially directed to relieve the muscular spasms are recommended. Lewis Smith lauds the effect of potassium bromide. Eustace Smith does not think it of any use. I believe much more benefit is derived from tonic and supporting treatment than from nervine sedatives. Of all the special means at our disposal, massage has in my experience been most successful, the mild voltaic current being used at the end of ten days or a fortnight.

LARYNGISMUS STRIDULUS.

NATURE AND ETIOLOGY.—This affection is one of a purely neurotic character, and I think most naturally demands consideration along with the other convulsive disorders. In alluding to inward fits, we have seen that the condition is one more or less of tonic spasm of the respiratory muscles. In this disorder the convulsive seizure is of an allied character, chiefly, although not always, solely affecting the laryngeal muscles. Sometimes spasm of the bronchial muscles may be present without laryngeal affection. I was lately asked to see a baby five months old, who was stated to be suffering from bronchitis. The practitioner who had attended the child stated that it suffered in the first instance from a mild bronchial catarrh. On examination, I found a fairly well nourished baby, who had been kept in a

hot room, and constantly poulticed. The chest was well formed, and on auscultation and percussion no abnormality was observed; but whenever the child moved or began to cry loud, wheezing at once came on, which subsided again on the child becoming quiet. He was ordered to be taken about the house, the poulticing to be stopped, and general tonic treatment adopted, and he soon began to improve, and the wheezing disappeared. The spasm apparently affected the larger bronchi, and there was no sign of laryngeal affection. The disease usually occurs in infants during the dentitional period. By the older authors, and even at the present day, it is often treated of under the appellation false croup, a distinct affection which clinically can in most cases be differentiated from it. Jacobi says, "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." Eustace Smith does not believe it to be ordinarily the result of cerebral encephalic irritation, whether from craniotabes or otherwise, but that it is essentially a reflex condition depending on some peripheral source of irritation, acting on a nervous system disposed to irritability, such as exists normally in rachitis. The reflex irritant may be a slightly catarrhal condition of the laryngo-tracheal mucous membrane, disordered gastro-intestinal tract, or mouth irritation from whatever cause, teething or other causes. Undoubtedly the condition is one met with in by far the larger majority of cases in rachitic children, in whom the reflex irritability of the nervous system is always increased, and in whom, it must also be remembered, the mucous surfaces are rarely in a normal state as regards their blood-vascular supply, the smaller arteries being dilated, and the circulation relatively less active than in a healthy child. In new-born children it sometimes occurs, often associated with inward fits, and depending on the causes generally predisposing to this condition. It has

been supposed, but there is great difference of opinion on this point, that it is often directly caused by pressure on the pneumo-gastric or its branches, from enlarged thymus or bronchial glands. Certainly, if this be the case, it is only exceptional in its occurrence, for in the great majority of cases of bronchial adenopathy no such symptoms are produced. The disease seems to occur very much under the same conditions, and from the same causes, as ordinary convulsions, most commonly, as already stated, in rachitic children and associated with some peripheral irritation.

SYMPTOMS.—The attacks may be of a severe and alarming character, or slight and trivial. They may be intermittent, the child being perfectly well in the interval, or remittent, the respiration being always of a slightly stridulous character, with exacerbation produced by a slight exciting cause. When of a severe character, the child is seized suddenly with apnœa. It often becomes rigid, and has all the appearance of an inward fit. In a few seconds it draws a long breath, with a loud crowing noise. The breathing now becomes natural, and it often falls over to sleep. In the slighter cases, the child when waking shows more or less stridulous breathing, and is subject, as already stated, to occasional exacerbation, the period of apnœa being less prolonged than in the severe attacks. In uncomplicated cases there is no pyrexia. When laryngismus complicates other affections, such as pertussis or pneumonia, it is often of grave import, and may prove fatal during the attack. A little girl, lately under my care on account of pertussis, had repeated and serious attacks, although she ultimately recovered. The whole of the respiratory muscles were suddenly thrown into a state of tonic spasm, lasting for some seconds, and succeeded by a loud crowing inspiratory effort. In young infants, it is well known, the convulsion of whooping-cough often assumes this form, the baby suddenly being attacked with apnœa from this cause. In these cases it is believed the epiglottis often becomes drawn back by tonic spasm of the aryteno-epiglotti-

dean muscles, thus closing for the time being the glottic opening. This is always an alarming and may be fatal condition.

DIAGNOSIS must be made from catarrhal spasmodic laryngitis. In this disease the child is generally otherwise in good health, and there is evidence of acute catarrh, and it is probably feverish and has a croupy cough and hoarse voice. The paroxysm comes on during sleep, the child waking up at once with a loud and hoarse croupy cough. Children subject to the catarrhal complaint are generally older. Infantile tetanus may be mistaken for it, but in this disease there is continuous tonic rigidity of the respiratory muscles, whereas in laryngismus stridulus the muscles are at once completely relaxed after the attack is over.

PROGNOSIS.—In babies, where the clinical features of the disease are more or less those of inward fits in many cases, the prognosis is often serious, depending of course on the severity and continuance of the attacks. In older children the prognosis is generally more favourable; but opinion must be based on the general constitutional condition of the child as regards strength and general health, whether it is rachitic or not. In rachitic children it increases the likelihood of pulmonary collapse, which is generally present to a greater or lesser extent.

TREATMENT.—During the attack it is only the severe cases that require treatment. The finger should be passed back into the pharynx, and the epiglottis hooked forward if it is lying over the glottis; sometimes forcible depression of the tongue with a spoon or spatula will have the same effect. Dashing cold water on the face, or flapping a wet napkin suddenly on the chest, or inhaling smelling salts, or tickling the nares, should be tried. Jacobi recommends the application of the interrupted current. After the attack general treatment should be adopted, according to the constitutional condition of the child. The feeding should receive special attention, and the diet regulated as regards quality according

to age. All the rules already laid down with regard to the feeding of delicate children must be adhered to; especially is this of importance in rachitic babes. The hygienic surroundings must be regarded. Well-ventilated rooms, sunlight, as much open air as the weather permits, are all-important factors. Careful attention to the state of the stomach and bowels should never be omitted. Gastro-intestinal catarrh indicates the use of rhubarb and magnesia or bismuth. Constipation, so often present in rachitic children, if there is no intestinal catarrh, must be met by tonic treatment and not by aperients; glycerine suppositories or simple enemata being used if need be. Medicinal treatment, although of secondary value, has its own importance. Certain medicines have a direct value in controlling nerve irritability; of these, conium and valerianate of zinc are undoubtedly valuable in some cases. Bromide of sodium or ammonium are, I think, more generally serviceable, and may be given freely unless bromism is produced, when no further good effects can be expected. In rachitic children, tonic doses of phosphorus, or maltine and phosphorus, or the oleum phosphoratum, may be administered. Iodide of iron, lacto-phosphate of iron, or chloride of calcium, especially if there is any lymphatic glandular enlargement, will be indicated. When the child cannot take cod-liver oil by the mouth, inunction should be had recourse to.

CHAPTER XXXVI.

THE NERVOUS SYSTEM—*continued.*

CEREBRAL PARALYSIS.

THE diseases affecting the cerebro-spinal motor areas in children are of pregnant interest. Much has been added in recent years to our knowledge of the subject, more particularly by the writings of Gowers, Ross, and Abercrombie in this country; of Jules Simon, Wallenberg, Ranke, Richardiere, Gaudard, and others on the Continent; and of Lewis Smith, M'Nutt, Sinkler, and Wood in America. The recent monograph of Osler of Philadelphia, in which clinical record is given of 150 well-marked cases of cerebral paralysis, forms a most valuable addition, in fact, to our already accumulating evidence of the clinical features of these diseases, and much of what I have to say is drawn from the clinical pictures given in this essay.

Hemiplegia—*Spastic Cerebral Hemiplegia* of Heine, *Atrophic Cerebral Paralysis* of Henoch, *Polyencephalitis* of Strümpell, *Spastic Infantile Hemiplegia* of Bernhardt. — The paralysis may show itself at birth or soon after, or may come on at a later period, generally within the first three years. Of Osler's cases, fifteen are noted as congenital, eighty-six during the first three years. There were 120 cases of hemiplegia; twenty cases of bilateral hemiplegia; eleven cases of paraplegia. Slight hemiplegia was met with in sixty-eight cases, left-sided paralysis in fifty-two cases.

SYMPTOMS.—The symptoms are varied and differ in indi-

vidual cases, according to the extent and site of involvement of the motor tract, whether in cerebral cortex, motor centres, internal capsule, pyramidal tract, crura cerebri, or pons varolii. Disturbed or defective intellectual function (including aphasia) motor paralysis, disordered movements, spasms, exaggeration of reflexes (muscular), normal electrical reactions, trophic muscular changes (slight or of slow development), are the leading clinical facts in this disease. The distribution of the paralysis may be hemiplegic, paraplegic, or bilateral. The contrast between these symptoms and those of disease of the spinal motor (anterior ganglionic) area proper, in which there is a sudden invasion of muscular paralysis, almost at once attaining its full development, with subsequent atrophy of muscles, absence of rigidity, loss of reflexes and electrical irritability—is sufficiently distinct.

In congenital cases the paralysis is usually the most prominent symptom. Spastic rigidity may or may not be present. In later cases the onset is generally sudden and accompanied by well-marked cerebral symptoms and disturbed brain function, manifested often by coma and convulsions or vomiting. Sometimes the child wakes from sleep paralysed. The comatose symptoms usually pass off after a time, or paralysis may supervene without any other disturbance of cerebral function. Epileptic seizures, limited at first to the affected side, and subsequently showing a tendency to become general, are also noticed. In other cases choreic movements (post-hemiplegic chorea) are observed, and, in some cases of Dr. Weir Mitchell's, tremor, athetosis, and mobile spasms. The paralysis is usually complete from the first, affecting both arm and leg. As in adults, there may or may not be facial paralysis. If present at first it usually passes off, and is rarely if ever complete. The paralysis is most marked in the arm, which, as in the adult, is slower of recovery than the leg. The limb often atrophies to a greater or lesser extent. In the leg the paralysis is less complete, and the limb recovers sooner. Spastic rigidity of the limbs is of common occurrence, so frequent that the

term spastic paralysis was given to it by Heine. The rigidity, when long persistent, often gives rise to permanent contractions and atrophic changes in the affected muscles. The spasm is aggravated by attempts to straighten the limb, or excitement on the part of the child. The tonic rigidity disappears during sleep. The affected limbs are generally colder than those of the opposite side. Sensation is normal. The reflexes are exaggerated in the affected limbs, sometimes also in the sound ones. Electrical irritability is usually normal. The constitutional condition of the patient varies in the initial stage, some cases showing considerable febrile movement, and others less. If present, the fever gradually disappears in most cases within a few days, rarely persisting for weeks. In right hemiplegias aphasia often occurs, thirteen cases of Osler's collection being affected in this way; one of them, it is noted, was a left hemiplegia. Gaudard mentions eight left-sided cases, with aphasia. Bernhardt remarks that in almost all cases of cerebral palsy in children, on whichever side, there is a degree of aphasia, often transitory. Intellectual defects, even amounting to idiocy, if not previously existent, are apt to supervene at a later period. The initial convulsions, in which the paralysed limbs are most affected, are apt to recur, and, as already stated, may become general and develop into epilepsy, or the child may suffer from slight and transient attacks of loss of consciousness, with absence of muscular movements. In some cases death takes place from coma, succeeding severe convulsions, before the stage of paralysis is reached. The reverse sometimes happens, the attacks being of a Jacksonian character.

ANATOMICAL CHANGES.—Whatever the primary cause may be, the ultimate result is usually atrophic or sclerotic changes. In fifty of Osler's cases there was sclerosis and atrophy. In twenty-four cases, cystic atrophy or porencephalus was observed, sometimes affecting large portions or the greater part of one hemisphere, and frequently in the area of distribution of the branches of the middle cerebral artery. Hæmorrhage, throm-

bosis, or embolism were found in sixteen cases; seven being noted as embolism of the Sylvian artery, nine as hæmorrhage. Hensch relates the case of a girl of nineteen who had been paralysed from the age of three months. On post mortem examination, "the left half of the skull was smaller than the right, and the frontal bone on this side thickened. The middle and upper part of the left hemisphere was quite absent, being replaced by a cyst filled with serum, which extended to the lateral ventricle. The corpus striatum and thalamus were shrivelled to half their normal size. This atrophy was continued partially in a crossed direction; the optic tract, corpus albicans, the crura cerebri, the left side of the pons, and the pyramid on the right side, appearing considerably thinner." Another of Hensch's cases, that of a girl of five, hemiplegic from eighteen months, showed the "pia mater on right side over the upper frontal convolution considerably thickened, whitish, and opaque, adhering at this place extremely firmly to the brain substance, which seemed wasted and very hard. The whole of the right upper frontal convolution markedly atrophied." The site of the morbid lesions may be found in any part of the motor tract. Post mortem records of recent cases are rare; those examined being generally of long standing, showing only the advanced atrophic changes. Lesion of the convolutions seems to be among the most common; thus, the frontal parietal or occipital lobes are often affected. Dilatation of the ventricles from increased amount of cerebro-spinal fluid, causing pressure and atrophy of the central ganglia, is often found. Porencephalus, in which the atrophic changes in localised areas are associated with cavities or cysts of the cerebral substance, was found in twenty-four out of ninety post mortems recorded by Osler. The primary cause of these atrophic changes is often obscure. Sero-sanguineous effusions, embolism, and thrombosis, and aneurisms of the cerebral arteries, have been found to exist in some. Strümpell has advanced the theory, which so far as I know has not been verified in fact by post mortem examination, that the morbid changes found in many cases

may be due to polyencephalitis, and, reasoning by analogy from the well-known pathology of infantile paralysis, this does not seem improbable. Lewis Smith believes in a cortical encephalitis as frequently the result of cerebro-spinal fever poison. In congenital cases, both Jacobi and Osler are of opinion that in most of them meningo-encephalitis is the only plausible explanation. In these cases the paralytic symptoms date from birth, and many of them are associated with idiocy. Sometimes the condition of the child after birth has been believed to be caused by ill-health on the part of the mother during pregnancy, mental excitement, or shock. Syphilis is mentioned by several observers as a pre-existent and probable cause. Injury to the head in difficult labour, or delivery by forceps, is recorded as another probable cause in nine of Osler's collection; traumatism, such as falls and wounds of the skull, are also included in the list. Many cases of cerebral palsy are observed as sequels to one or other of the eruptive fevers. A well-marked case of hemiparesis was lately admitted into the Royal Hospital for Sick Children. The girl, aged seven, when first admitted presented well-marked dyskinesia and hemiataxia on the right side, the inco-ordinate movements being most manifest in certain muscles of the limbs. There was little or no paresis at first, but on dismissal, after being under treatment for eight months, she was decidedly hemiplegic. She was a bright, intelligent-looking girl, who had suffered from typhoid four months previously. The first symptoms came on two months before admission, headache and recurrent vomiting being most prominent. About the same time, shaking movements on voluntary effort were noticed in the right limbs. On admission the movements were well marked in both limbs. When asked to grasp an object, she put out her hand by a series of jerking movements and failed to lay hold. The leg was affected by similar movements before it could be advanced to the ground in progression. Sensation was unimpaired; muscular sense normal; skin, deep and organic reflexes unaf-

fect; sight and hearing good; intelligence unimpaired. The progress of the case showed gradual diminution of ataxic movements and increase of paresis, and when the child left hospital, as already stated, she was distinctly hemiplegic. The sequence of events in this case was unusual, inasmuch as ataxic movements in hemiparesis generally succeed rather than precede the paralysis, as shown by cases recorded by Graves and Bastian, and also by Demeaux and Grasset. Whooping-cough is one of the diseases very liable to be complicated by cerebral symptoms. The frequent occurrence of convulsions in this disease points to altered cerebral conditions, and the probability of serous or capillary sanguineous effusions must be borne in mind as likely to lead on to subsequent inflammatory and atrophic changes. In convulsions from whatever cause, if long-continued or severe, similar results may accrue. Thrombosis and embolism, as well as hæmorrhage, have been found on post mortem examination. Many of the embolic cases are associated with endocarditis. In a child two years old, treated in the Children's Hospital, with severe convulsive attacks and spastic rigidity of the arm and fingers on the right side, I found thrombosis of the cerebral sinuses after death. At the posterior part of the fornix, a dense cicatrix, causing retraction of the falx cerebelli and pressing on the posterior portion of the brain, was also noticed.

Bilateral Spastic Hemiplegia, according to Osler, is most frequently a congenital condition occurring in children at or soon after birth, probably the result of congenital sclerosis or cysts (porencephalus) of some part of the motor area. The legs are usually affected more than the arms; the spastic rigidity is not accompanied by atrophy; sensation is unaffected; the reflexes generally exaggerated. In truly congenital cases the children are often imbecile or idiotic. Ataxic movements, or athetosis, are sometimes present. These cases have been termed by Gowers birth palsies, from the fact of their general occurrence at birth, and after difficult labour or the use of forceps. When the child grows older, and begins to

make efforts at walking, the legs are extended, and the feet, which are often affected with talipes varus or equinus, are crossed, the thighs being adducted, so that when held up the attitude is peculiar and characteristic. The arms are often affected with spastic rigidity, the wrists stiff, and the fingers clenched. In most cases, the children can make use of their hands with difficulty. The muscles of the neck and trunk are generally weak, causing difficulty and requiring assistance in maintaining the erect posture. In the reports of sixteen post mortem examinations, recorded by Osler, various morbid conditions existed. "Bilateral porencephalus, atrophy of frontal convolutions, atrophy of left central and right parietal convolutions, bilateral atrophy of central convolutions, sclerosis of temporo-occipital and parietal gyri on both sides, general cortical sclerosis of both hemispheres, foci of sclerosis in frontal and temporal lobes, general atrophy, general cortical sclerosis." Osler concludes by saying: "Destruction of the motor centres of the cortex is, then, the essential lesion in bilateral spastic hemiplegia. Diffuse atrophic sclerosis is the most common condition."

Spastic Hemiplegia is a condition closely allied to that just described. It is generally believed to be of cerebral origin, and is apt to be confounded with tetanic or pseudo-paralytic rigidity. The gait of the child is highly characteristic. In standing it rests on the toes and the heel of the foot, on account of talipes equinus, which, along with some degree of varus, is usually present. The lower limbs are crossed, from spasm of the thigh adductors, producing the so-called "clasp-knife rigidity." The muscles are not wasted. The intellectual functions are generally unimpaired, at all events less commonly defective than in the hemiplegic cases. The reflexes are increased. Sensation is unimpaired, and the organic reflexes normal. The theory of the cerebral origin of these cases is based on their close resemblance, as to clinical history and etiology, to the hemiplegic varieties, the general belief being that they are due to similar defects of the motor areas of a more limited character.

DIAGNOSIS chiefly rests between this condition and tetanic or pseudo-paralytic rigidity. In the latter cases, the painful and transient nature of the spasm, which is generally limited to the hands and arms more particularly, the association of the disease with rickets and laryngismus, and its later appearance, contrasts strongly with the painless and persistent rigidity of the legs existing from birth and associated with difficult labour. Clinically it is important to note the distinction between the condition of the limbs in the cerebral as distinguished from the spinal form of paralysis. In cerebral paralysis the contour of the limbs and trophic condition of the muscles are unaffected. You may have contractions of the muscles and always more or less stiffness or rigidity, certainly not flaccidity. In spinal paralysis the limbs are generally flaccid, the muscles often atrophied. There is also an absence of any sign of cerebral involvement or interference with the intellectual functions such as obtains in atrophic cerebral conditions, whether the result of hæmorrhages, meningitis, encephalitis, or porencephalus.

PATHOLOGY.—The congenital nature of most of these cases points to some inherent congenital defect of development, or accident of birth. Cruveilhier has depicted examples of meningeal hæmorrhage, the result of difficult labour. Parrot¹ and Litzmann² have also described numerous similar cases. In most cases of asphyxia neonatorum and tetanus, intense passive congestion of the brain or meningeal hæmorrhage are generally believed to exist.

TREATMENT of cases of cerebral paralysis must be conducted on general principles, according to probable nature and cause of the attack. If the child is seen during the earliest or acute stage, when convulsions or coma are present, it should be placed in a comfortable, well-ventilated room, the body and feet kept warm and the head cool; cold applications, if necessary, applied to the vertex, or sinapisms to the epi-

¹ *Clinique des Nouveau-nés*, 1877.

² *Archiv f. Gynäkologie*, Bd. xvi.

gastrium or nucha. The bowels should be freely moved by a calomel or other purge. Recurrence of convulsions indicates the use of bromides or chloral, or a combination of both. The child will rarely take the breast or bottle at first, but must be fed with a spoon or soft rubber tube. In the chronic stage, the most successful results are obtained from massage and the cautious use of the Faradic current—the child being clothed in soft flannel. Chronic contractions are often benefited by surgical treatment or orthopædic apparatus. Cases which develop epilepsy are recorded in which operative interference has been resorted to. Weir Mitchell relates a case in which the Rolandic area was exposed, an œdematous state of the membranes discovered, but no “focal disease.” The child recovered, and an amelioration of symptoms followed. In cases of idiocy or imbecility little can be done, unless by educational treatment and training by those specially accustomed to the management of such cases, at home or in public institutions.

CHAPTER XXXVII.

THE NERVOUS SYSTEM—*continued.*

CEREBRAL TUMOUR.

Tumours of the Brain are met with in children as in adults. Their clinical features and relations are the same. A detailed consideration of the subject would therefore be out of place in such a work as this. It will suffice to refer to some leading facts, and a few illustrative cases in connection with the subject. Of one hundred cases collected by Mills and Lloyd,¹ ten occurred under ten years of age. Injuries and blows on the head are antecedent in a goodly number of cases. Dr. Shaw² expresses the opinion, and details six cases in point, that measles often precedes the development of cerebral tumours. In all the cases the attack had been of an average or mild character, leading him to draw an analogy between these cases and brain syphilis, in which it is often noted that gummata or other syphilitic disease of the cerebral substance succeeds in cases when the secondary manifestations of the disease have been of a mild character.

ANATOMICAL CHARACTERS AND SITE.—The literature of the subject shows that the cerebellum is the most frequent site of morbid growths of the brain in children, yet, as in adults, they may occur in almost any other situation. Tubercular tumours stand first in order of frequency, and are most frequently found in the cerebellum, or in the region

¹ Pepper's *System of Pract. Med.*

² *N. Y. Med. Jour.*, April 18, 1885.

of the pons varolii and medulla. They are found in masses, varying in size, and may be single or multiple, and are usually local manifestations of general tuberculosis.

A child, aged six, was admitted into hospital with well-marked hemiplegia on the left side. The mother stated that some months previously he had received a blow on the head from a fall, and soon afterwards paralysis came on. After death, a tubercular tumour, one and a half inches in length, was found in the anterior lobe of the cerebellum, about an inch from the anterior portion, and close underneath the grey matter bounding the longitudinal fissure. The right lobe of the cerebellum was firmly adherent to the dura mater. Some fluid blood was extravasated from the pia mater, over the pons and medulla.

A boy, aged seven, was admitted into hospital, and died in a few hours after admission. On post mortem examination, multiple tubercular tumours were found in both lobes of the cerebellum, and also in the brain. Those in the brain were found in the middle of the first frontal convolution; on the right side was a mass, measuring one and three-quarters by five-eighths of an inch. A similar though smaller tumour was found, about the size of a filbert, in the first temporal convolution, and a smaller tumour just behind this. In the posterior part of the middle lobe, on the right side, were three similar tumours, and in another part of the same lobe were two others of considerable size, at the commencement of the second frontal convolution. All the tumours were situated in the grey substance, and passed down to, although not involving, the white matter. There were no tumours in the pons or medulla. The surface of the cerebellum was marked by several projecting tumours of a similar nature, on both sides. On section of the right lobe, the masses were found to be numerous and varied in size, from a pea to a walnut, of roundish form, and grey colours, hard consistence, and distinct margins. Similar masses were found in the left lobe, although not so large.

Dr. Seguin¹ relates a case, that of a boy aged ten, who, soon after a fall on the head, developed cerebral symptoms, and on post mortem examination, four years after, a sarcomatous tumour was found in the inferior part of the right lobe of the cerebellum, and a large cyst, occupying the anterior three-fourths of the same lobe. The symptoms during life were vomiting, severe occipital headache, and epileptiform seizures, loss of sight from optic atrophy, deviation of the eyes to the left, right hemiparesis without ataxia or anæsthesia, intelligence unimpaired. Dr. Lewis Smith² has recorded an interesting case, in which the localisation of the tumour was distinctly made out before death. The child was only thirteen months old when he received a severe blow on the head from a baseball, over the region of the seventh cervical vertebra. The next day his head was inclined to the left side. Some months after, retraction of the head was noticed, and he began to vomit. The next symptoms noticed were right facial paralysis, and right internal strabismus. The legs became feeble, the reflexes were normal, and no contractures were noticed. The paralysed facial muscles did not react to the Faradic current; electrical reactions in the limbs were normal. The diagnosis now made by Professor Starr was "unilateral lesion, probably a tubercular tumour, with accompanying meningitis, also simple meningitis from disease of the ear; lesions, causing pressure on motor tracts and paralysis of fifth, sixth, seventh, and eighth nerves." He subsequently developed a corneal ulcer on the right eye, probably the result of the eye remaining open from paralysis of the orbicularis palpebrarum. About eighteen months after the first seizure the child died, and the post mortem examination disclosed a "tumour protruding from the right half of the cerebellum, at the point of entrance of the middle peduncle, and a little posterior and inferior to it. It had contracted firm adhesion to the dura mater in the cerebellar fossa, and compressed the seventh

¹ *Jour. of Nervous and Mental Diseases*, April 1887.

² *Archives of Pediatrics*, vol. v., 1889.

and portio mollis nerves. A second tumour was found in the same side, in the centre of the pons varolii. A third tumour was found on the opposite side of the brain, in the outer of the three grey portions, making up the lenticular nucleus. The tumours were all caseating in the centre, and were evidently of a tubercular nature."

Gliomata and sarcomata are probably next in order of frequency. Sarcomata are generally of the round-celled variety, and occur as primary growths. Gliomata are often of large size and ill-defined from the general cerebral substance. They are generally of firm consistence and vascular. Syphilitic growths are rare in children, being apparently uncommon in the congenital disease, much more frequently as tertiary results of the acquired syphilis of adults. Hydatid cysts (*tænia echinococcus*) are sometimes met with; although rare, they seem to be as common in children as in adults. Cysticerci (*tænia solium*) have also been found. The situation of both parasites is generally near the surface, or in the substance of the hemispheres. Certain other varieties of tumours are of such rarity as to merit simple mention, still they are all known to occur in early life. I refer to myxomata, papillomata, osteomata, cholesteomata. Aneurisms of the basal or Sylvian arteries are sometimes met with. They are apt to give rise to symptoms of pressure when present, or hæmorrhage from rupture, and are often accompanied by embolism or thrombosis.

As an example of gliomatous tumour, the following case is of interest.¹ An otherwise healthy and intelligent boy, nine years old, died, after an illness of four months, characterised by peculiar symptoms. He was subject, at irregular intervals, to slight and transitory attacks, characterised by a vacant and unnatural look, accompanied by incoherence of speech. He often skulked into the corner of the room, as if afraid of something. After the attack passed off, he said he had not been sensible of anything wrong. One morning,

¹ Carmichael, *Jour. Anat. and Physiol.* vol. xiv.

while his hair was being brushed by the nurse, he suddenly sank down in a crouching manner on the floor, and crawled underneath the bed, as if to avoid the light. On one occasion, when walking in town, he suddenly remarked that the street was too steep, became confused for a few seconds, and then regained his natural manner. During most of the attacks it was noticed that he put his hand to his forehead or over the eyes, as if to exclude the light. There were no other symptoms referable to the nervous system. After passing a restless night, he had a rigor in the morning, the temperature rising to $101^{\circ}8$. He gradually became comatose, and died in twelve hours. On post mortem examination, when the calvaria was removed, it presented unusually well-marked *impressiones digitatae*, in the concavities of which, the bone by transmitted light appeared thinner than natural. On removing the brain, the only abnormality noticed was in the temporo-sphenoidal lobe. It appeared more prominent than usual towards its lower part, in the situation of the middle temporal convolution, and was slightly paler than the surrounding brain substance. On grasping it in the hand it felt hard, almost cartilaginous in some places. There was no distinct projecting or isolated tumour, the borders of the indurated mass passing insensibly into the surrounding brain tissue. The appearances were more like those of an infiltration of some new material into the brain substance, spreading diffusely through it, without destroying the outline of the convolutions. The whole temporo-sphenoidal lobe seemed more or less involved, but the middle third of the second temporal convolution was the chief seat of lesion. On cutting horizontally through it, no line of demarcation of the grey from the white substance could be noticed, apparently from the absence of the former. The consistence of the indurated portion was tough and somewhat gelatinous, while in certain places it reminded one of hyaline cartilage. The edges of the section were clean cut, and retained their sharpness even after handling. On microscopical examination, after hardening in a solution of bi-

chromate of potassium and ammonium, the tumour was found to be very vascular. None of the vessels were degenerated. The tumour was composed of rapidly growing cells of an embryonic kind, which at first were suspected to be solely of the sarcomatous variety, but on further examination, by treating the sections with oil of cloves, which rendered the dense structures more transparent, many of the cells, which formerly looked like rounded sarcomatous ones, presented an altogether different appearance, being extensively branched, constituting a close-meshed network by the intertwining and anastomosis of their processes. The cells were evidently delicate protoplasmic masses, exactly like the "spinne zell" of the German pathologists. All the appearances pointed to the case being one of the gliomatous sarcoma originally described by Virchow.

SYMPTOMS.—These vary infinitely in different cases. One of the most curious facts in cerebral pathology is the existence of morbid growths, sometimes of considerable size, with an absence of any special or characteristic symptoms during life. When well-marked symptoms are present, these may give no indication of the situation of the tumour. In other cases, the clinical features of the case give a tolerably clear indication of the site of the disease.

Headache, vomiting, vertigo and photophobia, and double optic neuritis, are among the most frequent symptoms of brain tumour. Associated with these are other symptoms, such as affections of vision, either total or partial blindness, hemianopsia. Optic neuritis is a sign deserving of special notice, as being present in a large proportion of cases at some period of the disease. It is generally double, and when it exists the presumption in favour of cerebral tumour is very strong. In the early stage the fundus shows enlargement of the veins, and in further advanced stages well-marked neuritis, with swelling and blurring of the discs. In cases of long standing, optic atrophy and total blindness may result. The loss of vision is usually gradual; exceptionally, total blindness may occur suddenly. Deafness is a somewhat rare symptom.

Bramwell states, as a probable explanation of this fact, that "the auditory nerve on each side is connected with both auditory cerebral centres, the absence of symptoms being due to bilateral representation. Disorders of the senses of smell and taste are still more rare. In children, the clinical difficulty in testing these special senses is very great, and therefore little information is forthcoming in the literature of the subject. Impairment of the mental faculties is sometimes observable in adults, but in children, these, as is the case with some of the special senses, are less easily determined. Aphasia is one of the less common symptoms, but, when present, is of value in determining the locality of the disease. The question of the relations of intracranial pressure, in the production of symptoms in brain tumour, is important. In estimating its effects in children, it is important to note whether the sutures and fontanelles are closed and the bony cranium incapable of expansion from pressure within its cavity. When the sutures and fontanelles are capable of separation and expansion, the compensatory enlargement of the head relieves the pressure within to a great extent. In rapidly growing tumours, particularly when pressure is exerted on the vessels or sinuses, the intracranial pressure must necessarily be greatly increased. In slowly growing tumours, on the other hand, especially when they cause compensatory atrophy of cerebral substance, the pressure is less. Bramwell draws attention to the influence of the tentorium and falx, in primarily limiting the pressure in the one case to the cerebellum, and in the other to one or other of the hemispheres. He points out that whereas cerebral tumours above the tentorium "compress chiefly the parts which are situated in the upper cranial cavity, and as a rule exert comparatively little pressure upon the cerebellum, pons, or medulla, the reverse is by no means the case. Subtentorial tumours, in fact, may and do exert very great compression on the parts in their immediate neighbourhood, but may, and very frequently do, by producing dropsy of the ventricles, cause an enormous increase of

pressure in the upper cavity." "I believe," he says, "it is to this increased intracranial pressure and its results that the general symptoms of intracranial tumours are largely due."

The localisation of cerebral tumours is often a matter of great difficulty; but in recent years, since the researches of Ferrier and Hitzig and other pathologists have given us so many experimental data for our guidance, the diagnosis, especially when the motor phenomena are well marked, has been rendered much more certain. Cerebellar tumours being much more common in children, we may refer to a few of the more common and rarer symptoms met with. Headache, vomiting, epileptiform seizures, and staggering gait, are among the most common. Double optic neuritis, associated with intracranial pressure, is hardly less frequent. Stupor and drowsiness is always present when effusion occurs into the serous cavities. Strabismus, nystagmus, hemiparesis or hemiplegia, ataxia, loss of tendon reflexes, irregularity of the pupils, are occasionally present. The unsteady or staggering gait, when present, is generally considered pathognomonic of cerebellar disease in children. In adults it requires differentiation from that of locomotor ataxia. It must be remembered that in many well-marked cases of cerebellar tumours this symptom is absent. It is believed that the reeling gait is most frequently present in tumours of the middle lobe, and when the disease is unilateral. Lesion of the anterior part of the middle cerebellar lobe, according to Bramwell, produces "a tendency to fall forwards, while irritation of the same part excites the muscular combinations which would counteract this tendency, such as backward movement of the head, extension of the trunk and limbs, together with upward movement of the eyes." Lesion of the posterior part of the middle lobe "produces a tendency to fall backwards, while irritation of the same part calls into play the muscular adjustments necessary to counteract this tendency, viz. forward movements of the head, and downward movement of the eyes. Lesions of the lateral lobes or of the middle peduncle are followed, when complete, by rotatory movements. "Incomplete

lesion of the same portion causes, instead of a movement of rotation, a tendency to fall backwards and to the opposite side." Ataxia, tremors, and tonic spasms are probably produced by pressure on the medulla, pains and paralysis of the limbs by pressure on the pyramidal tracts on one side. The diagnosis and localisation of cerebral tumours is a wide subject, and cannot be taken up in such a work as this. The difficulty of localising the disease in any given case is often very great. Tumours causing destruction of important centres sometimes give rise to no symptoms specially referable to the part affected. By reason of alteration of general pressure within the skull, or direct pressure on important blood-vessels or on the conducting paths from the cerebral cortex or brain centres, or by reflex irritation or inhibition of distant centres, the symptoms may be referable to other than the diseased parts. The multiple nature of many cerebral tumours is also a confusing element in diagnosis. This has been specially noted in the case of cerebellar tumours of a tubercular nature.

Tumours of the Cortex of the hemispheres produce symptoms according to the seat of the lesion. The *general* symptoms we may anticipate in such conditions are headache or localised pain, convulsions, and interference with intellectual functions.

Special Symptoms referable to particular areas:—

Tumours of the Frontal Lobes seldom produce any marked symptoms except those referable to the sense of smell, when one or other of the olfactory nerves is involved. It must be remembered that, as already indicated, disease in one part of the brain, producing no symptoms referable to the part, may give rise to disturbance of function in a distant portion of the brain by radiation; thus, disease of the frontal lobes, by creating irritation in the anterior motor centres in the region of the ascending frontal convolution, may cause convulsions. Aphasia may result from growths involving the third left frontal convolutions.

*Tumours of Cerebral Cortex and Relative Convolution*s may

produce convulsions or paralysis on the opposite side of the body. The earliest symptoms are generally of a convulsive nature, followed by paralysis as the growth causes destruction of brain-tissue. In this region are the motor centres, regulating the movements of legs, arms, and face, and if the symptoms are localised they may be referred to the corresponding area.

Tumours of the Parietal Lobes, with disease of which is believed to be associated the higher sensory phenomena of tactile and muscular sensibility and the temperature sense, are difficult to interpret in children, from absence of intelligent response on examination. In disease in this situation, paræsthesia or anæsthesia on the opposite side may be met with.

Tumours of the Occipital Lobes produce hemianopsia, that is, blindness in one-half of both eyes, from disease of the opposite lobe in the brain.

Tumours of the Temporo-Sphenoidal Lobes, as indicated in a case of disease in this situation already related, do not usually give rise to special symptoms. Tumours of the corpora quadrigemina often cause immobility of pupils, nystagmus, or strabismus, with staggering gait, very similar to the symptoms of cerebellar disease.

TREATMENT.—The medical treatment of intracranial tumours is most unsatisfactory. As a rule, no means as yet at our disposal, by drugs or other methods of medical treatment, have much effect in arresting the disease or averting a probably fatal termination. Children suffering from tubercular disease may be benefited for a time by careful hygienic and dietetic treatment, and the administration of iodides or cod-liver oil. Syphilitic growths are more likely to be arrested or even cured than any others by the usual anti-syphilitic remedies—iodide of potassium or mercurials. In recent years the brilliant results of cerebral surgery have opened up a hopeful field in certain cases of clearly localised cerebral disease. Horsley and Macewen, the pioneers in this department, have had wonderful results in many cases. The indications for surgical interference are an exact diagnosis of the localisation of the disease,

which must be in a situation within reach of the surgeon. The tumours must be of a single nature, and localised or encapsuled, so as to admit of thorough removal; antiseptic measures must be carefully attended to, so as to prevent subsequent inflammation of the brain or meninges. A remarkable case, illustrative of the benefits derived from careful and accurate observation and diagnosis combined with surgical skill, was lately brought before the Medico-Chirurgical Society of this city by Dr. Felkin. It was that of a girl, æt. seventeen, who was affected with arrested development of the right arm and leg, with some degree of paresis of the limbs. When ten months old a brick fell from a house and struck her on the head. There was no wound produced, but she was rendered insensible for a time. When exhibited at the Society, the arrested development of the limbs was readily observable. A trench-like depression or fissure, three and a half inches long, existed in the parietal region of the skull, which admitted the tip of the finger along its whole length. There was no tension in the floor of the fissure. A second depression, one and a quarter inches long, ran downwards towards the external auditory meatus. It was decided to trephine the skull, and the operation was performed successfully by Mr. (now Professor) Hare. On reflecting the pericranium, the rift was found to be occupied by a thin membrane, on puncturing which a quantity of clear fluid escaped from a cyst, of which the membrane was the outer wall. A circular portion of bone was removed by trephine, and the finger could then be passed into a large cavity, about two inches deep. The brain gradually expanded during the operation, obliterating the cyst cavity. The wound healed in twelve days, and the patient made a satisfactory recovery. Since the operation the limbs have undergone gradual growth and development, and she is now able to work at a sewing-machine.

CHAPTER XXXVIII.

THE NERVOUS SYSTEM—*continued.*

EPILEPSY

Is met with in children in all its varieties, from slight loss of consciousness or megrim, which Hughlings Jackson describes as epilepsy of the sensory cortical centres, to the fully-developed *grand mal*, with all the characteristic motor symptoms due to sudden discharges from the cortical motor centres, the suddenness and intensity of which causes total loss of consciousness. The chief interest connected with the disease in children rests on the fact that we are enabled to study it in its initial stages, and trace its connection with hereditary predisposition on the one hand, and various acquired causes on the other, which, acting on the naturally unstable nervous system of the child, tend to produce the habitual discharges from the nerve-centres which are the essence of this disease, or rather group of symptoms, for as yet we have not been able to connect it with any constant central lesion.

ETIOLOGY.—The disease may be congenital or acquired. Idiotic or imbecile children are frequently subject to it. Bourneville and Sollier investigated a large number of cases of idiocy, a considerable proportion of which were epileptic, and they have shown that in certain other cases congenital defects were met with, particularly those of the dental and genital organs, hereditary neurotic tendency being present in a large proportion of cases, and alcoholism in the parents apparently a frequent cause. The causes of convulsions generally

in children may be truthfully stated to be those of epilepsy in many cases. Rickets being one of the principal of these, is no doubt a frequent factor. Emotion, fright, or terror, blows on the head, in fact, any cause which initiates a convulsive seizure, may predispose to habitual continuance of motor discharges, lasting for an indefinite time. How this is brought about stands as yet an open question in pathology. In convulsions there is probably always grave interference with the cerebral circulation, possibly in some cases serous or capillary effusions, which leave lasting effects on the cerebral centres. It seems probable that epileptic discharges may be associated either with vasomotor spasms or dilatation. Anything which for the time being disturbs the nutrition and vasomotor activity of the centres, may produce it. The discharges, it is believed, may be initiated in any part of the motor area. Nothnagel believes that the most sensitive part of the motor area is in the medulla. Meynert gives nineteen chronic cases of the disease in adults, where he found lesion of the hippocampus, with atrophy or sclerosis.

SYMPTOMS are similar to those met with in adults, and vary, infinitely from the most transient loss of consciousness, without spasm, to the highest degree of motor disturbance. A well-marked aura is often present. A short reference to one or two cases will perhaps best describe the clinical features.

Peter M., æt. ten, a strong, well-made boy, of slightly defective intelligence, was admitted into hospital with a good family history; personally, there was evidence of rickets during the primary dentitional period, as he was late in walking, and had no teeth till he was fourteen months old. Five years ago the fits began. He used to have fifteen in a day. He had a distinct warning of their approach, and used to run and catch hold of anything at hand, and gradually became unconscious and rigid. Under observation, after admission, he had on an average about twelve fits in the twenty-four hours. The attacks came on suddenly, with violent movements of the limbs, lividity of the face, squinting and conjugate deviation

of the eyes. In from two to three minutes the convulsion passed off with a long stridulous inspiration.

Wm. C., aged seven years, was admitted to hospital with the following family history. His father was a drunkard. A first cousin of the father's was epileptic, and became insane before death. On the mother's side several relatives had died of consumption. Personally, the boy had been subject to fits since he was fifteen months old. He had suffered both from scarlatina and measles, also from jaundice. He was a badly-nourished boy, with external strabismus on one side, and of nervous excitable temperament. Any excitement seemed to bring on the fits. The fits were not very frequent, and recurred at irregular intervals, generally in the daytime. He used to fall down suddenly in an unconscious state, the lower limbs being generally more or less rigid, the arms clonically convulsed, with foaming at the mouth.

E. S., aged two years and two months, was several weeks under treatment without benefit. She was a well-nourished, healthy, and intelligent child. Her father was a healthy man, with good family history, and very temperate. The mother is subject to epilepsy (*petit mal*); she becomes unconscious for a few seconds, after having a vacant stare. There is no history of syphilis or alcoholism. The personal history shows that the child had three fits when she was ten months old, at the time she was cutting her first double teeth. The fits never recurred till six months ago, and have since been very frequent. During her stay in hospital she had on an average about six fits a day. They were of short duration, accompanied by loss of consciousness, and spasmodic movements of the limbs and facial muscles, and stertorous breathing. The sensory and reflex functions were normal, except that she was persistently constipated, which seemed to aggravate the fits. The further history of the case presented nothing specially noteworthy, except the rapidity with which she recovered from the attacks, and the varying intensity of the fits. Sometimes, within a

minute after the fit, complete consciousness appeared to have returned, and she would be seen sitting up in bed playing with her toys, as if nothing had happened.

A very curious form of epilepsy has been occasionally noticed, which Angel Money has termed cutaneous reflex epilepsy. Such a case was under treatment in the wards of one of my colleagues some years ago. It was that of a boy, who immediately had a fit whenever the head was touched, however lightly, over a limited space on the back of the parietal region on one side. The true pathology of the case was not made out, and I have been unable to obtain particulars of its further history.

PROGNOSIS.—The disease is generally unfavourable in regard to prognosis, especially in cases where the convulsive seizures have begun during the first dentition. The more frequently the fits recur, the more likely will a permanent habit and damage to the encephalic centres result. Cases where the disease commences during the second dentition, or in the interval between the first and second, often admit of a more favourable prognosis, when the fits do not recur frequently, and there is no hereditary neurotic tendency. The accession of puberty sometimes apparently determines a cure. Cases due to some evident peripheral irritation, such as disordered stomach and bowels, or the presence of worms, or phimosis, may be relieved by removal of the existing cause. The present era of cerebral surgery opens up an interesting field for the relief or cure of any case that may depend on definite encephalic lesion, such as tumour.

TREATMENT.—Hygienic and regiminal measures are all-important in the management of epileptics. Healthy housing, country air, with suitable bodily occupation and a minimum of mental work, all favour a cure. All causes of excitement of whatever kind should be avoided, whether in the form of amusements, games, or otherwise. Healthy manual occupations of any kind are advisable, over-fatigue being always avoided. Gymnastics should be tried, so also cultivation of

the musical taste, if it exists. The dieting of epileptics is of considerable importance. The food should be nutritious but unstimulating, therefore the proportion of animal food in the dietary should be reduced to a minimum, on account of the stimulating effects of highly-nitrogenous food on the encephalic centres. The state of the digestive system must be carefully attended to, gastric indigestion being treated by rhubarb and soda, or bismuth, or potash and gentian mixture. Constipation must be avoided, most epileptics being subject to it. For this purpose Hunyadi or Friedrichshall waters may be used, or cascara, which, if need be, may be added to the mixture of bicarbonate of potash and infusion of gentian. Cold sponge baths or shower baths, when the powers of reaction are good, are sometimes of service. A hot bath at bed-time often has a good effect, when followed up by a rapid cold sponge all over, and subsequent friction. Special nerve sedatives are always worthy of a trial. The bromides of potassium or sodium stand first in their power of controlling the discharges. Fifteen or twenty grains of either drug given at bed-time, or morning and evening, seldom fail to reduce the frequency and severity of the fits. Oxide of zinc, or valerianate of zinc, in from one to two grain doses morning and evening, I have found to be useful. If need be, a single dose of bromide of sodium at bed-time may be given at the same time. Belladonna is strongly recommended by Eustace Smith, combined with strychnine. In my hands their use has been disappointing. General tonics should be tried, suited to the constitutional peculiarities of the child. In highly neurotic cases, arsenic is often of much service. Some cases, if there be any anæmic tendency, are benefited by iron, the ammonio-citrate or tartrate being the best preparations. Cod-liver oil does good in all cases where the gastric digestion admits of its use. During an attack, the patient should be laid on a rug on the floor or in bed, a cork or piece of wood, if possible, being placed between the teeth, and cold water dashed on the face, smelling salts applied to the nostrils, or

a sinapism to the epigastrium or feet. In prolonged convulsions, chloroform, or in some cases amyl nitrate, may be tried. The only other question demanding allusion is, the possibility of surgical interference in certain cases. In ordinary idiopathic epilepsy no surgical means will likely do good, either in the shape of trephining or ligature of the carotids. Compression of the carotids for a few moments during a fit has been recommended. The cases justifying surgical interference are those in which there is good reason to believe some localised lesion of the cerebral cortex is present, such as thickening of the membrane from localised pachymeningitis, or a depressed or thickened portion of bone. Children are tolerant of surgical interference with the brain, and the operations of Macewen and Horsley have amply justified resort to operation in suitable cases.

HEADACHE—MIGRAINE, HEMICRANIA.

Headaches are by no means uncommon in children, less so probably than in adults. They are more frequent after the age of five years, and during the second dentition on to puberty. In young children they are not so uncommon, in my belief, as generally supposed; but from the difficulty of eliciting subjective symptoms in them it is impossible to arrive at correct data.

ETIOLOGY.—The causes are various. The first question the physician has to decide in any case of headache is, whether it is idiopathic, or symptomatic of some cerebral disease—incipient meningitis, encephalitis, or cerebral tumour. A careful study of the history and observation of the case will soon lead the experienced physician to eliminate brain disease, and it then remains to be ascertained what the disturbed functional or constitutional condition may be which gives rise to it. The causes of headache may be classed generally under the following types—(1) cerebral disease, (2) neurotic, (3) gastro-intestinal, (4) hypermetropic, (5) genital, (6) anæmic.

The purely *neurotic* form is often hereditary, and more

frequent in girls, in whom it may be associated with hysteria or the accession of puberty. It is often periodic, and accompanied by sickness or vomiting. There is seldom any evidence of disturbed function in any of the organs. The treatment is uncertain and often unsatisfactory.

Gastro-intestinal Headache is caused by any disorder of stomach, bowels, or liver, or the presence of intestinal worms. It is accompanied by symptoms referable to such deranged functional states. The pain is generally orbital or frontal, with foul tongue, nausea, anorexia, but quite as frequently depraved appetite. The child has a bad complexion and foul breath, often due to decayed teeth, the irritation from which may be the sole cause of the attacks. The *hypermetropic* variety is by no means uncommon, and often overlooked as to causation. Inquiry should always be made whether the child strains its eyes in reading, or suffers from increased lachrymation or pain in the eyeballs or forehead. An examination by the ophthalmoscope, and test letters, will enable a diagnosis to be made. I have seen a child dosed with stomachic or tonic medicines for months, when a simple examination of the eyes, followed by the use of suitable glasses, was all the treatment necessary. The *genital* form is that associated with masturbation in boys, or manustupration or ovarian irritation in girls. It is most common from the age of eleven years onwards. The headache is usually of a dull aching character, and vertical, worse in the morning than during the rest of the day. The child often has a heavy and depressed look. It is not usually associated with any other disordered state, except perhaps constipation. The *anæmic* form is not uncommon, and more frequent in girls. It often succeeds convalescence from some acute disease, such as typhoid fever.

TREATMENT.—The management of such cases in children is all-important. Parents often neglect their children in this respect, dosing them with medicine, and delaying to get medical advice till the headache habit has become confirmed,

and therefore more difficult to cure. The treatment is etiological. A careful study of the case, as to previous history and existing condition of health, with reference to all the organs and functions, is a matter of necessity in order to success in treatment. The neurotic form is probably the most difficult to treat, and the most liable to recur. It occurs in boys or girls, most frequently the latter, during the second dentition and on to puberty. Existing causes are not always evident, but, if ascertained, will be a guide to treatment. Careful attention to hygiene is essential, and also avoidance of over-study and excitement. Change of air, with a due amount of physical education, and a restriction of mental work and long hours at school, are indicated. A simple, nutritive, but unstimulating diet should be ordered, with careful regulation of meal hours. The medicines most useful in my hands have been ammonium bromide, in doses of ten grains, twice a day, during the headache. Sulphonal at bedtime, in from seven to ten grain doses, I much prefer to antipyrine. It should be given in a single dose at night. Guarana is useful in many cases, but less certain in its action than either the bromides or sulphonal. Caffeine has its advocates, but is, I think, more uncertain in its action than any of the remedies just alluded to. In many of these cases, according to Möllendorff and Bois Reymond, the headache appears to be associated with vasomotor disturbance and capillary dilatation in the blood-vessels of the dura mater—a so-called "congestive headache." In these cases ergot of rye is indicated, and its administration is generally attended with much benefit. Eustace Smith recommends a combination of strychnine and ergot; neither remedy, he believes, acts so well alone as in combination. I can testify to the benefits to be derived from ergot in many cases of neurotic headaches, but have not been able to satisfy myself that it is possible to differentiate the "congestive" from the ordinary varieties of neurotic headache, and therefore the remedy in my hands has been given somewhat empirically. Careful attention to the

digestive system, and specially regulation of the bowels, which are usually constipated, is essential in these cases. In the gastro-intestinal variety, the indications for treatment are clear. The catarrhal condition of the stomach or intestines must be met by suitable means—by regulation of diet and medicine, or the removal of worms. An emetic may be useful at the outset. If the tongue is much furred and nausea is present, early morning doses of Hunyadi or Friedrichshall water may be tried. Bismuth, with magnesia or soda, or rhubarb and grey powder, followed by tonic doses of cinchona or quinine, or calumba, soda and ext. of cascara, will generally afford relief. In regard to the hypermetropic headache, its treatment is self-evident. The genital form must be treated by endeavours to arrest any depraved habits, and remove local sources of irritation, leucorrhœa or balanitis, or the cure of phimosis if it exist. Anæmia must be treated by Blaud's pills, or glycerite of the protochloride of iron, with attention to diet and treatment of constipation, and, if need be, change of air to the country. Arsenic, either alone or combined with iron, is often successful in giving relief when iron alone fails.

PERIPHERAL PARALYSIS.

Peripheral Spasm has already been treated of in the consideration of general convulsions, tetany, and laryngismus stridulus, and such-like affections.

Peripheral Paralysis in children is generally associated with three conditions—*traumatism*, *neuritis*, or *reflex irritation*.

Traumatic Paralysis.—This is most commonly met with in the *facial nerve* at birth, and is directly due to pressure by the forceps, or otherwise. It is generally unilateral, more rarely bilateral, as in cases described by Parrot and Troisier.¹ The symptoms are the ordinary ones met with in this affection—vacancy of expression (due to immobility of the muscles on the affected side), with inability to close the eye, the face being

¹ *Sur l'anatomie pathol. de la Paralysie Faciale.*

drawn to the sound side in crying or laughing. The tongue and uvula are unaffected, and the child is able to suckle. Electrical contractility is diminished, or lost in proportion to the extent of the paralysis. Another form more rarely met with, but also of a congenital nature, is *paralysis of the arm*, from pressure on the brachial plexus during parturition. It is said to occur not unfrequently in instrumental delivery in face cases. Dragging on the arms during delivery may also produce the same effect. In older children dragging by the arm may produce similar effects. Sometimes blows or strain of the deltoid, from pulls or otherwise, cause temporary paralysis of the arm. These cases are of a trivial nature, and get well in a short time.

Neuritis.—Here again the *facial nerve* is the one most frequently affected, and from similar causes to those obtaining in adult life. Cold or draughts are generally believed to be the exciting cause. The symptoms are the usual ones, and the paralysis generally incomplete. Inflammatory indurations or abscesses in the mastoid region, pressing on the nerve after it leaves the stylo-mastoid foramen, are less frequent causes met with in childhood. The most serious form of facial paralysis met with in children is that associated with ear disease. When the petrous bone is involved, nerve pressure is produced in the Fallopian canal. In these cases there is usually an offensive otorrhœa from carious bone. The paralysis is seldom complete; but paralysis of the soft palate and uvula, on the affected side, is generally noted, from involvement of the motor fibres of the palatine nerves passing down through Meckel's ganglion from the vidian and greater superficial petrosal nerves. Certain rarer forms of peripheral paralysis, presumably from neuritis, are occasionally met with in the limbs, affecting muscles or groups of muscles, after typhoid fever or other acute febrile diseases. Probably diphtheritic paralysis, in many cases, belongs to this group. A curious form of paralysis has been described by Möbius,¹ affecting the

¹ *Neurolog. Centralblatt*, 1884.

ocular muscles. He describes the paralysis as unilateral, and commencing during infancy or childhood, and liable to recur. It is characterised as commencing with headache, which is followed by paralysis of some of the oculo-motor muscles supplied by the third or sixth nerves. A case of this kind was lately under my care in hospital; that of a girl, æt. three years, admitted complaining of headache and squinting. She was under observation for two months, and suffered from recurrent attacks of headache and paresis of the oculo-motor muscles and facial nerve. On admission, the face was drawn to the left side in crying. This lasted for about three weeks, and then passed off. Before the facial paralysis got well she suffered from internal strabismus of the right eye and slight ptosis on the left side. All paralytic symptoms had disappeared at the end of six weeks. She was about to be discharged, when the internal strabismus reappeared on the right side, lasting about ten days. Soon after, she left hospital quite well. The child was healthy and well nourished, and there was no family or personal history indicating tendency to disease, neurotic or otherwise. In this case, although I suspected such might be its nature, I was unable to find any peripheral source of irritation on the mucous surface or otherwise which would have classed it under the term reflex paralysis, next to be alluded to.

Reflex Paralysis. — Peripheral irritation would seem to inhibit the motor cord centres, so as to cause exhaustion and paresis, or paralysis in some cases. This seems to be proved in the case of the irritation caused in boys in many cases of phimosis or other irritation in the genito-urinary organs. Henoch's case, in which a boy of seven, who practised masturbation for several years and suffered from paraplegic symptoms, is a case in point. The gait became ataxic. Under treatment, the boy recovered completely in about six weeks. Cases of paraplegia have also been recorded where recovery took place after the expulsion and cure of intestinal worms. Incontinence of urine, from paralysis of the sphincter vesicæ, is sometimes met with in phimosis. A boy under my

care at present in hospital suffered from persistent incontinence for two years. Circumcision has completely cured him. The reflex paralyses are intenser degrees of reflex spasms, due probably to persistency of the peripheral irritation, and may be essentially referable to similar causes, producing either localised spasms (often choreic forms) or general convulsions. Disordered states of the mucous surfaces, whether it be of the respiratory or digestive systems, are among the commonest causes liable to produce these effects; thus we have seen how general convulsions can be produced by intestinal irritation, bronchial spasm by nasal irritation. In like manner, no doubt, the rarer forms of localised spasm or paralysis may be produced.

Neuralgic Affections of sensory nerves are met with in children, the most common being migraine, intercostal neuralgia, and pains in the limbs. Although such affections are more frequently associated with general conditions of depraved health, such as debility or anæmia, yet they are sometimes apparently due to similar reflex causes which produce motor paralysis, such as intestinal or genito-urinary irritation.

The treatment of all these cases is purely etiological.

CHAPTER XXXIX.

THE NERVOUS SYSTEM—*continued.*

MENINGITIS—

SYNONYMS, — *Lepto-Meningitis, Non-tubercular Meningitis, Purulent Meningitis, Simple Meningitis*—is usually a secondary disease. The primary or idiopathic form is rare. In warm countries, undue exposure to the sun is ascribed as a cause of the primary disease. Lewis Smith and other American physicians mention such cases. The epidemic form is described under the chapter, *Cerebro-Spinal Meningitis*. Apart from meningitis occurring from blows on the head and other surgical injuries, which do not demand our attention here, the most frequent causes are disease of the internal ear, the nares, affections of the teeth and mouth. It occasionally arises during the progress of acute or chronic diseases, such as scarlatina, erysipelas, pyæmia, pleuro-pneumonia, peritonitis, ulcerative endocarditis, acute rheumatism, Bright's disease, and syphilis. There is probably a tendency to underestimate the frequency of simple meningitis, owing to the more common occurrence of the tubercular form of the disease.

CLINICAL FEATURES.—The symptoms often vary much in intensity, the disease sometimes running a very acute course, terminating within a week or ten days; on the other hand, they may be of a more passive nature, the child living for several weeks. The nature of the cerebral lesion, as well as the character of the primary disease, also affect the symptoms and progress of the case. In the typical form

of the disease the symptoms are very acute, the fever high, the temperature generally rising from 102° to 104° . There is acute pain in the head, active delirium, convulsions, local paralysis, vomiting, and constipation. On the other hand, in cases of a more passive nature, as in a child aged two years lately under my care in hospital, in which the disease followed a blow on the head, the symptoms commenced with convulsions, succeeded by vomiting; the temperature never rose above $101^{\circ}5$; the child was restless and cried a good deal, but was quite sensible during the first fortnight, after which gradual insensibility came on, and it died comatose on the twenty-sixth day. The post mortem examination showed absence of tubercular disease, cerebral congestion, basic meningitis, with some effusion into the ventricular cavities. Another case,¹ showing very acute symptoms, and in which the constitutional condition pointed to acute rheumatic poisoning, was that of a girl aged nine, admitted to hospital, having been ailing for about a fortnight with febrile symptoms of a rheumatic type, great sweating with rheumatic odour and lithate deposits in the urine; no history of joint affection. On admission the temperature was $103^{\circ}6$. She was very restless and delirious, with left internal strabismus and dilated left pupil. The heart's action was rapid and tumultuous, with diffuse shifting impulse, systolic and pre-systolic bruit over the mitral area. On the third day after admission her condition was similar, with increase of the general distress, and pleural friction in the left upper axillary region. On the evening of the fifth day the temperature fell to subnormal, she was delirious and noisy, brows knit, staring eyes, double nystagmus, irregular squint in both eyes, urine and fæces passed involuntarily. She continued in this state of noisy delirium, with occasional quiet and drowsy intervals, for the

¹ The record of this case is from notes taken by my resident physician, Dr. H. Alexis Thomson, whose unremitting care and skilful management of the case was most praiseworthy, and to whom, I believe, the child owed her life, by the prompt performance of venesection during a severe convulsive seizure.

next two days, the temperature gradually rising to $100^{\circ}2$. Convulsive twitchings were now noticed in the left facial muscles, which soon spread to the left arm and leg and then became general, the temperature rising to $103^{\circ}6$. There was now complete insensibility, with equally dilated pupils and absence of conjunctival reflex, nystagmus, and squinting. The convulsions having continued for two hours, and the respiration becoming much impeded with râles all over the chest and embarrassed right heart, four ounces of blood were drawn from the left external jugular vein, with the most satisfactory results. She immediately became quiet, the convulsive moments ceasing. The blood was watery and of dark colour, the serum rapidly rising to the surface after standing, and clotting taking place in a thick yellow layer of "buffy coat" distinct from the red clot beneath. After an interval of half-an-hour the convulsions returned, but were less violent, and continued for two hours without intermission, and then ceased. On examination of the fundus of the eyes, the retinal veins were found gorged with blood. The further progress of the case was of much interest, the patient remaining in a semi-comatose state with occasional intervals of consciousness for five weeks, from which state she gradually recovered. During this time she was blistered at the nape of the neck, and ungt. hydrargyri rubbed into the axillæ, and she was nourished by enemata of peptonised milk and brandy. She now rapidly convalesced, and was discharged, apparently quite well, three months after admission. The heart-sounds were normal, and the general health and state of nutrition much improved. She remained quite well for five months, except that she had occasional slight attacks of unaccountable vomiting, and when she stooped forwards she at once became giddy and tended to fall to the ground. About five and a half months after dismissal she was re-admitted in convulsions, and died in a few hours, the fit having lasted about sixteen hours. On post mortem examination the calvarium and dura were found intact. The convolutions on the surface

of the brain were flattened and the sulci effaced. There was a considerable quantity of fluid in the sub-arachnoid space at the base. The infundibulum projected downwards, as a thin walled cyst, containing colourless fluid in free communication with the ventricles. There was some milky thickening of the membranes over the pons and medulla and posterior aspect of the chiasma. The inferior surface of the cerebellum was covered with thick milky membrane, glueing the adjacent surfaces of the amygdalæ together and the lateral surfaces of the medulla oblongata. The third and lateral ventricles were enormously distended with fluid, the foramen of Monro being dilated to .45 of an inch of the cone diameter measure. The essential lesion appeared to be the closure of the foramen of Magendie by the inflammatory exudation described on the inferior surface of the cerebellum involving the roof of the fourth ventricle. The heart showed a patch of fibrous thickening on the posterior cusp of the mitral valve. The left pleura was adherent in the upper axillary region, and there were some local adhesions of the peritoneum in the abdomen. The case is of interest as being one of simple meningitis complicating rheumatism, the immediate cause of death being acquired hydrocephalus from inflammatory thickening of the membranes, causing closure of the foramen of Magendie, and death from intracranial pressure.

Purulent Meningitis.—A somewhat delicate lad of fifteen came home one afternoon bleeding from the right ear, having received a blow on the head from his schoolmaster. He continued to have discharge from the ear for nine months after, without any other inconvenience. The case was not treated, and no medical man was called in before I saw him. On examination, I found a purulent otorrhœa on the right side. He was feverish, and complained of headache, photophobia, and occasional delirium. There was no paralysis of sensation or motion. He continued in much the same state, until death took place on the sixth day somewhat suddenly. On post mortem examination, an abscess was found, involving and

destroying the cerebral substance in the temporo-sphenoidal region. There was surrounding meningitis, extending to the base of the brain and towards the vertex, and also caries of the petrous bone.

Simple Meningitis complicating typhoid fever.—A case of this kind occurred in hospital ¹ of a boy aged seven, who died on the twenty-eighth day of the fever, with pneumonia and head symptoms. On post mortem examination, thick layers of purulent lymph were found at the base and to a less extent over the vertex. The lateral ventricles were full of purulent serum.

DIAGNOSIS.—The symptoms may be well marked, or to a great extent latent at first. When there is acute pain in the head, high fever, vomiting, photophobia, delirium, convulsions, and local paralysis, the nature of the case cannot admit of doubt. The differential diagnosis of simple and tubercular meningitis is referred to under article *Tuberculosis*. In traumatic cases, and those associated with ear disease, the ultimate diagnosis generally reveals itself with sufficient distinctness, although the symptoms may be of a latent character at first. During the progress of acute fever or pneumonia, it is difficult to tell whether delirium is purely symptomatic, and due to altered blood conditions or cerebral congestion rather than inflammation. In simple congestion the symptoms are of a transient nature, in meningitis they are progressive and continuous.

PROGNOSIS is always grave. Recovery sometimes takes place, not so in tubercular cases. When the disease is recognised and treated at an early stage, the prognosis is more hopeful. When local paralysis and ventricular effusion have supervened, recovery rarely takes place. An early diagnosis, with prompt treatment, is therefore all-important. A very guarded opinion should always be given. An amelioration in the symptoms often takes place, throwing both physician and friends off their guard, soon to be followed by a relapse into a hopeless and fatal condition.

¹ Russell, *Brit. Med. Jour.*, July 12, 1884.

TREATMENT.—The patient should be kept very quiet, in a well-ventilated room of mean temperature. He should be fed on milk and light soups chiefly. The head, being previously shaved, should be kept cool, with evaporatory lotions or ice-bags. In acute cases, in well-nourished children, the application of one or two leeches to the temples or behind the ears often affords relief. In rare cases, such as the one I have recorded, where serious and prolonged convulsions were present, bleeding by venesection is indicated. I have no doubt, in the case alluded to, venesection saved the child's life, the respiratory function being impeded, and the right heart and venous system so gorged that it afforded the only means of relief. The medicines indicated are either mercurials or the bromides and iodides; I confess my prejudice in favour of the mineral remedy, and generally use it in the form of inunction. The bromides are useful in controlling the tendency to convulsions. In many cases, the addition of from five to ten grains of chloral hydrate, occasionally given, is, I believe, beneficial. Ergot has been recommended, but I have only found it of service in the epidemic form of the disease.

HYDROCEPHALUS.

Chronic Hydrocephalus.—Hydrocephalus, or dropsical accumulation of fluid in the interior of the cranium, may be congenital or acquired. The ordinary term chronic hydrocephalus, used in medical literature, generally refers to the congenital variety of the disease.

Congenital Hydrocephalus signifies an accumulation, to a greater or lesser extent, of cerebro-spinal fluid in the ventricles and sub-arachnoid space, frequently in the cavity of the arachnoid, still more rarely between the dura and the skull (external hydrocephalus). The disease may show itself during intra-uterine life, or become developed soon after birth. The gradual accumulation of fluid gives rise to globular enlargement of the head, prominence and widening of the fontanelles,

and separation of the cranial bones. Even before the head becomes enlarged, cerebral symptoms may show themselves, such as convulsions and strabismus. The general health gradually fails, and as the head enlarges the disproportion between the cranial vault and the face becomes well marked. The infant at the same time loses flesh gradually, and is unable to move or raise its head. It makes little use of its limbs, which become feebler as the disease advances. The eyeballs, owing to downward pressure on the orbital plates of the frontal bone, protrude in an unnatural manner, the white sclerotics being visible above the iris, and the eyes having a downward direction. In cases where the ventricular dropsy does not develop to any extent before the ossification of the fontanelles, there may be little or no enlargement of the head. Strange to say, actual paralysis of any kind is rare in this disease, although convulsions and glottic spasms, especially in rachitic cases, are common. Strabismus and oscillation of the eyeballs are frequent, and vision is generally impaired or totally lost from pressure causing atrophy of the optic nerves. Vomiting is a common symptom, and digestive derangement, with constipation, is usually present. In some cases the hydrocephalic signs and symptoms may not be well marked, but the child presents all the features of a less-marked form of idiocy. It is defective in intelligence, backward in speaking or using its limbs, often mischievous or bad-tempered. On the other hand, some hydrocephalic children are wonderfully intelligent and of cheerful disposition. The duration of the disease varies. Infants born with dropsy seldom survive long, perhaps only a few days. The slower the dropsy is in developing, the longer the child is likely to live. In rare cases adult life has been reached, but as a rule the child succumbs to some intercurrent disease, such as diarrhœa, acute inflammation of the lungs or other organs, or one of the eruptive fevers.

The disease is congenital, sometimes hereditary. More than one child in a family may be affected by it, or one of the other children may be otherwise congenitally defective

(idiotic). It is more liable to occur in unhealthy children exposed to unfavourable hygienic conditions, and consequently is more frequently met with among the poor than those more favourably circumstanced.

MORBID ANATOMY.—The leading feature of the disease is dropsy of the ventricular cavities of the brain, which become dilated in proportion to the amount of contained fluid. The pressure of fluid gradually thins and causes atrophy of the cerebral substance, and in cases with large effusion only a small amount of brain substance may remain, to form, along with the membranes, the cyst or sac containing the fluid. The dropsy is generally bilateral, and the cavities equally enlarged. In rare cases it may be unilateral. The cause of the dropsy is often obscure, yet in some cases it may be apparent. The condition of excessive secretion or deficient absorption of cerebro-spinal fluid, regulated by disturbance or alteration of the normal relation of blood pressure within the cranium, are presumably in operation, from whatever cause. Any congenital defect in the development of the brain or membranes, tumours, or inflammatory conditions, whereby there is any obstruction to the free circulation of the cerebro-spinal fluid, may readily give rise to it. Tumour of the cerebellum may compress the straight sinus and cause obstruction to the venous flow, dropsy from the choroid plexures inevitably being the result. Closure of the foramen of Magendie, from whatever causes, or pressure on the fourth ventricle or iter, will tend to accumulation of cerebro-spinal fluid. Many physicians hold the view that the dropsy is frequently due to inflammation, chronic in its nature, of the ependyma of the ventricles, which is often found much thickened, but whether this is of a primary nature or the secondary result of other and pre-existent conditions is not determined. Certainly, although frequently seen, it is not present in all cases. Sandos, Fournier, and Bärensprung consider that hereditary syphilis often plays an important part in causation. In hydrocephalic children there is often a syphilitic history, especially in the father, and the morbid

appearances noted in those cases known to be syphilitic are, in addition to ventricular dropsy, meningeal congestion of the pia, thickening and increased vascularity of the ependyma of the ventricles, with congestion of the choroid plexuses. In the so-called hydrocephalus externus, where an accumulation of fluid is found between the dura and pia, it seems doubtful whether the condition can be, strictly speaking, called congenital. It seems to be closely associated with, if not always caused by chronic inflammation (pachymeningitis). A typical case of this kind is described by Hensch, in which after death ten and a half ounces of fluid were found external to the brain, which did not fill the cranial cavity. "On removal of the vault," says Hensch, "a third membrane was found between the dura and pia mater, which enveloped the whole brain with the exception of the posterior fossa, and could be raised up from the internal surface of the dura mater as a transparent, colourless, and but slightly vascular membrane." In another case, a girl six months old, "we found pachymeningitis pseudo-membranacea hæmorrhagica, with fibrous thickening of the arachnoid and pia." These cases appear to be conclusive of an inflammatory and probably acquired origin of the disease.

Acquired Hydrocephalus may be due to various causes, either existent within or without the cranium. Meningitis, whether of a simple or tubercular nature, is probably the most common pre-existent condition, and the resulting dropsy is often directly the cause of death. The fluid being effused with comparative rapidity causes death from pressure, by gradual abolition of cerebral function. The rapidity with which death takes place in acute effusion contrasts in a remarkable manner with the results of chronic effusions, in which the fatal termination is apparently not so frequently due to the direct effect of the pressure of the fluid, as the intercurrent of some other morbid condition. The mode of death in ordinary tubercular meningitis is described under that disease. In simple meningitis large effusions are probably less frequent

than in the more chronic and frequent tubercular affection. Under the head of *Simple Meningitis* I have described a case of hydrocephalus in which there was a large amount of fluid and ventricular dilatation from simple meningitis associated with closure of the foramen of Magendie. Tumours causing pressure and interfering with the circulation (venous), congestion and hyperæmia of the brain, thrombosis of the sinuses in wasting diseases, such as chronic diarrhœa, are fruitful causes of dropsy within the cranium. Without the cranium, causes producing pressure on the large veins in the neck or thorax are recorded as producing dropsy. Thus retro-pharyngeal abscess, enlarged cervical or bronchial glands, have all been noted as in a similar manner obstructing the venous return to the head. When resulting from venous pressure, the dropsy is generally universal—that is to say, the fluid is found equally in the cavities of the brain and on its surface (œdema). In acute fevers, such as scarlatina, and in Bright's disease, cerebral dropsy may also occur.

DIAGNOSIS is of much importance with reference to treatment. It may be at once said that in true congenital cases a cure is hopeless. When the child presents all the characteristic signs of the congenital disease—globular enlargement of the head, prominent fluctuating fontanelles, altered axis of the eyes, with progressive increase in size of the head, coming on from an early period of infancy—the diagnosis is pretty well assured. Acquired hydrocephalus generally comes on at a later period, after the cranial bones are united. If it occur before the closure of the fontanelles, there may be enlargement of the head and separation of the bones, but not to the same extent as in the congenital disease. Rachitic heads, especially those associated with cerebral hypertrophy, require to be diagnosticated from the hydrocephalic. The skull is of a different shape, not globular but rather square, flattened vertex, depressed anterior fontanelle, prominent parietal bosses, flat forehead, with longitudinal groove between the parietal bones, and other symptoms and deformities of rachitis.

PROGNOSIS.—In all congenital cases, as already stated, the disease is almost invariably fatal. The duration of life depends on the rapidity and amount of effusion ; in cases of slow progress life may be prolonged for many years. In the acquired disease the prognosis is much more favourable, especially when the amount of fluid effused is small. In enteritis or after acute disease, when the dropsy is the result of venous stasis or partial thrombosis, a cure may result, if the constitutional condition of the patient is otherwise favourable.

TREATMENT.—*In the congenital disease* it can only be palliative. Attention to the general health should be the first care. Careful dieting is important. As nourishing food as the child is able to digest should be given in small quantities, at stated and regular intervals. The state of the bowels should be attended to. Constipation generally being present, suitable laxatives are indicated. The child should be warmly and suitably clothed, and should be taken out regularly in fine weather. The gentle pressure of a closely-fitting cap should be tried. Another plan, which in some cases gives temporary relief, is strapping the head. Strips of Seabury's plaster should be applied all over the head, from the mastoid process on the one side to the outer point of the orbit on the other, encasing the whole of the skull. The plaster must not be put on too tight, and if convulsions come on it should be removed altogether. The only other method of local treatment is tapping the ventricles in large effusions. The operation should be performed with a small trocar, introduced near the coronal suture, about one inch and a half from the sagittal. Only a partial quantity of fluid should be removed. The wound should be closed with a collodion and cotton-wool scab, and the head strapped as already directed. As a rule, the fluid soon re-accumulates, and the operation requires to be performed again within a short period. I have never found any but temporary benefit from this procedure, but it often satisfies the anxious requirements of friends. As regards medicines, iodide of iron or iodide of potassium seem to have a re-

straining influence on the accumulation of fluid. Diuretics, as acetate of potash, citrate of caffeine, or digitalis, may also be tried.

In the acquired disease treatment is always more hopeful. Many cases, as those of a tubercular meningeal nature, are obviously hopeless as a rule. The pre-existing disease, whatever it be, must be treated. Cold applications to the head are often of service. Counter-irritants are of undoubted value—liniment of iodine or cantharidine vesications. Iodide of potassium is the most useful internal remedy. Further and special treatment is discussed under the separate primary diseases.

CHAPTER XL.

THE NERVOUS SYSTEM—*continued.*

ACUTE SPINAL PARALYSIS.

Infantile Spinal Paralysis (Von Heine), *Poliomyelitis Anterior Acuta* (Kussmaul), *Paralysie Atrophique de l'Enfance* (Duchenne). — No form of spinal paralysis is now better understood in both its clinical and pathological relations than this. Although known clinically long ago, even as far back as 1784, when Underwood described it, its true pathological anatomy was not known until thirty years ago, when it was described with great clinical exactness by Von Heine and Duchenne. Cornil was one of the first who pointed out its true nature, and after him Prévost and Vulpian. Lockhart Clark, Charcot, Erb, and others have since made independent observations, corroborating the assertion that the disease resided in the anterior grey columns of the cord.

The disease, at one time believed to be peculiar to childhood, is now known to occur in adults, although it is more frequently seen in the earlier periods of life, between the ages of one and four years. The end of the second year, or the closing period of the first dentition, is a time of special liability. The etiology of the disease is not well ascertained. Neither syphilis, rachitis, nor struma are known as predisposing causes. The strain on the neuro-muscular apparatus connected with the commencement of walking has been adduced as a cause. It not unfrequently follows one or other of the fevers of childhood, but more often attacks children in

apparently good and robust health. The onset is sudden ; the child may be feverish and restless, giddy, confused, or drowsy, and when old enough complains of aching in the back and limbs. Sometimes convulsions usher it in. Frequently the constitutional symptoms are of a very trivial nature ; in many cases no initial phenomena being observed. When present they last from twelve hours to two or three days. A very ordinary history is that the child, on being taken out of bed in the morning, is found to have lost the motor power of one or more of its limbs. On examination, the statement of the mother is easily verified. One or more of the limbs, most commonly the legs, are found to be paralysed, as regards motor power, partially or completely. On closer examination, the paralysis will generally be found confined to certain muscles or groups of muscles, sensation being unimpaired, reflex excitability in the affected muscles abolished or greatly impaired ; the plantar reflex may be present. The affected muscles are flabby. The electrical reaction shows loss of irritability to Faradic and Voltaic currents in the nerve trunks. The muscles show loss of or diminished irritability to the Faradic, with increased sensitiveness to the Voltaic, the anodal closure showing more reaction than the cathodal, and the cathodal opening more than the anodal opening ; in other words, the so-called reaction of degeneration is well marked, the qualitative changes being the reverse of those in health. The affected limb is generally cooler than the other, and there is often more or less lividity or pallor of the skin. The progress of the disease is characterised by atrophy of the affected muscles. In the child, not only is muscular atrophy well marked, but the growth of the limb as a whole is retarded, the ligamentous structures become lax, and contractures of various kinds result. In this disease paralysis of the functions of the bladder and rectum are not interfered with, except in some cases temporarily, showing a striking contrast to other forms of spinal paralysis. A no less highly characteristic feature is the speedy onset of the paralysis, which is not pro-

gressive, but attains its maximum within a very short time, clinically speaking at once, although perhaps not with the suddenness of an apoplectic seizure. The amount of paralysis depends on the site and extent of the central lesion: thus one leg or arm may be affected; either arm, forearm, leg, or thigh; both arms or both legs; one arm and one leg, rarely on the same side. In any case rarely are all the muscles of the limb or parts of the limb affected, but portions or groups of muscles. When the upper extremities are paralysed, there is generally involvement of some of the muscles of the scapula and trunk. The further progress of the case shows either a gradual improvement or the reverse. The upper extremities generally regain power sooner than the lower. When improvement takes place, it commonly occurs within six weeks or two months. After six months little or no improvement can be expected, and steady and progressive atrophy of the muscles takes place, the limb becoming often literally skin and bone, except in fat children, when the adipose covering often masks the muscular atrophy of the limb.

DIAGNOSIS is not difficult. In the initial stage, and before the paralysis is made out, it may be mistaken for some acute febrile affection, but the early supervention of paralysis soon confirms the diagnosis: the sudden febrile attack, quick supervention of paralysis, and loss of motor power in certain muscles or groups, abolition of reflexes with unimpaired cutaneous sensibility, and only temporary if any loss of control over bladder and rectum, recovery in some cases, but generally atrophy of affected muscles, are the prominent symptoms. One of the most common conditions liable to be mistaken for infantile paralysis is the muscular debility and wasting attendant on marasmic affections, such as rickets. Careful attention to the history of the case, and an examination of the affected limbs, will show that in these cases we have to do with general wasting and weakness of the muscles of the limbs, and not paralysis of a local nature. In transverse myelitis, the impaired skin sensibility and

functions of bladder and rectum, occurrence of bed sores, presence of reflexes and absence of muscular atrophy, are distinctive enough. Sanguineous apoplexy (hæmatomyelia) is liable to be confounded with it, chiefly on account of the suddenness of the paralysis; but the presence of sensory derangements, the affection of bladder and rectum, with the tendency to bed sores, and the absence of initial fever, are striking points of distinction. *Hemiplegia*.—In it are present head symptoms, local paralysis of cerebral nerves, paralysed muscles often tense, increased tendon reflexes; no muscular atrophy or very little; electrical irritability not abolished, generally some sensory disturbance. The hemiplegic nature of the attack in itself points to the probability of its cerebral origin. *Spastic Paralysis*, occurring either in connection with hemiplegia or transient functional disorder, is differentiated by muscular tension and contraction, presence of tendon reflexes, and absence of atrophy.

PROGNOSIS.—The disease, as a rule, does not endanger life. As to the paralysis, it is doubtful in the extreme. Recovery is the exception, atrophy of muscles and permanent paralysis the rule. If recovery takes place it is at an early period, later on there is no likelihood of amelioration.

MORBID ANATOMY.—The lesion appears to affect primarily the anterior grey columns of the cord. It is presumably an acute inflammatory affection. The anterior grey horns probably conduct impressions from the lateral columns to the motor nerve-roots, the fibres being connected with the large ganglionic cells, which are believed to be concerned in or to regulate the trophic functions of the muscles. Certainly the pathological changes found in them seem to account for all the phenomena of this disease, the localised nature of the muscular paralysis being associated with the corresponding areas in the cord. The cervical and lumbar portions of the cord are those most frequently affected. Byrom Bramwell, in his work on the spinal cord, reproduces in some beautiful drawings the morbid appearances found on section. Macroscopically, the

atrophied appearance of the anterior grey column is at once seen, and on microscopic examination the special changes are observable. The anterior horns present a shrunken appearance, the cells are granular and in various stages of degeneration, and many if not all of the large ganglionic cells have disappeared. The connective tissue elements of the cord are in a state of proliferation. The nerve-fibres of the anterior columns and motor nerve-roots are generally more or less affected with degenerative and atrophic changes. The muscles involved in the paralysis are pale and soft, and the commencement of atrophic changes is seen in the atrophied appearance of the muscular fibres and indistinct striation of the whitish or yellowish bands in their substance, the result of increased connective tissue formation and fatty change. The brain is generally found to be quite healthy; but in one case, reported by the late Professor Sanders, the lobulus paracentralis and two of the central convolutions were much stunted.

TREATMENT.—In the first or febrile stage of the disease the treatment should be that suited to an acute inflammatory affection of the cord. The child must be kept in bed. Local counter-irritation should be applied over the spine, such as sinapisms or mild vesicants; ergot of rye, or belladonna with saline aperients, should be given internally, followed up at a later stage by iodide of potassium, either alone or combined with bromide of potassium. In some cases ice may be applied over the spine in preference to counter-irritation. When the febrile stage is over and the paralysis has developed, the treatment should be directed to arrest the progress of degenerative processes in the cord by galvanism; one electrode should be applied over the spine, the other to the anterior surface of the body. Applied to the muscles, it is necessary to distinguish between those in which Faradic contractility is only slightly impaired, and those in which it is nearly or entirely lost, and those which do not respond to any stimulus at all. In the first class of cases recovery is hopeful, and electrical treatment should be steadily pursued. In the second

class of cases, although atrophy may have taken place to a greater or less extent, the treatment should be continued as likely to assist in restoring the tone of the nerves and centre, and stimulating the remaining healthy muscular fibres. In the third class of cases treatment is well nigh hopeless; although the application of the electrical current is one of the most powerful methods of treatment, other serviceable means may be adopted, and the most important of these are saline bathing and rubbing and kneading of the muscles. The limbs should be kept warm by encasing in soft flannel stockings. The diet ought to be of the most nourishing description, except during the febrile stage, when it should consist chiefly of milk and beef-tea, with the lighter farinæ. Tonics, as iodide of iron, cod-liver oil, or Easton's syrup, should be given for a time. The child should be taken out to the open air in a perambulator as often as possible in fine weather. Change to the country is also desirable, when it can be obtained.

Contractions and Deformities require, in addition to the measures already advised, mechanical treatment, either of a rigid or elastic character.

CHAPTER XLI.

THE NERVOUS SYSTEM—*continued*.

PSEUDO-HYPERTROPHIC PARALYSIS.

THIS disease, best known by the title *Pseudo-hypertrophic Paralysis*, is essentially one of early life. Probably the term progressive muscular sclerosis of Jaccoud is the most satisfactory one, as having a distinct and definite pathological meaning. Duchenne's term, myo-sclerotic paralysis, is also a distinctive appellation. Gowers applies the name, lipomatous myo-atrophy. The disease is essentially muscular in its nature, and is characterised by altered nutrition in the affected muscles, attended by increase of their connective tissue and wasting of the muscular substance, which is replaced to a greater or less extent by fat. The muscles chiefly affected are those of the lower extremities, which increase in size, at the same time becoming progressively feebler. The muscles of the upper limbs and trunk also suffer from progressive weakness and atrophy of their substance.

The MORBID ANATOMY of the disease, so far as the muscles are concerned, is well ascertained—atrophy of muscular substance proper, with hypertrophy of the interstitial connective tissue, and the development of fat cells between the muscular bundles, being the anatomical features. The true origin of the disease is yet undecided by pathologists. The analogy between it and progressive muscular atrophy of the adult is evident. Erb considers it an infantile progressive muscular atrophy. The balance of present evidence seems to show that it is an intrinsic

disease of the muscles themselves rather than one due to central lesion in the cord. In many typical cases the cord has been found free from any appreciable disease. Friedreich considers the essence of the disease to be "a congenital nutritive and formative weakness of the striated muscle substance." Auerbach thinks that "the terminal nerve plates, or else the capillary network on the outside of the primitive bundles of muscle fibre, does not grow in proportion to the increasing mass, and therefore becomes insufficient for its nutrition." It is essentially a developmental disease, occurring at a period of life when the muscles are called into increased functional activity, and when any congenital defect in the neuro-vascular apparatus is likely to disturb the functional balance of nutrition.

CLINICAL FEATURES.—Of eighty-eight cases collected by Mary Jacobi, thirty-five were congenital, inasmuch as the symptoms of paresis showed themselves whenever the child began to walk. In twenty-one cases they began between the ages of three and six. In two-thirds of the cases, symptoms showed themselves before the age of six. It rarely commences after the age of ten. Boys are much more frequently attacked than girls. More than one child in the same family may be affected. The disease is generally transmitted through the female line, and in this respect shows a striking analogy to hæmophilia. This mode of inheritance, as pointed out by Gowers, is inconsistent with the idea of the disease being of nervous origin. It is gradual in its onset, and essentially progressive in its nature. The first symptoms noticed are weakness of the legs, and unsteadiness in walking, showing that the disease almost invariably commences in the lower limbs. Other initial signs may be noticed in the manner in which the patient rises from a chair, and it is observed that he generally prefers a high to a low one, on account of the greater facility in rising. In endeavouring to stand, he pushes himself up with his hands, and gradually gains the erect posture in the same way as in rising off the ground.

The muscles of the trunk and arms are subsequently affected. As the disease advances, the characteristic hypertrophy of the lower limbs is developed. This is always best marked in muscles of the calf. A striking peculiarity is often observed between the muscles above and below the pelvis, the latter usually showing, primarily, hypertrophy during the progress of degeneration. The hypertrophic process may also take place in the muscles of the arms, such as the pectoral, deltoid, and brachial muscles; but this is exceptional, the rule being that the trunk and upper extremity muscles primarily atrophy, while the atrophy of the leg muscles is preceded by hypertrophy. In the fully-developed disease, the patient stands with his feet apart to widen the basis of support. In progression he straddles; the trunk, oscillating from side to side, inclines to the side of the foot which is being placed on the ground, the other leg and foot being swung forward. In walking, the loins and abdomen are pushed forwards, the shoulders being carried backwards, causing an exaggerated lordosis. A plumb-line from the shoulders falls behind the sacrum. Perhaps the most characteristic of all the movements in this disease, and which are quite pathognomic, is the difficulty which the patient experiences in rising from a sitting or recumbent posture. If he can get hold of any support, he pulls himself up by the arms; failing this, he first gets on to his hands and knees, then pushes himself on to his feet, the head falling between the extended arms. He next seizes first one thigh and then the other, and by successive grasps, first above the knee and then further up the thigh, he gradually gets into the erect posture, as it is often described by "climbing up his thighs." Cutaneous sensibility is unimpaired in this disease, so also are the skin reflexes. The functions of rectum and bladder are normal. The electrical excitability of nerves remains intact. Eulenberg has noted a peculiar phenomenon in the galvanic reaction of nerves, inasmuch as "the anodal opening contraction becomes weaker, and disappears with a progress-

ively stronger current, and then with a still stronger current reappears." This he considers due to a cross current acting on the conductibility and excitability of the nerves. Muscular electrical irritability diminishes and disappears *pari passu* with the atrophy of the true muscular substance. The duration and course of the disease is essentially chronic. The initial or paresis stage, which precedes hypertrophy, lasts for periods varying from a few weeks to months or years. When the calves begin to enlarge, a period of at least a year elapses before they attain their maximum size. Several years elapse before further change takes place; then the muscles of the trunk and arms begin to atrophy, the patient in the course of time loses all muscular power, and is unable to rise from the recumbent posture, or help himself. The termination of the case is almost invariably brought on by some inter-current pulmonary affection, such as pneumonia.

PROGNOSIS is unfavourable. Death results in a period varying in different cases. In girls it does not run such a rapid course. In two out of thirteen cases related by Duchenne, the disease was arrested spontaneously in one, and apparently cured in another girl.

DIAGNOSIS is rarely difficult under careful observation, yet in the early stages there may be some doubt. Adipose rickety children with paretic limbs, the result of muscular debility, might be suspected to be the subjects of this disease, and confusion may arise, especially if a child affected with pseudo-hypertrophic paralysis be also rachitic, which may be the case. The large and hard muscles of pseudo-hypertrophy and the atrophy of subcutaneous fat contrasts with the flabby muscles and hypertrophy of subcutaneous fat of the rachitic child. Imbecile children are sometimes affected with weakness of the lower limbs, and contractions of the calf muscles and spastic rigidity, which may also be confounded with this disease. In such cases, however, the absence of lordosis, and the peculiar gait of the pseudo-hypertrophic

child, along with the retention of Faradic contractility, will assure the diagnosis. A very rare disease described by Duchenne—who has noticed seventeen cases—the infantile form of progressive muscular atrophy, requires to be noted, but the differential diagnosis cannot be difficult from the description of Duchenne, as it appears the muscular disease progresses from above downwards, the reverse of pseudo-hypertrophy, the atrophy commencing in the facial muscles, particularly the orbicularis oris, and proceeding gradually downwards.

TREATMENT is of little avail when the disease is confirmed. Hensch and Bourdel have each reported a case where galvanism, assiduously applied in the early stages, arrested the progress of the disease. As a rule, all that can be done is to adopt measures which tend to maintain or restore the general health, by open air and passive exercise of the muscles by friction and galvanism, generous diet, and general tonics. The patient should avoid all chills, and wear flannel next the skin, so as to ward off inter-current pulmonary attacks, to which he is predisposed.

OTITIS MEDIA.

Otitis media is very common in children. It may be of an acute or chronic nature, and is almost invariably associated primarily with disease of the naso-Pharynx, secondarily with scarlatina or other of the exanthemata. It may also result from traumatism—as, from foreign bodies in the ear, or picking the ear with anything which injures the membrana tympani. Blows on the head may rupture the drum membrane in children. Reference has already been made to the case of a boy, æt. twelve, who was suffering from cerebral inflammation. He died in ten days, and, on examination after death, a large gangrenous abscess was found, occupying the temporo-sphenoidal portion of the left side of the brain. The petrous bone was carious,

and also the ossicles and walls of the tympanic cavity. The history of the case showed that for more than a year the boy had suffered from otorrhœa. Thirteen months previously the schoolmaster had "boxed his ears," and he came home with bleeding from the left aural meatus, and the otorrhœa succeeded this, and continued till his death. In this case the membrana tympani must have been ruptured. Deafness from otitis media, however, has resulted from blows on the head, without rupture of the membrane. The ordinary history of otitis media in children usually shows primary throat affection. This may be of any kind, acute or chronic, simply catarrhal, or some of the more severe varieties, and the otitis may be set up by direct extension of the inflammation along the Eustachian tube, or a simple Eustachian obstruction, causing retention of secretions. In any case, the symptoms are those of ordinary earache—pains in the ear and head, deafness, with some febrile movement. In practice such cases are very apt to be overlooked or undiagnosed by the busy practitioner. Whenever a child is suffering from an acute febrile condition, and appears to be in pain, which cannot be otherwise accounted for, the probability of otitis media should be suspected. This points to the need of *always* examining in children the throat and ear.

When diagnosed and treated in good time, such cases generally do well. Otherwise, dangerous results may ensue. Inflammation may extend to the mastoid cells, causing caries of this portion of the bone. In the same way the petrous bone may be affected, and cerebral abscess result. Petrous caries is a hopeless and fatal condition. Mastoid caries is amenable to treatment. The bone must be carefully gouged away until an opening is made, through which the cavity may be washed out into the meatus. Mastoid caries is sometimes complicated by thrombosis of the lateral sinus, which in turn may cause embolism and pyæmia. Septic basilar meningitis, or inflammation of the dura in the middle and posterior fossæ of the skull, are also met with. The possibility

of the occurrence of cerebral inflammation of one kind or another in this disease should always be remembered. In many cases, especially in abscesses of the temporo-sphenoidal lobe, there are no definite localising symptoms, and the cerebritis may be far advanced, and abscess or gangrenous sloughing of the brain substance have taken place, without any special symptoms. In cases of suspected cerebral complication, the occurrence of optic neuritis is a sign of great value in the positive determination of the diagnosis. It may occur in cerebral abscesses other than those of the temporo-sphenoidal lobes, in septic basilar meningitis, thrombosis of the lateral sinuses, and inflammation of the dura of the posterior and middle fossæ. Thrombosis of the lateral sinuses of a septic nature is almost invariably accompanied by a frequent recurrence of rigors.

TREATMENT.—In the management of such cases the throat must be attended to, and also the Eustachian tube, which should be inflated daily. This is easily done when the child is crying. Hot bran poultices or fomentations should be applied over the ear, and in some cases a leech over the mastoid will do good. On examining the ear, if there be evidence of distension of the tympanic cavity, the drum membrane should be incised. If there be already discharge, the ear must be frequently washed out with warm boracic lotion or permanganate of potash. When the discharge becomes chronic, the insufflation of boracic powder should be resorted to, care being taken to inflate the Eustachian tube regularly. When large granulations and polypi form, in addition to boracic insufflation, the ear should be filled occasionally with rectified spirit, which is very efficacious in drying and shrivelling up the exuberant granulations and polypoid growths. Cod-liver oil and tonics should be given internally.

CHAPTER XLII.

THE NERVOUS SYSTEM—*continued.*

CHOREA.

Chorea Magna is a disease more of adults, or of young people about the age of puberty, than of children. It is rarely seen in Great Britain. The best account of it will be found in the Sydenham Society's translation of Hecker's *Epidemics of the Middle Ages*. It is to a great extent a mental affection, with which are associated all kinds of strange muscular movements and antics (dancing mania), catalepsy, or hysterical epilepsy. It requires careful regiminal, mental, and tonic treatment; and in girls, attention to all those measures which favour the natural evolutions of menstruation and the sexual functions. Nervine tonics and sedatives, as zinc, arsenic, and bromides, are the most useful drugs.

Chorea Electrica—*Lightning Spasms, Fibrillary Twitchings*—is a condition distinct from chorea minor, inasmuch as the movements are independent of the will. The patients are not excited, but rather quiet. Thus the tongue may be affected in part with vermicular or twitching movements; the muscles of the face or eyeball, and the body or limbs. One case lately came under observation where the muscles of the ball of the left thumb exhibited remarkable twitchings. The essential pathology of this condition is, I believe, unknown. An irritability of the reflex centres is present, from whatever cause. Professor Henoch recommends the continuous current with the administration of bromides.

Chorea Minor.—Chorea, or St. Vitus's dance, is a disease of

common occurrence in children, more especially in girls, who are subject to it in greater proportion than boys. In a large number of cases observed in the Paris Children's Hospital, three-fourths occurred in girls. Sinkler notes 328 cases, 232 being females, 96 males. The disease, although most frequent during the second dentition, may occur at any period from infancy to extreme age. A few well-authenticated cases of congenital chorea are on record, in which the movements commenced at birth and continued in after life. A correct definition of the disease can hardly be given. The clinical features are essentially disordered muscular movements, of a spontaneous and inco-ordinate character, sometimes associated with paralytic conditions. The movements cease during sleep. Any or many of the voluntary muscles may be affected.

The term chorea is a general one, and, although used to indicate a disease, is, strictly speaking, a symptom or group of symptoms analagous to such terms as paralysis or tremor. Choreic movements may be due to organic brain disease, or they may exist totally independent of it. They are, undoubtedly, due to peripheral irritation in some cases. It is generally believed that the disease is associated with disordered nerve functions, which presumably may lead on to organic changes in the ganglionic cells of the cerebro-spinal system. According to Charcot, when cerebral lesion is discovered, the posterior part of the internal capsule, in the vicinity of the lenticular nucleus and optic thalamus, is the most frequent seat of pathological changes. In the absence of organic morbid conditions of the nerve-centres, the functional derangements are those of debility and instability, which lay the foundation for chorea, on the incidence of any exciting cause. The neurotic condition predisposing to this disease may be induced in various ways. Hereditary predisposition to disease of the nervous system, in many cases, seems to play an important part. Thus in families where we meet with insanity, hysteria, or epilepsy, chorea often occurs in the children during the second dentition and onwards to

puberty. No predisposing cause is more noteworthy than that of sex. The natural disposition in females to various forms of nervous instability is strongly brought out in this disease. The altered blood state met with in anæmia would appear to lead on to chorea, many cases, especially girls, being decidedly anæmic. Gastro-intestinal irritation, worms, decayed teeth, or other irritation about the mouth, would seem to act either as exciting causes in some cases, or at all events contributing elements in keeping up nerve excitement. Such factors in causation are denied, on the high authority of Hensch, but I have seen at least one case get rapidly well after some decayed teeth had been removed, and an accompanying stomatitis got rid of. Rheumatism, of all diseases, is the one most frequently associated with chorea, and yet its exact relation is not clearly understood. It may precede or succeed it. Of 439 cases collected by the British Medical Association Committee, rheumatism preceded the attack in one-fourth of the cases. Anæmia was antecedent to it in five per cent. Exciting causes mentioned are those of a nervous character, such as fright, shock, mental strain.

MORBID ANATOMY. — I know of no anatomical changes invariably present in this disease. Post mortem examinations are rare in uncomplicated cases, but well-marked examples are recorded where no obvious changes in any part of the nervous system were discoverable, tending to show that in them the disease was purely of a functional nature, doubtless associated with what, in the absence of more perfect knowledge, we term nervous exhaustion or debility. In cases associated with anæmia or rheumatism, this may be readily accounted for by the effect of depraved blood conditions on the cerebral texture. I have already alluded to Charcot's views regarding the involvement of the nerve-centres. Dr. Hughes, of London, records the post mortem appearances in fourteen cases, of which the brain was healthy in four, congested in three, some softening was found in six. The spinal cord was healthy in three, congested

in two, softening in the cervico-dorsal region of the cord in twelve cases. Congestion of the brain and spinal cord is present in a large number of cases. One of the most common lesions met with is endocarditis, with fringing vegetations on the valves; and in connection with this, emboli are not infrequently found in the brain and other parts of the body. So frequently do these minute emboli occur in such cases, that Kirke and Hughlings Jackson hold that the disease is directly the result of this process; and doubtless the interference with nutrition of the cerebral substance, due to localised embolic plugging, is probably sufficient to produce the characteristic symptoms of the disease. So far as our present knowledge goes, the disease may or may not be associated with changes in the central nervous system. As already indicated, in a large proportion of cases no anatomical change is met with, and we conclude that the condition of the central nervous system is one of depraved nutrition and exhaustion of nerve cells. Quite recently, Pianese¹ has made some interesting experiments to prove the bacillary origin of chorea. He believes he has been enabled to isolate a bacillus from the cervical portion of the spinal cord of a patient dying from chorea, which, when inoculated under the dura mater either of the cord or into the sciatic nerve of dogs, gave positive results. In the illustrative cases, ten animals showed the following symptoms—tremors, either general or localised in particular groups of muscles, especially those of the back and shoulder. These symptoms were followed by irritability and tenderness along the vertebral column, and appeared about twenty-four hours after inoculation, and were followed by unsteady gait and contractions of the limbs, succeeded by death in three or four days. On post mortem examination, the bacillus was found in the brain and spinal cord, and cultures were easily obtained. The large cells in the anterior cornua showed changes similar to those already met with in chorea.

CLINICAL FEATURES.—These are highly characteristic and not

¹ *Reforma Medica*, July 1891.

likely to be mistaken,—inco-ordinate muscular movements of any of the voluntary muscles or groups of muscles. Paresis is often one of the most prominent facts. Sometimes the muscles on one side of the body, generally of hand or arm, are affected with spasm or partial paralysis (hemichorea), due presumably to affection of the motor cortex on the opposite side of the brain. Sensation is rarely impaired to any extent, but when it is so, the seat corresponds to the affected muscles, lending additional proof to the cerebral origin of the disease. Occasionally, hyperæsthetic areas are met with corresponding to the area of distribution of certain nerves. The mental condition in this disease is generally altered in cases of any degree of severity; the child is irritable or depressed, sometimes violently passionate or obstinate; speech is partly or entirely abolished. A boy, lately under my care with a severe form of the disease, accompanied by nervous excitement, did not speak for three weeks. The movements are always excited by observation. When the child is quiet, and thinks he is unobserved, no movements may be present. When visited and spoken to they at once begin. During sleep the spasms cease. The digestive system is generally disordered, as evidenced by foul tongue; anorexia may be present, but often the appetite is good. The bowels generally tend to costiveness. The urine is usually of high specific gravity, and contains excess of urea and often phosphates. There is an absence of pyrexia, except in presence of heart or other complications of an acute nature. When heart murmurs occur, these may be either vanishing or permanent; in the latter case due to endocarditis; in the former anæmic, generally of a pulmonary basic nature, or apical, due to dilated left ventricle, or, according to some observers, irregular action of the papillary muscles. The muscular theory is, however, generally disputed; and Cheadle, in his recent Harveian Lectures, expresses grave doubts as to its correctness, on the ground of want of evidence in fact. The theory seems to be solely based on the variation and

vanishing character of choreic murmurs, but in most cases of this nature the subsequent evidence of endocarditis is confirmed. Persistent irregularity of rhythm and disturbed action of the heart is generally associated with organic changes, although no murmur is present. Well-marked signs of endocarditis are often detected after death, when no murmur existed during life.

Stephen Mackenzie found the murmur of chorea persistent in from sixty per cent. to seventy per cent. of cases from one to five years afterwards. Osler, in 110 cases, examined two years after, found organic disease in fifty-four. "A large proportion," says Cheadle, "of chronic murmurs persist or reappear, and in some instances do not develop until after the chorea, when all motor or paretic disturbance has disappeared." He also makes an important observation on mitral stenosis regarding its earliest signs, believing that reduplication of the second sound at the apex is conclusive evidence of swelling and rigidity, and consequent imperfect opening of the mitral flaps.

Illustrative Cases.—A. W., æt. 6. On admission to hospital, the mother stated a week previously he got a fright, and next day the movements began, and have gradually grown worse. When an infant he suffered from bronchitis; two years ago had measles. On examination, the choreic movements were well marked and general, although not violent. He could not feed himself nor keep his hands quiet. His head was rotated, flexed, and extended alternately. The movements of the legs were less marked than those of the arms. He was able to stand, but walked unsteadily. When in bed the legs were frequently jerked or flexed up, with occasional movements of the toes. There was no heart affection, nor indication previously of rheumatism. His father had rheumatic fever. He made a slow recovery, and was dismissed well in seven weeks.

Lizzie W., æt. 8, a thin and somewhat delicate girl, anæmic, never had rheumatism, but pertussis and measles. Family history good. Previous to present illness she was a remark-

ably quick and intelligent girl. She is now dull and stupid. About a month ago her parents noticed a change coming over her. She became dull and listless, and her limbs began to jerk about. On examination, the movements were noticed in hands, arms, face, and legs. When observed, the facial muscles were more or less in constant movement, the mouth being drawn frequently to one side. The arms and legs were in constant jactitation. When asked to protrude the tongue, she puts it out quickly and immediately draws it in again, and protrudes it a second time. There is no heart affection. She recovered in about a month.

Eva H., æt. 7, reported ill for two months. She was fairly well nourished and developed, very nervous and emotional. She presents the usual irregular and jerky movements of limbs and also facial muscles. The movements are most marked on the right side, arm, and hand, and there is diminution of grasping power in both hands, especially the right. She cannot feed herself, and has great difficulty in walking, staggering like a drunken person from side to side, sometimes taking a step backwards instead of forwards. Requires support when walking, otherwise she staggers against the furniture. When observed, all the movements become exaggerated. In putting out her tongue it is only protruded for a short distance, and suddenly retracted with even greater celerity; sometimes it is put out mesially, but more frequently to the right side. The heart shows no increase of dulness. There is a soft systolic murmur in the mitral area. A week after admission she suffered from incontinence of urine, which continued for several weeks. Sleeps badly. She was treated with massage alone and occasional doses of bromide at night. She made a slow but good recovery.

E. M'G., æt. eight years. About a month ago mother noticed she did not sleep well at night, and that she threw about her arms and legs. She is a nervous and excitable child. No family history of rheumatism, except in the case of the maternal grandfather. Had measles four years ago,

pertussis two years ago. She used to be a bright and intelligent child, but is now dull and vacant looking, is disinclined to speak, and will only answer in monosyllables. There is considerable loss of power in both hands, with choreic movements of both, also similar motions of neck and trunk. She walks in an erratic manner. The tongue is put out suddenly, and pulled in quickly. Can drink and feed herself. Apex beat of heart is forcible and diffuse, the action irregular in force and rhythm. The second sound in the pulmonary area is reduplicated. She recovered in about a month.

The duration of the disease varies in different cases. Some will get well in a month, others linger on for two or even three months. The tendency to relapses are noteworthy. A choreic child may have a relapse from fright or any other disturbing cause. In rheumatic cases the relapsing tendency is always great, and the attacks often alternate with rheumatic phenomena, such as arthritis or erythema, or an eruption of subcutaneous nodules, which give place to choreic movements.

PROGNOSIS is generally favourable, as regards life, in uncomplicated cases, but the tendency to relapse must always be borne in mind. In cases complicated with the graver rheumatic phenomena, such as endocarditis or nodules, an opinion must be given with reference to the gravity of the complication. Intercurrent affections have been supposed to arrest the progress and prevent the recurrence of the disease. I have seen scarlatina and measles or other ailments occur during its progress, and, so far as my experience goes, the complaint was rather aggravated than otherwise after the subsidence of the attack. In very severe and prolonged cases the tendency of the neurosis to develop changes in the central nervous system must be borne in mind. I had under observation a boy, who had persistent and continuous chorea from the age of seven on to puberty, when the movements gradually ceased. He remained mentally feeble, although originally a sharp and intelligent boy, and there was a degree of paresis of both legs and one arm, indicating probably some organic change in the central

nervous system. When death takes place in uncomplicated cases, it is generally due to exhaustion from the severity of the symptoms and the inability of the patient to feed and sleep. In such cases collapse, followed by coma, ushers in a fatal termination.

TREATMENT.—The treatment of this disease naturally resolves itself into that of the constitutional condition with which it is associated. Thus we have (*a*) those cases, the largest class, where rheumatism exists or has preceded the occurrence of the neurosis; (*b*) those in which some disturbing cause, psychical or peripheral, acts on a constitution predisposed to rheumatism, in which other rheumatic phenomena have not presented themselves; (*c*) those which occur in children of highly neurotic disposition, who are not rheumatic. Lastly, (*d*) a rare class of cases in which no evident disposition has originated the disorder.

In all cases of any degree of severity, the patient should be kept in bed in a well-ventilated room, and excitement of any kind should be carefully avoided. If the movements are very violent a padded bed must be used, or the child put into a hammock after the American fashion. All the functions should be carefully regulated, particularly the digestive. As nourishing food should be given as the digestive powers admit of. Animal food should be limited in quantity at first. In many cases it is better not to give it at the commencement, limiting the diet to milk and farinæ, with soups. In some cases animal food given too early aggravates the symptoms. Any peripheral irritation, such as decayed teeth, or intestinal worms, or skin eruptions, must be promptly treated. In very severe cases darkening the room is often serviceable. In slight cases the patient need not be put to bed. Hygienic, dietetic, and regiminal treatment should be put in force. In fine weather the child should be taken out in the open air. A tepid salt-water bath may be given in the morning, followed by friction of the surface. Regular gymnastic exercise of the limbs and voice should be tried, limiting the duration of the

daily lesson in accordance with the strength of the child, carefully avoiding over-fatigue. In those cases in which confinement to bed is deemed necessary, and when there is muscular debility and emaciation, massage will often be found most useful. I have used this treatment so frequently, and with such good results, that I adopt it almost as a matter of routine in such cases. The whole body and limbs should be gone over once a day for about thirty minutes, or twenty minutes twice, taking one side at each sitting. The child is fed as well as the digestive power permits. During this treatment the bowels generally act well, and the child sleeps without chloral or other hypnotics. Gymnastic exercises, carefully regulated, are beneficial, especially massage, during convalescence. Cold douches and ice-bags to the spine may be tried, and in many cases with good results, especially where the neurotic element predominates, and there is little debility or anæmia. The ether spray to the spine has also its advocates. Choreic children should not be sent to school for some time after the attack, yet I think they are better to have some easy lesson at home. The mental as well as the muscular functions should be gradually accustomed to healthy work, so far as strength permits. A short daily lesson of an interesting kind for an hour to begin with, alternating with twenty minutes to half-an-hour of gymnastics, is, I think, a useful adjunct to the rest of the treatment.

Medicinal Treatment, as an adjunct to hygienic and dietetic measures, next deserves consideration. Before prescribing drugs, I am always in the habit of ascertaining the qualitative and quantitative conditions of the blood, as one of the best guides for the administration of remedies. The blood may be found normal. More frequently there are indications of anæmia; rarely do we meet with signs of plethora or hyperæmia. In the latter class of cases it is that the old treatment by purgatives is so useful. Morning doses of Henry's solution of magnesia, or the more elegant and effective way of administering salines, the natural mineral waters, of which the

Victoria is the best, may be given in sufficient dose to produce a regular and free movement of the bowels. This treatment alone, along with light unstimulating diet, is sufficient to cure such cases. When there is anæmia, our choice lies between iron and arsenic, both valuable as hæmatinics. Arsenic has the largest and deservedly the best reputation of all the drugs of this class. Children bear it well. The dose should be gradually increased till the physiological effects are produced. In a child seven or eight years old, we may begin with four or five minims of Fowler's solution, increasing the dose by a drop every week. The effects of the drug are often very striking. It is the most certain remedy we possess in the largest class of cases, those associated with the rheumatic diathesis and debility. Iron is most beneficial during late convalescence, especially when combined with cod-liver oil. Phosphorated cod-liver oil may often be given with advantage as a nutrient and nerve tonic. Many other nervines have been tried and advocated. Trousseau lauds the effects of strychnine. Sulphate of zinc, oxide or nitrate of silver, have their adherents. Conium is undoubtedly useful in some cases, but is uncertain in its action in many. Combined with bromide of potassium its effects are often more marked. When there is great restlessness and insomnia, chloral alone, or combined with bromide of potassium, is useful, a large dose being given at bedtime, suitable to the age of the child. Sulphonal acts very well for the same purpose. Belladonna and morphine, either separately or combined, are favourite sedatives with some. I have found them of service in many cases; but it is difficult to lay down any rule for the preferential use of either of these remedies. The intuitive knowledge of the experienced physician will often guide him in the choice of one or other sedative drugs.

HYSTERIA.

The vague and numerous groups of symptoms classed under this term, whether referable to the psychic, sensory, special sensory, or motor centres, are met with in children

as well as in adults. Hysterical phenomena may manifest themselves during the progress of organic disease, but as a rule most cases may be relegated to the class of so-called functional nerve disorders.

Psychic Phenomena are rarely so intense or well marked as in the adult, yet the milder forms of hysterical mania are sometimes met with, in which the symptoms partake more of the forms of impulsiveness or moroseness, with the tendency to simulation and imitation in its various forms, than the more violent psychomotor explosions met with in adults.

Motor Phenomena partake of the nature of spasm or paralysis. Choreiform symptoms are not uncommon, and also general convulsions, local spasms and tremors, ataxic hysterio-epilepsy. The paralysis is generally local; thus laryngeal aphonia or paresis of limbs may be met with.

Sensory Phenomena are even more common in children than the motor varieties. Various forms of hyperæsthesia and anæsthesia, localised in different parts, are met with. Hæmi-anæsthesia is sometimes associated with hemiplegia. Localised sensitive or anæsthetic areas (hystero-genetic), irritation of which may produce hysteroid convulsive seizures, are recorded by several observers. Incontinence of urine is sometimes apparently of hysterical origin.

DIAGNOSIS.—The diagnosis of hysteria is of much interest, and requires careful reasoning and clinical acumen. The protean nature of this malady, simulating so many real diseases, is no less a fact in children than in adults. The subjects of it are generally of highly neurotic disposition, excitable and sensitive, liable to fits of depression or exaltation, crying or laughing, lachrymation being easily excited. Roberts' remark on the hysteria of children is pregnant of wisdom. He says: "Although it imitates every neurotic disorder, the imitation is never perfect. There is always wanting, either in the history or in the symptoms, some feature which is essential to the imitated disease."

Hysteria may precede, accompany, or succeed organic dis-

ease. Thus hysteroid convulsions or hystero-epilepsy may develop into true epilepsy, or a hysterical joint may ultimately become affected with arthritis or synovitis. Hysterical aphonia may complicate catarrhal laryngitis. Hysterical hyperæsthesia or neuralgia in a joint may follow rheumatism. In morbus coxarius, or arthritis of the knee-joint, a residue of hysteria often remains, giving rise to a hyperæsthetic or neuralgic condition of the joint, which persists for some time, long after the real joint affection has got well. The differential diagnosis of true from hysterical epilepsy is admittedly very difficult, so also is the distinction between slighter forms of imbecility or moral depravity (insanity), and the simulation and exaggerated or eccentric conduct of the truly hysterical patient. Jacksonian epilepsy and hysteroid epilepsy are, according to Horsley, allied if not identical conditions, caused by cortical discharges. The hystero-genetic zones of true hysteria are closely analogous to the well-known epilepto-genetic zones. Charcot gives the differential distinctions between hysteroid and true epilepsy in the following table of Gowers, as quoted by Mills:¹—

EPILEPTIC.		HYSTEROID.
Absent	{ APPARENT CAUSE }	Emotional disturbance
Any, but especially unilateral or epigastric aura	{ WARNING }	Palpitation, malaise, choking, bilateral foot aura
Commonly sudden	ONSET	Often gradual
At onset	SCREAM	During course
Rigidity, followed by jerking, rarely rigidity alone	{ CONVULSION }	Rigidity or struggling, throwing the limbs and head about
Tongue	BITING	Lips or hands, or more often people or things
Frequent	MICTURITION	Never
Occasional	DEFÆCATION	Never
Never	TALKING	Frequent
A few minutes	DURATION	Often half - an - hour, or several hours
To prevent accident	RESTRAINT	To control violence
Spontaneous	TERMINATION	Spontaneous or artificial (after cold douche)

¹ Keating's *Cyclopædia*, vol. iv.

Charcot bases his diagnosis of hystero-epilepsy on the existence of hystero-genetic zones, of hæmianæsthesia, of affections of vision, and on the effects of æsthogenetic substances on sensibility and motility. The sensory phenomena are highly characteristic of hysterical disturbances of sensibility generally. Motor paresis and paralysis of a hysterical kind can be diagnosticated by the history of the case, the absence of trophic disturbance in the affected limb, the normal condition of the deep reflexes, and the presence of normal electrical contractility to the Faradic current.

TREATMENT.—The management of cases of hysteria must be conducted on strict regiminal and moral principles. In all such cases the patient is better treated in hospital, or at all events away from home, than with relations or friends. Due attention must be given to maintain all the other bodily functions, as well as those of the nervous system, in health. The neurotic disposition cannot be removed, but the habits engendered by unfavourable conditions of life and insufficient moral control can be met in many ways. The very removal of the patient from the sympathetic influence of home relations is in itself a great gain. Open air exercise duly regulated, country air and healthy mental occupation, with the administration of tonic remedies, such as iodide or bromide of iron, Easton's syrup, or Fellows' preparation, will be found useful. No remedy I know of is of greater service than massage, especially in paralytic cases. The use of Faradic current may be used with advantage at the same time.

For further information on the subject, which space forbids of our further discussing, I would refer to the excellent articles by Dr. Mills,¹ by Professors Henoch,² Memel,³ and Riesenfeld.⁴

FRIEDREICH'S ATAXIA.

The disease is one of great rarity, but of extreme clinical

¹ "Hysteria," Keating's *Cyclopædia*.

² *Diseases of Children* (Sydenham Society).

³ *Deut. Med. Wochen*, April 1884.

⁴ *Ueber Hysteria bei Kindern Dissert.*, Kiel 1881.

interest. It occurs during the period of active growth and development of the cerebro-spinal centres, between childhood and puberty. It is now known to be distinct from such diseases as locomotor ataxia, ataxic paraplegia, and multiple cerebro-spinal sclerosis, with which it was formerly confounded. Friedreich¹ first described it thirty years ago, and since then Charcot, Ladame,² and others have investigated its clinical features and pathological anatomy. Byrom Bramwell³ has lately published a *résumé* of the subject, with illustrative cases. Boys and girls seem to be equally liable to it. One of the leading peculiarities of the disease is that several members of the same family are liable to be attacked, and it is noticed the disease usually commences about the same age in each case. It has therefore been called a "family" rather than a hereditary disease. A hereditary predisposition to neurotic disease is present in a large proportion of cases. Intemperance in the parents often produces a disposition to it in the offspring. Acute febrile diseases, such as measles or scarlatina, seem to act as determining exciting causes in children predisposed to disease of the nervous system.

PATHOLOGY.—The morbid anatomy is now well determined. Déjerine⁴ and Letulle, Pitt⁵ and Rüttimeyer⁶ have published the most recent researches on the subject, from which it is shown that not only the spinal cord but frequently the medulla and pons varolii are diseased. The spinal cord is generally small and atrophied. The diseased portions are extensively distributed, and the intimate pathological process is sclerosis of the affected areas. Bramwell gives the following *résumé* of the pathological anatomy: "Spinal cord

¹ French translation, *Gazette Medicale de Paris*, Nov. 1861.

² Dudgey's translation, "*Brain*," Nov. 1890. Gowers' *Diseases of the Nervous System*, vol. i.

³ *Atlas of Clinical Medicine*, vol. i.

⁴ *La Médecine Moderne*, No. 17, 1890.

⁵ *Guy's Hospital Reports*, vol. xlv. p. 369.

⁶ Virchow's *Archiv*, Bd. 110, 1881.

distinctly smaller than normal, and in some cases this congenital defect involves not only the spinal cord but also the medulla oblongata and pons varolii." The "lesion of the cord is a sclerosis which involves the (*a*) columns of Goll, (*b*) the columns of Burdach, (*c*) the vesicular columns of Clarke, (*d*) the direct cerebellar tract, and (*e*) the crossed pyramidal tracts. . . . The posterior roots, especially those attached to the lower part of the cord (lumbar and lower dorsal regions), are also affected." The cervical region of the cord may also be diseased. The morbid anatomy thus shows a marked distinction from that of locomotor ataxia where the disease is localised in the posterior columns and nerve-roots. Further, it would appear that the degenerative changes in the two diseases are essentially different, being in this disease essentially a neuroglial and not a vascular sclerosis as in locomotor ataxia.

CLINICAL FEATURES.—Ataxia is essentially the prominent feature of the disease. It appears to be purely motor, the inco-ordination showing itself first in the lower, and ultimately in the upper extremities and other muscles, such as those of the eye and tongue. The muscular weakness and inco-ordination is slow and gradual, atrophy and contractions frequently taking place as the disease advances. Ataxia is usually present for some time before actual loss of muscular power is noticed. The abolition of the patellar tendon reflex is a very early symptom, so also is a peculiar deformity of the foot, which is of high diagnostic value. The foot is short and stumpy, and has a crumpled-up appearance, as it were compressed from before backwards. The instep and dorsum of the foot are arched, the ball of the great toes being apparently enlarged. The deformity is best noticed when the foot is off the ground, being effaced to some extent when the compression of the body's weight is put upon it in standing. The spinal column often presents a lateral or antero-posterior curve. Choreic and jerking movements, never seen in locomotor ataxia, are usually present, and occur when the body is at

rest. The speech is affected very much like that of a drunken person—slow, difficult articulation, altered voice tone. There is also a vacant expression of countenance. The patient is unable to stand erect with the eyes closed. Other symptoms, denoting psychic and nerve involvement, are risibility, headache, and vertigo, or excited heart action. Nystagmus is sometimes present, more frequently in an advanced stage of the disease.

DIAGNOSIS.—The diseases liable to be confounded with it are locomotor ataxia, cerebro-spinal sclerosis, chorea, ataxic paraplegia, and cerebellar tumour. For convenience, I have tabulated the distinctive clinical features of the three principal diseases. In *cerebellar tumour* we have cerebellar as distinguished from purely ataxic gait, headache, vomiting, and optic neuritis, which are absent in Friedreich's disease. *Chorea* only simulates this disease in the muscular twitchings and altered facial expression. A further investigation, and the discovery of foot deformity, ataxia, absence of knee jerks, and other symptoms, excludes this disease.

	Friedreich's Ataxia.	Locomotor Ataxia.	Multiple Cerebro-Spinal Sclerosis.	Ataxic Paraplegia.
MORBID ANATOMY .	Sclerosis of posterior and lateral columns	Sclerosis of posterior columns	Indiscriminate; sclerosed patches scattered through cerebro-spinal centres	Sclerosis of postero-lateral columns; distribution different
PERIOD OF LIFE, ETC.	A family disease; occurs in early life	Occurs in adult life	Occurs generally in adult life; rarely in childhood	Adult life as a rule, rare in childhood; no cases isolated; no neurotic inheritance
GAIT	Ataxic cerebellar; staggering from side to side	Ordinary ataxic; walks straight	Rhythmically trembling movements, with spastic rigidity	Not ataxic; loss of muscular power
KNEE JERK	Abolished	Abolished	Exaggerated; ankle clonus often present	Generally increased; ankle clonus often present
LIMBS AFFECTED . .	Legs, arms, trunk, etc.	Legs alone	Varied cerebral and spinal symptoms, paretic and ataxic	Legs alone
ROMBERG'S SYMPTOM	Rarely present	Always present	Present, and at an early period
NYSTAGMUS	Present	Generally absent	Seldom affected	Absent
SENSATION	Not affected	Lightning pains, dysæsthesia, and impaired muscular sense	
EYE SYMPTOMS . .	None	Paresis of ocular muscles; myosis; optic atrophy; Argyll Robertson symptom	Atrophy of optic discs	None
GENITO-URINARY . .	None	Always present	Present	Present
SPEECH	Always affected	Not affected	Affected; slow and drawing
HEADACHE, ETC. . .	Rarely present	Present; often vertigo, loss of memory, and pseudo-apoplectic attacks	None
VOMITING	Absent	Present (gastric crisis)	Absent	Absent

PROGNOSIS.—The ordinary course of the disease is progressively to a fatal termination.

TREATMENT is of little value, except in the way of palliation. Suspension or a Sayre's jacket, often of use in locomotor ataxia, are useless in this disease. Attention to the general health and functions, apart from those of the nervous system, with the exhibition of such remedies as ergot of rye, nitrate of silver, or the constant current to the spine, are the only means recommended.

CHAPTER XLIII.

PARASITIC DISEASES.

CHILDREN are liable to be infested with a number of parasites, either on the cutaneous or mucous surface of the body. The external parasites belong to the division *Anthropoda*. Of the *Arachnida* the *acarus scabiei* is the only one frequently met with. The *leptus autumnalis*, or harvest mite, is liable to infest children as well as adults. The *acarus folliculorum* and the *ixodes ricinus*, so far as I am aware, have not been specially described in children.

EXTERNAL PARASITES.

Scabies.—*Acarus Scabiei* is described as tortoise-shaped. It has eight legs attached to its ventral surface, and is covered with bristly hairs. The four anterior legs possess the function of suckers, and in the male the two posterior ones are similarly endowed. Projecting from the extremity of the foremost of the two posterior legs in the male, and both posterior ones in the female, is a long bristle. The border of the body is also furnished with bristles, and the dorsal surface is covered with tooth-like hooks and spines. The head is of a rounded shape, and covered with bristles. The female insect is twice as large as the male. These parasites lodge in the epidermal layer of the skin, the female burrowing and forming a cuniculus, where she deposits her eggs, from which the young are hatched. After changing their skins several times they become mature. The irritation they cause is very great, especially when the surface of the body is warm, as in bed, and the result is a

varying amount of irritation and inflammation of the cutaneous surface, as evidenced by papular, vesicular, and pustular formations; these, being aggravated by scratching, giving rise often to superficial ulcerations.

DIAGNOSIS.—Certainty, pathologically speaking, can only be attained by the discovery of the acarus. In actual practice, however, the external characters of the disease and the symptoms produced by the animal are so decided as rarely to leave any doubt as to its true nature. The eruption is found in situations where the skin is most thin and delicate, as between the fingers, on the flexor aspect of the forearm, anterior surface of the body and lower limbs. In children it is thus much more diffused than in adults, in whom it is chiefly confined to the flexor surface of the forearm and interdigital skin. The anterior surface of the abdomen, thighs, and legs, and dorsal and inner aspects of the feet, are by far the most common situations. Sometimes little or no eruption may be seen on the hands or arms, although it is distinct on the other parts mentioned. The dorsal surface of the body, head, and face are rarely, if ever, affected. The character of the eruption itself is generally sufficiently distinctive—small acuminate vesicles or pustules, isolated and not in clusters, near which can be seen with a glass, often with the unaided eye, the cuniculi. The contagious nature of the eruption is also an important aid in diagnosis, more than one child in a family being affected, and often the mother of the child, if young and she has occasion to carry it about. Other forms of eruption often complicate or are associated with scabies. Of these eczema is the most common. As a matter of fact, the eruption, especially on the hips and thighs, often assumes the eczematous type from the first. Large pustules, forming superficial roundish ulcerations, often give it the character of ecthyma. Sometimes, but more rarely, bullæ of varying size are met with.

TREATMENT is generally simple and easy when diagnosis is assured. Strict cleanliness must be observed, with frequent changing of the body linen. A warm soap and water bath

should be ordered once or twice a day if necessary. The acari must then be killed by some parasiticide application. The late Professor Bennett, of Edinburgh, used to choke the insects by covering the skin thickly with plain lard, and this plan succeeded well; but inasmuch as it is dirty and troublesome, I think the other applications now in vogue are preferable. The time-honoured sulphur ointment is invariably successful when properly applied, but I have almost entirely discarded it in private practice, because its prescription is equivalent to telling the patient that he is suffering from itch, which it is not always necessary or desirable to do. The best recipe for using sulphur is, I think, that recommended by Helmerich — sulphur two parts, potassium carbonate one part, lard eight parts. The ointment I favour most is liquid styrax one part, lard two parts. In children, the most effectual and quickest cure is effected by baths of the potassa sulphurata, $\bar{3}$ ss to $\bar{3}$ i to the gallon of water. Three or four baths at most are sufficient to effect a cure. The child should be put into the bath, the water being as warm as can be conveniently borne, and it should be allowed to lie in it up to the neck for twenty minutes at night before being put to bed.

Insecta of this class there are several, nearly all being epizoa, which only infect the skin for the purpose of nutriment, or in order to deposit their eggs. Of these the most common are pediculus capitis, pediculus vestimentorum, pulex irritans, cimex lectuarius.

Pediculus Capitis, the common *Head Louse*, inhabits the hair of the scalp. I lately found a female encysted at the base of one of the eyelashes in a little girl. By means of its proboscis the insect draws blood from the scalp. The eggs, or nits, are found adhering to the hairs by means of their chitinous coating. They are generally hatched in about a week. The chief interest, clinically, which this parasite possesses is its tendency to produce irritative inflammations on the scalp. Eczematous and impetiginous eruptions are thus set up, and

in delicate and scrofulous children often prove troublesome. The irritation thus caused generally produces enlargement of the post-cervical lymphatic glands—the parent often bringing the child for advice because the “glands are down.” Shaving the head and cleanliness are generally all that is needed to rid the child of the pest. If it is not considered necessary to remove the hair, carbolic oil should be applied at night, the scalp being washed with warm soap and water in the morning. Allan Jamieson recommends kerosene oil for the same purpose.

Pediculus Vestimentorum is found in the body clothes, from which it wanders on to the skin to feed. Being larger than the *pediculus capitis*, it is easily seen. It causes irritation of the surface in the shape of papula or wheales, or sometimes ecthymatous spots; sometimes nothing is visible but scratches. Frequent changing of the clothes, washing, and general cleanliness is all the treatment necessary.

Pulex Irritans, or *Common Flea*, infests children preferably to adults, on account of their more delicate skin. The animal draws blood from the skin, leaving a small hæmorrhagic point, surrounded by a reddish areola. This disappears in a healthy child in about a week. In a badly-nourished or delicate child the spots present a purpuric appearance, and persist for a much longer period. Cleanliness and the application of a parasiticide ointment, such as staphisagria, ʒss to the ʒi of lard, if necessary, will be all the treatment required.

INTERNAL PARASITES.

Of these, the only common ones affecting children are those inhabiting the intestinal canal, constituting the disease called *Worms* (*Helminthiasis*). The parasites either belong to the class *Nematodes* or *Cestoda*.

Nematodes.—*Trichinæ* are met with in children as in adults, and do not merit special notice.

Acaris Lumbricoides, the *Common Round Worm*.—It is of a rounded form, with tapering extremities. The male measures from four to six inches, and the female from ten to fourteen.

They are of a reddish or yellowish colour, like an earth-worm. The mouth is tripapillated, and the tail obtusely pointed. The male has a double penis and an arcuate tail. The female is broader than the male. They inhabit the small intestine, and wander about, often into the stomach, from which they may be vomited. They are most commonly met with between the ages of eight to ten years. They vary in number from two or three to twenty or thirty. The ova are $\frac{1}{500}$ of an inch in diameter, oval in shape, with dark granulated contents. These worms often give rise to special symptoms, such as pain in the region of the umbilicus, vomiting, during which the worm may be discharged. Nervous symptoms are more common than in the other varieties of worms. Vertigo, blindness, strabismus, or convulsions may occur. Occasionally more or less pyrexia is present, and diarrhœa. Sometimes the worms penetrate the intestinal canal, and an abscess is formed in the region of the umbilicus, from which they are discharged.

Oxyuris Vermicularis is the most common form of worm met with in this country. The male is about one-sixth of an inch in length, the female one-third to one-half of an inch. The caudal extremity of the male is obtusely pointed, that of the female tapering and with three points. The bodies of both male and female are fusiform, the head somewhat truncated in shape. The mouth is tripapillated, and leads into a triangular œsophagus. The integument is of a whitish silvery colour, and delicately striated transversely. The ova are very minute, long, and unsymmetrical, $\frac{1}{1400}$ of an inch long and $\frac{1}{900}$ of an inch across. They inhabit the lower part of the ileum, and particularly the cæcum, vermiform appendix, and sigmoid flexure of the colon. Zenker and Heller state that the mature females chiefly inhabit the colon and cæcum, the young ones and the males the ileum. They pass down the colon into the rectum, and often escape through the anus on to the nates, and in the female to the vulva. They are more rarely found in the small intestine or stomach,

and less frequently in the œsophagus. On account of the habitat of these worms, the symptoms are mainly referable to the lower bowel. Thus, itching of the anus, especially at night, tenesmus, frequent desire to defæcate, diarrhœa with prolapsus ani, mucous evacuations, in which the worms are seen often in lumps or balls, are all symptoms characteristic of their presence.

Sclerestoma Duodenale is a small worm infesting the upper part of the small intestine, but rarely met with. It gives rise to few or no symptoms.

Trichocephalus Dispar is a small worm inhabiting the cæcum and colon. It is rare in Great Britain and unimportant, giving rise to no symptoms.

Cestoda (*Tape Worms*).—Three are met with.

Tænia Solium (*Pork Worm*).—It is ten to twenty or even thirty feet long and about one-third of an inch broad, and it is developed from the cysticercus of the pig, whose flesh it inhabits. The vesicle is about the size of a pea. The cell wall has a depression which marks the position of the head. On entering the intestine the embryo rapidly undergoes development. The head of the worm is about the size of a little pin's head, and from this the segments are rapidly developed. It is estimated that each segment of the mature tænia contains about 50,000,000 eggs.

Tænia Mediocanellata (*Beef Tape Worm*) is developed from the cysticercus of beef. It is from twelve to thirteen feet long. The ova are of an oval form, and somewhat larger than those of the tænia solium. The head is larger, and is furnished with four suckers, but has no hooklets.

Bothriocephalus Latus—developed from the cysticercus of fish.—It is the largest of the tape worms, from twelve to twenty feet long, and is made up of from 3000 to 4000 segments. The body is thin and flattened. The uterus is a coiled tube in the centre of each segment. The genital openings are seen anteriorly in the middle of the ventral surface. In this country the worm is most commonly met with in Ireland.

Tape Worms generally produce a feeling of weight and gnawing in the belly, and sometimes fulness, and attacks of colic occur. Emaciation to a greater or less extent is usually present.

SYMPTOMS (*referable to worms*). — Mothers believe that certain symptoms always exist and are an infallible guide to diagnosis. It may be at once said this is a fallacy. Symptoms may or may not be present. If any exist they are by no means distinctive, and are generally those referable to gastro-enteric derangement. Diagnosis can only be assured by ocular demonstration of the worms or their ova in the evacuations. A more or less unhealthy state of the gastro-intestinal mucous surface precedes or accompanies them. One of the most common conditions is simply an increased secretion of mucus, in which the worms find a favourable nidus. In many cases the child presents certain marked symptoms, which are mainly referable to the digestive and nervous systems. Depraved appetite, furred tongue, sickly breath, nausea, and vomiting, constipation, or diarrhœa, are variously present. Some physicians believe that they can diagnose the presence of worms by the appearance of the tongue, and particularly the basal papilla. I have not been able to corroborate these assertions in practice. The nervous symptoms are very various. Children with nervous tendency often exhibit them in a high degree. The symptoms are either direct or reflex, being manifested in distant parts. Thus, itching about the anus, or on the skin of the belly, and of the nose, is commonly met with. Disturbed sleep, night terrors, grinding of the teeth, choreic movements, general convulsions, squinting, headache, tinnitus aurium, giddiness, and in older children symptoms which may be grouped as hysterical, may be present. Incontinence of urine, particularly in boys, and even masturbation, have been cured by the expulsion of the worms. It will be seen that the symptoms thus enumerated are by no means distinctive and might be referred to other causes, and although the experienced physician may venture to give a probable, he

cannot venture on a positive diagnosis, without the corroborative evidence of the expulsion of the worms.

TREATMENT.—The indications are—(1) secure expulsion of the worms; (2) restore the general health and tone of the alimentary canal.

Anthelmintics should, as a rule, not be employed until the presence of the worms is detected. Much harm is often done to children by prescribing such remedies on the supposition that worms are present. If the stools are carefully examined from time to time, the worms or their ova can generally be seen. If not found and still suspected, a mild aperient, such as castor-oil or senna, will generally be successful in bringing away portions of the parasites. Another cardinal point in the treatment of these affections is to recollect that the worms are really not the disease which requires to be treated, but the concomitant of an unhealthy condition of the gastro-intestinal surface, in virtue of which the parasites find a suitable nidus for development. The general health and bodily tone are usually below par, thus it is we so often find children suffer from these affections after acute diseases, such as measles or whooping-cough, which debilitate and lower the general tone of nutrition.

Tape Worms are best treated by the administration of filix mas, in thirty drop doses, with mucilage, and a few drops of spirit of chloroform added. The day before, the child should abstain from solid food, and be fed on beef-tea, or gruel, or milk and water. In the evening the bowel should be cleared by a dose of castor-oil, and the anthelmintic given fasting the following morning. A dose of senna or compound liquorice powder ought to be administered three or four hours after. It is absolutely necessary that the expulsion of the head of the *tænia* should be secured, and it should be carefully looked for, and, if not expelled, the dose repeated. Kousso in 5i doses is also a successful remedy, or kamala, of which a drachm of the tincture may be given with glycerine. Petroleum has been found very successful in securing the

expulsion of *tæniæ*. It may be given in from twelve to fifteen minim doses.

Round Worms.—By far the most successful remedy is *santonin*. Two to four grains given at night or in the morning, previous attention being given to dietetic precautions, is certain to kill the worms. I have found turpentine in 5i doses with castor-oil ʒss very successful in these cases.

Oxyurides are by far the most difficult worms to get rid of, on account of their large number, and the fact that their favourite nidus is generally high up in the colon, often in the *cæcum*. They require to be attacked by medicines given by the mouth and also by enemata. The best way to proceed is to give at intervals of three or four days a purge of castor-oil and turpentine, or of calomel and jalap, or the pulv. scammon. co., using on the days on which the purgative is not administered, enemata of salt and water, or of infusion of quassia every evening.

DIETETIC MEASURES.—In all cases the child must be carefully dieted. The indication is to administer such food as does not tend to produce acidity and fermentation, and favour excessive secretion of mucus, which is generally increased in all cases of worms. Starchy and farinaceous foods, sweets, pastry, potatoes, vegetables, and fruits, and sugar should be prohibited, and milk and lime water, bread in limited quantity, eggs, meat (mutton preferred to beef and pork), fish, or fowl given. Spinach or asparagus are vegetables which do little harm. In debilitated cases a little brandy and water, sherry or claret, may be given. If the skin is dry, tepid baths should be given daily, and the body anointed thereafter with olive oil or lanoline. Concurrently with the dietetic and special treatment, the child's general health should be attended to, attention being directed to hygiene, open air exercise, change of air. Medicines should be administered which tend to restore the tone of the alimentary canal, and improve the general health. Of the former class, the bitter tonics, such as gentian or *calumbæ*, with sodium or potassium bicarbonates, or ammonium chloride,

are useful. Aloes is often a valuable addition to the mixture. It should be given in tonic doses— $\mathfrak{z}\text{i}$ to $\mathfrak{z}\text{ij}$ of the compound decoction is the pleasantest preparation to use. It is useful, in my experience, in giving tone to the intestinal mucous surface, and restoring the balance of secretion. After having administered such remedies for a suitable period, and when the tongue is clean and any existent catarrh got rid of, the remedy which is most useful in permanently restoring the general health and tone of the bowel is iron. The preparation which is most suitable for the special exigencies of the case should be chosen. It is well to begin with one of the milder preparations, such as the ferrum tartaratum, or the ammoniated citrate, in two or three grain doses, with fluid extract of liquorice and glycerine— $\mathfrak{z}\text{i}$ of compound decoction of aloes being added to each dose. The ferri et quinae citras is also a most useful preparation. In some cases the ferri sulph. with glycerine in cinnamon water, is of service. Ferruginous preparations should be continued for some time after the worms have disappeared.

CHAPTER XLIV.

SKIN DISEASES.

THE skin in children is active and sensitive, and very liable, like other organs, to derangement. It is in close sympathy with the kidneys and digestive organs generally. Its softness and elasticity, as well as its vascularity, renders it very liable to external impressions of cold. The cutaneous nervous system, like that of the nervous system generally, is highly sensitive and liable to depression. This cannot be better illustrated than by reference to the effects of extreme heat or cold on the cutaneous surface. Burns are very easily produced in children by too hot poultices or other such applications, and the vital activity of the skin readily destroyed. The application of ice-bags always requires caution, on account of this tendency to local and general depression, by long-continued application. The importance of maintaining, by suitable clothing adapted to the season, an equable temperature on the cutaneous surface of the child, is self-evident. Scrupulous cleanliness of the skin is necessary, as dirt very readily acts as an irritant, setting up cutaneous eruptions. Irritating soaps should not be used in very young children, but rather the superfatted varieties. In extremely irritable skins it is often necessary to discontinue the use of soap altogether, and have recourse to simple warm meal and water or other emollient baths.

Lichen Strophulus, or red gum, is one of the simplest cutaneous eruptions met with in children. It consists of minute reddish papules, due to papillary and glandular congestion. It

is generally due to local irritation from clothing, or irritating soaps. Simple aperients, with the discontinuance of soaps, and the substitution of the warm meal and water baths, with careful drying and the use of soothing dusting powder, is all that is required in the way of treatment.

Lichen Scrofulosorum is a chronic affection, consisting of small tawny red papules, generally situated round the hair follicles in groups, accompanied by slight desquamation, and little or no itching. It occurs commonly in strumous children. Constitutional treatment, suitable to the diathesis of the child, must be mainly relied on, with tepid bathing and soothing unguents.

Lichen Circumscriptus is the name given to essentially the same disease as that just described, occurring in non-scrofulous subjects. It may affect any part of the cutaneous surface. The papules generally arrange themselves in a crescentic or circular manner.

Seborrhœa, a disorder of the sebaceous glands, in which their secretion is increased, diminished, or altered, forming on the surface into scales or plates of fatty material, or remaining of a more or less fluid consistence. According to the consistence of the secretion, it is either termed *oleosa* or *sicca*. It rarely, but sometimes, affects a large portion of the cutaneous surface. As a rule, however, the scalp is the most frequent site of the eruption. It is common in young infants, forming a dirty brown skin over the scalp. It often complicates or constitutes the residue of eczematous eruptions on the scalp. It may occur on the face, or around the umbilicus or genitals, about the period of puberty. It is apt to be confounded with dry eczema, but may be distinguished by the pale colour of the skin, and the absence of itching and inflammatory symptoms.

The TREATMENT of seborrhœa must be by constitutional as well as local means. Children suffering from this affection are often below par as regards general health and nutrition. They may be either debilitated after recovery from some acute disease, anæmic or syphilitic. Tonic treatment is generally indicated, cod-liver oil, and quinine and iron being useful remedies.

The diet should be nutritious, oatmeal and indigestible articles should be avoided, and the digestive system attended to. The local treatment should be directed to getting rid of the accumulated secretion by some emollient oil, as olive or almond, and then washing with an alkaline spirit lotion, of which Hebra's is one commonly in use—sapo viridis two parts, rectified spirit one part. After the skin has been thoroughly cleaned, an oleaginous application should be used, such as precipitated sulphur two drachms, lanoline one ounce. Allan Jamieson speaks highly of the value of tannin, as in the following ointment:—Tannic acid one drachm, glycerine a sufficiency, vaseline one drachm, oxide of lead cerate one ounce. An elegant wash, strongly recommended by Nevins Hyde, is made by mixing five minims of pure carbolic acid with half a drachm of each of castor-oil and glycerine, to one ounce of eau de Cologne.

Erythema.—The two most common *primary forms* met with in young people are erythema nodosum and erythema intertrigo.

Secondary or symptomatic varieties occur in temporary derangements of the system, either in the digestive organs or in some of the fevers, such as diphtheria, vaccinia, etc. They require to be diagnosed from scarlatina, rôtheln, or measles. As regards the character of the eruption itself, it may at first closely simulate one or other of these diseases, but the progressive and regular evolution of the rashes and other special symptoms peculiar to the exanthemata being absent, a definite opinion may generally be given after the first day.

Erythema Nodosum is a very well-marked form, accompanied by constitutional symptoms. It is said to occur, and I believe truly, in children of rheumatic habit. It is preceded by symptoms of malaise and slight febrile movement for a few days, after which the characteristic eruption comes out in the shape of red elevated nodules, most usually on the anterior aspect of the legs, sometimes on the arms, or even on the face, accompanied by pain and tenderness over the nodules. The

frequent association of this affection with rheumatism in children should always lead the physician to look out for other symptoms of the constitutional condition. The heart should be carefully examined from day to day, and fibrous nodules looked for. Tonsillitis (follicular) often accompanies or precedes the eruption. The patient ought to be kept in bed till the eruption has disappeared, as well as any constitutional symptoms. The treatment should consist of mild saline laxatives, or pulv. rhei co., with small doses at intervals of salicin or salicylate of soda. Local treatment is seldom needed. Covering the nodules with a skin of flexile collodion will often give relief.

Erythema Intertrigo is met with on opposed surfaces of skin, especially on the nates, and is often excited by the irritation of wet or dirty napkins. The skin often becomes intensely irritated and red, and readily takes on the action of a mucous surface, secreting freely a foul-smelling mucous fluid. Cleanliness, and keeping the opposed surfaces dry with the application of a dusting powder, or equal parts of oxide of zinc and powdered starch, is all the treatment required locally. If the child be suffering from intestinal catarrh with acid secretions, suitable treatment for this condition must be ordered.

Urticaria is a frequent and important skin affection in children. It has certain peculiarities in infancy and early childhood different from adult life. It is a localised congestive affection, characterised by the production of wheals due to congestion and œdema of the affected parts, accompanied by itching and tingling, and is probably due to vasomotor disturbance of central, peripheral, or reflex origin. One of the most common causes giving rise to it, is digestive derangement due to the ingestion of indigestible articles of food. Intestinal worms in children may produce it. External irritants often set it up—such as nettle stings, bites of insects, pressure of irritating clothing. Children suffering from nervous disease of central origin are often subject to it.

Morbid conditions of the blood, due to malarial, rheumatic, or other poisons, often give rise to it. According to recent dermatological writings on this subject, there seems to be a tendency to classify under the term urticaria, certain lichenous and pruriginous eruptions which were previously held as distinct. Colcott Fox,¹ in a recent monograph, deals with this question from his own clinical experience, and I take the liberty of quoting from his paper. He says: "The ordinary urticaria, as we know it in adults, is very rare indeed in tender childhood, and almost unknown in infancy; that the lichen urticatus of Bateman is a true urticaria, and that urticaria is one of the most common affections of young life; that it takes a special form, in which the wheals have their centres occupied by an inflammatory lesion, which is left behind when the evanescent wheal subsides; that this inflammatory lesion is most commonly a papule, and hence the terms lichen urticatus and urticaria papulosa, sometimes a vesicle and sometimes a pustule; that the conditions described as lichen urticatus, varicella prurigo, infantile prurigo following measles and vaccination, and probably Crocker's papular, vesicular, and pustular vaccination rashes, are only phases of one and the same disease, viz. the urticaria of infancy and childhood." Such a conception of the disease certainly tends to simplicity, and Fox adduces strong evidence to prove the correctness of his conclusions. Viewed from this standpoint, the disease, essentially and primarily of a papular nature (urticaria papulosa), may develop vesicles (urticaria vesiculosa), or pustules (urticaria pustulosa), or bullæ (urticaria bullosa).

DIAGNOSIS.—Little difficulty is experienced in the early stages in the diagnosis of urticaria. The sudden appearance of the eruption and the characteristic wheals leave no doubt as to the nature of the case. The papular form may be mistaken for lichen, or prurigo, scabies, or multiform erythema. In regard to scabies, the cuniculi should be looked for, and it must be remembered that the two eruptions may be com-

¹ *Urticaria in Infancy and Childhood.*

bined. In doubtful cases, if the treatment for scabies is resorted to, no effect will be produced if it is urticaria.

TREATMENT.—The management of cases of urticaria must have reference to causation and the constitutional state generally. In the acute stage little treatment is needed, but constitutional. If the digestive system is at fault, saline laxatives, or rhubarb and soda, or grey powders, should be given in suitable doses. If the child is feverish it should be kept in bed. In any case it is well to do this for a day or two, as in children the frequent association of this disease with rheumatism must always be borne in mind. It is often complicated with tonsillitis. Should there be decided evidence of rheumatism, salicylates with guaiacum or acetate of potash should be given. Warm alkaline baths will soothe and relieve the irritation and fever.

In *Chronic cases* very different treatment must be adopted. The child need not be kept in bed. Everything must be done to restore the general health, and soothe and relieve cutaneous irritability. A well-ventilated room, open air exercise, non-irritating clothing, tepid bran or oatmeal baths instead of soap and water, drying the child gently with a soft towel without much irritation, are all measures which are likely to relieve. Cooling lotions are often of service, thus,—carbolic acid one drachm, to one ounce of glycerine with five ounces of peppermint water, is an excellent mixture; or—menthol one drachm, rectified spirit one ounce, glycerine one and a half ounces, with water to eight ounces. A starch bath given at night, and the following lotion sponged over the surface in the morning, is very useful—sulpho-ichthyolat. ammon. one drachm, rectified spirit one ounce, camphor water five ounces. The liq. carbonis detergens alone, or mixed with one to five lot. plumbi subacetat., is also an excellent application. Internally, cod-liver oil, when the child can take it, will generally do good. I cannot say I have found any benefit from arsenic, as a rule, in urticaria. At all events, it does not seem to have any specific effect. No doubt its general tonic pro-

perties are sometimes beneficial. A more likely remedy, and one which is credited, and I think justly, with controlling local congestions due to vasomotor nerve disturbance, is ichthyol, which may be given in two or three grain doses thrice daily.

Eczema.—Of all the cutaneous diseases in children, this is the most common. It may be local or general, dry or moist, vesicular or pustular; in fact, any degree of inflammatory action may exist from erythema to pustulation. It is most common in infants, the most frequent site being the head and face. Its etiology is not well understood. It may occur in apparently healthy and well-nourished children, or in those who are emaciated and in delicate health, in scrofulous, syphilitic, or rheumatic subjects. Even to outline the subject in all its bearings would require more space than is at our disposal. A few general observations on the clinical features and treatment of the disease must suffice. Of 5000 cases described by White of Boston,¹ 855 occurred in children under two years, 1135 in children under three years. The frequency of its occurrence in infancy is a natural expectation, when we bear in mind the sensitive tenderness of the skin in early life, its exposure to external irritative influences, and the readiness with which its functions are liable to disturbance from the derangements of internal organs, particularly those of the digestive system. The first dentition, when difficult or disordered, is often assigned as a positive and direct cause of eczema of the head and face in infants. The influence of teething on causation is a popular belief, but has not been proved to be a scientific fact. I have never been able to satisfy myself there is any direct etiological relation between the processes. Vaccinia is popularly believed by mothers to be the cause of eczema, or indeed of any skin eruption which happens to break out within a certain time after vaccination. I know of no regular causal relation between the two diseases. No doubt vaccinia, if very severe, may tend to debilitate the child, in the same way as any other eruptive fever, and there-

¹ *Boston Med. and Surg. Jour.*, 1881.

by lead to disordered skin function and inflammation ; but this is quite exceptional, as is the case with the eruptive fevers generally.

The eruption may be classified — (1) as to its *site*, the scalp and face being the most common. It may also occur on the trunk or extremities, often about the flexures of the larger joints ; (2) as to *duration and type* of inflammatory action, acute or chronic, dry, vesicular or pustular ; (3) as to *constitutional state*, it may be met with in well-nourished and apparently healthy, or in badly-nourished and debilitated children. The skin is red and inflamed, and covered with crusts of a yellowish or greenish yellow, sometimes of a dark brown colour. The surface easily bleeds on the slightest pressure, or by scratching. There is generally a deal of itching and irritation, so much so, that if permitted the child is constantly scratching, which causes bleeding from the inflamed surface. From a large number of observations made in the out-patient room of the hospital during five years, I found that infantile eczema was more common, in the proportion almost exactly of two to one, in breast babies than in bottle babies. This is exactly the reverse of what might be expected under physiological conditions ; but in the class of mothers who frequent our hospital out-patient room, a large proportion are in poor condition for nursing, and have milk of defective quality, with the result that their children are insufficiently nourished, and probably suffer, as most of them do, from chronic gastric catarrh in consequence of irregular suckling, and the ingestion of milk of defective quality. Bottle babies are less liable to be affected, as they are generally better nourished, and usually suffer from a more acute form of the disease. The pustular form of eczema is common in the scalp, and often called impetigo capitis. It is not infrequently met with in scrofulous children, and associated with it the occipital and other glands may become enlarged, and there is frequently nasal or conjunctival catarrh, and more or less facial eczema and ulceration about the lips and angles of the

mouth. In syphilitic children, likewise, eczema is apt to assume the pustular type. A form of pustular eczema is commonly met with complicating *pediculi capitis*.

TREATMENT.—The management of such cases requires great care and discrimination on the part of the physician. What we have to treat is not so much the disease as the patient. In *poorly-nourished babies on the breast*, the bottle must be substituted, and the most careful directions given as to the preparation of the milk. The cure of gastro-intestinal disorder must be assisted by suitable remedies, as already recommended in such cases. In most of these poorly-nourished babies the disease is of a very chronic nature. In *bottle babies* the feeding must be regulated. The children are generally fairly well nourished, and the food often in excess, probably too much solid food being given. In well-nourished children, especially after the nursing period, over-feeding is a common cause of eczema. The food in such cases must be carefully regulated as regards quality and quantity. In such children constipation is the rule, and therefore if change of diet does not restore a healthy action of the bowels, simple saline or other mild laxatives should be given. There is a popular belief that oatmeal porridge as an article of diet causes eczema. Allan Jamieson alludes to this subject, and with his observations, characterised as they are by sound sense and judgment, I substantially agree. No doubt there is idiosyncrasy on the part of some children, as there is in adults, regarding the digestibility of oatmeal and its effect in causing cutaneous irritation, but I believe this to be exceptional. Good oatmeal porridge, *properly cooked*, I believe to be as wholesome a food for children suffering from eczema as in health. Unfortunately children among the poorer classes are too often fed on oatmeal porridge only half cooked, and under these circumstances I consider it most hurtful, and as likely as any other irritating article of diet to aggravate the disease. The dietetic treatment, therefore, of eczema, whether in lactating infants or older children, is of primary importance; and

in connection with this, the state of the digestive system generally must always be looked to, and any derangement, whether of a catarrhal nature, or, as so often happens, a constipated condition of the bowels, treated. *Medicinal* treatment is second in importance to dietetic. Should the child be scrofulous, cod-liver oil and iodide of iron or other preparation of iron will be of service. In anæmic cases, iron or arsenic or other hæmatinic drugs are indicated. In constipation, mild saline laxatives, such as citrate of magnesia, or calcined magnesia, or Victoria water, will be found useful, especially in plethoric cases.

Local Treatment.—We have an inflammatory irritative condition of the skin to deal with, therefore soothing applications are indicated in acute cases, slightly stimulating in chronic cases. The cutaneous surface must be protected in every possible way from irritating influences. Flannel should not be worn next the skin. The use of alkaline soaps should be discontinued, and the superfatted basic soaps, such as that of Unna, substituted. Even such unirritating soaps are sometimes not well tolerated, and require to be discontinued; bland mucilaginous baths of oatmeal decoction or starch being used instead. As a rule the inflamed surface should be washed as seldom as possible, and only when the scabs have accumulated to such an extent as to interfere with the local application which has been prescribed. If simple washing be not sufficient, starch poultices may be used to soften the scabs, or the head covered with a wet compress soaked in warm water, to which a little bicarbonate of soda and glycerine has been added, the whole covered over with jaconet for a few hours. Having cleaned the surface of all scabs, the particular form of local application must be chosen. In acute cases, where there is much irritation and itching, soothing and sedative applications are indicated. In treating eczema of the head and face, a skull-cap and face cover must be made with soft linen, holes being made in it for eyes, nose, and mouth. The child's hands must be tied during the day to the

side of the bed, or to the waist if it is allowed to sit up. At night it should be put into a bag or a pillow-case, which suits the purpose admirably. A hole should be made in the end of the pillow-case large enough to allow the child's head to pass through, the case being secured below the feet by drawing together and tying the tapes. A flannel or other bandage is put round the body, above the pelvis and elbows, so as to prevent the arms being moved about. In acute cases I am in the habit of using a sedative lotion for a few days, one of the best being—

Black wash two parts, lime water one part; Or,
Glycerine of borax \mathfrak{zss} , bicarbonate of soda gr. xxx,
aquam ad \mathfrak{zviij} ; Or,
Liq. carbonis detergent. \mathfrak{zj} , aquam ad \mathfrak{zviij} .

After the lotion has been applied for two or three days, one or other of the following ointments may be used:—

Oxide of zinc \mathfrak{zij} , oleate of zinc \mathfrak{zj} , pulv. amyli \mathfrak{zj} ,
vaselini puri unguent. simplicis $\bar{a}\bar{a}$ \mathfrak{ziss} ; Or,
Carbonatis bismuthi \mathfrak{zj} , oxidi zinei \mathfrak{zij} , olei cadini \mathfrak{zss} ,
vaselini unguent aq. rosæ $\bar{a}\bar{a}$ \mathfrak{zj} ; Or the
Original diachylon ointment of Hebra: Pulv. litharg.
 \mathfrak{zxxx} , ol. olivæ opt. \mathfrak{zxxv} , aquæ q.s. *Coque secundum artem et fiat unguentum.* The olive oil is mixed with a pint of water, and heated in a steam bath, the litharge being mixed with continual stirring until cool.

The ointments should be spread on soft rags and applied close to the scalp, the linen cap being put over all.

Another favourite application is Lassar's paste, made as follows:—

Salicylic acid gr. xxx, powdered starch \mathfrak{zvi} , oxide of zinc \mathfrak{zvi} , vaseline \mathfrak{ziss} .

Unna has introduced several elegant preparations in the

form of jellies, which are very useful. Two of these, as quoted by Jamieson,¹ are as follows:—

Gelatine fifteen parts, oxide of zinc ten parts, glycerine thirty parts, water forty parts.

The ingredients are melted, and two per cent. of ichthyol are added. The jelly is kept in a tin can, and when required is liquefied by heat and painted over the part, which is afterwards covered with a layer of absorbent cotton.

Another form is—

Gelatine fifteen parts, oxide of zinc ten parts, fresh lard ten parts, glycerine sixty-five parts; to this, after heating, two per cent. of salicylic acid is added.

Some inveterate cases of eczema of the scalp yield to the following treatment:—Finely powdered boracic acid is applied over the scalp, and the whole covered with a layer of absorbent cotton-wool. This application is kept on for two or three days, during which time a good deal of hyperæmia and desquamation of the skin takes place. The application is then discontinued, the scalp cleaned with a starch poultice or gruel of oatmeal, dried, and the following ointment applied: Pounded boracic acid $\mathfrak{z}\text{i}$, lanolini (Liebreich's) $\mathfrak{z}\text{i}$. Another dusting powder I have found useful is salicylic acid five grains, kaolin $\mathfrak{z}\text{iss}$, powdered starch $\mathfrak{z}\text{ss}$; misce. I have occasionally found benefit in very chronic and intractable cases of eczema of the scalp, from painting the surface over once with a solution of nitrate of silver, ten grains to the ounce, allowing the surface to dry, and then covering it with a thin layer of medicated cotton-wool for forty-eight hours, thereafter applying one or other of the oxide of zinc unguents. Whatever applications are used, the main indications of treatment must be kept in view—prevention of all sources of external irritation, by *avoiding washing* as much as possible, and when cleansing is required it must be effected by emollient gruels or soothing poultices; *exclu-*

¹ *Diseases of the Skin*, p. 250.

sion of the air and keeping the surface aseptic. The local application must be suited to the condition of the part at the time, and should be of a soothing kind in acute cases, mildly stimulating in some chronic cases.

Tinea.—*Tinea Circinata* or *Body Ringworm* is a superficial inflammation of the horny layers of the epidermis, caused by the presence and growth of the trichophyton. It shows itself first by small reddish patches, which spread by the margin, gradually leaving the skin originally affected in the centre, which assumes a natural appearance, the whole patch thus presenting a ring-like appearance. As the disease goes on, desquamation of the epidermis takes place. It can hardly be confounded with any other skin affection, although occasionally limited eczematous patches or even psoriasis assume a somewhat similar appearance.

TREATMENT.—It is readily curable when recognised. Carbolic glycerine is a good application. Tincture of iodine is also useful. Ammoniated mercury ointment two parts, benzoated zinc ointment one part, is a good unguent. Sulphur ointment often cures it, so does liquor epispasticus, or corrosive sublimate two grains, glycerine three drachms, chloroform water five drachms.

Tinea Tonsurans, or *Ringworm of the Scalp*, is caused by the growth of the trichophyton in the superficial epidermal layers and in the hair follicles. The fact of the epiphyte invading the hair follicles constitutes the main difficulty in getting rid of the disease, as it is no easy matter to find local applications which will penetrate into the follicles. Both forms of tinea are eminently contagious, and when undetected spread rapidly over the scalp, and from child to child if the same hair brushes or towels are used, or if the child sleeps in the same bed with one affected with the disease. It shows itself by small reddish patches with a scaly surface, which spread steadily by the margin. The hairs soon become diseased, and either fall off or break, leaving dry brittle stumps. When the scalp is shaved the patches are easily

seen, of a different colour from the surrounding healthy skin, reddish or greyish with scaly surface. *Tinea kerion* is that form of the disease where the patches are raised and the skin has a boggy appearance, from acute suppurative inflammation of the hair follicles. The hair follicles are often destroyed, and permanent baldness may result. On examining the scales or hairs of the affected part by treating with liquor potassæ, the spores and mycelium are easily recognised.

TREATMENT.—The cure of this complaint is most difficult. It is one of the *opprobria medici*. The first thing to be done is to shave the scalp, and keep it shaved during the continuance of the disease. Great cleanliness should be observed, the scalp being washed frequently with carbolic soap and water. There are two principles in treating these cases—the application of parasiticide remedies or the induction of a mild kerion by irritating applications. The latter method of treatment must be most cautiously gone about. There can be no doubt that the induction of a mild form of inflammation in the hair follicles is one of the quickest methods of curing the disease, but it is always hazardous, because, if inflammation is pushed beyond a certain point, destruction of the hair follicles and permanent baldness result. The applications resorted to for this purpose are mild croton liniment or blistering, strong iodine preparations, or bichloride of mercury. Ordinary parasiticide applications are generally used in the form of ointment or lotion. The following *ointments* will be found useful. It may be mentioned that it is always necessary to “ring the changes,” and after a time substitute one application for another. Ammoniated mercury ointment alone, or diluted in one or two parts of lard; or, ammoniated mercury ointment six drachms, thymol ten grains, simple ointment two drachms; or, dilute nitrate of mercury ointment two parts, vaseline one part; or, oleate of mercury (ten per cent.) three parts, lanoline one part; or, sulphur ointment one ounce, oil of cade one drachm; or, acetate of copper ten grains, benzoated lard and vaseline of each half-an-ounce. *Lotions*—Calomel forty

grains, tincture of iodine one ounce ; or, glycerine of carbolic acid ; or, iodine one drachm, colourless oil of tar (*ol. picis pallidi*) one ounce ; or, precipitated sulphur one drachm, *liq. carbonis detergens* one ounce. Care must be taken in using the stronger applications not to produce too much irritation, the application being used with sufficient frequency to produce the minimum amount desired. During the interval of application of the stronger remedies, dilute carbolic oil or carbolic glycerine may be applied. The secret of cure is keeping the scalp shaved, persistence in the application of remedies until the microscope shows absence of spores. It is very necessary during the process of local treatment to attend to the constitutional condition of the child. Many children, owing to constitutional weakness, do not seem to be able to throw off the disease. Hygiene must not be neglected, and iron and cod-liver oil are often useful in hastening a cure.

Favus.—A parasitic disease of the scalp caused by the growth of the *achorion schönleinei*, called also *tinea favosa* and *dermatomycosis achorina*. The parasite is very like *trichophyton* ; the mycelium is more distinctly jointed, and the spores larger and more numerous. The disease commences by the formation of little vesicles, which rapidly become pustular, drying up and forming characteristic cup-shaped crusts. Each pustule has a hair for its centre. The hairs soon break off, being destroyed by the growth of the fungus. The scalp has a peculiar and characteristic mousey odour. The disease occurs chiefly among the children of the poor. As a rule, cases are not seen till it is well advanced and the hair has fallen out, producing large areas of baldness, over which are scattered the cup-shaped scabs with a few dried-up brittle hairs here and there.

TREATMENT must be directed to improving the constitutional condition of the patient by hygienic and dietetic measures, and the application of parasiticide remedies to the scalp, with epilation of all the hairs in and around the diseased areas. One of the best applications is a lotion of corrosive sublimate,

four grains to half an ounce of each of glycerine and water. Allan Jameson recommends the following ointment :—Resorcin one and a half drachms, oxide of zinc, powdered starch, vaseline, and lanolin, of each two drachms. Any of the applications recommended for trichophyton may likewise be found suitable.

Sclerema.—Sclerema is a condition of the skin distinct from either scleroderma or œdema neonatorum. Originally described by Underwood and Choissier, it remained for Parrot¹ in his work on *Athrepsie* to differentiate it from these two diseases. On examination of the skin, the essential and leading peculiarities are found to be induration and atrophy. It presents a compressed appearance on section, and, on more minute examination, the atrophy is found to extend to the rete Malpighii, the cells of which are hardly visible. There is also more or less complete atrophy of the fatty elements, the cells being shrivelled up and the nuclei often distinct. On the other hand, the connective tissue is hypertrophied, its bands or bundles being more than usually thick, and by their growth apparently causing atrophy of the fatty elements of the tissue. The lumen of the blood-vessels is narrowed, especially of the vessels in the papillæ. A form of sclerema described by Langer, differing from ordinary sclerema, is characterised essentially by a peculiar condensation of the skin without atrophy of the fat. A certain temperature of the body is requisite to maintain the fat in its normal semi-fluid condition, and in depressing or debilitating states of the body, with low temperature, this condition of the fatty element of the skin is favoured. It is generally termed “adipose sclerema.”

CLINICAL FEATURES.—The disease is a very fatal one. It appears at birth, or soon after. The lower limbs, on which it is generally first noticed in patches which gradually spread over the rest of the limbs and body, more particularly the back, are very cold. The patches have a reddish or livid

¹ *Clinique des Nouveau-nés*, p. 116, Paris 1877.

glossy appearance, sometimes they are intensely pallid. The skin over the body, limbs, and face soon becomes indurated, the child being unable to suck. The hardness of the skin, which does not pit on pressure, causes general rigidity and immobility of the joints, and the legs remain stiffly stretched out, the child being quite unable to move. It may die in a few days from inanition, or, if life is prolonged, internal complications may arise, such as pneumonia, pulmonary congestion, or peritonitis, which soon prove fatal. The condition of the circulation and body heat are specially noteworthy; the pulse being slow and feeble, the temperature subnormal, generally ranging between 80° and 90°, sometimes as low as 70°. The respiration is likewise slow, and the voice feeble. The child is generally markedly apathetic and somnolent. Besides the complications already mentioned, hæmorrhages into internal organs, as the stomach or intestines, or minute punctated hæmorrhages in the brain and spinal cord, may be found after death.

The *etiology* of the disease is obscure. It seems often to be connected with prematurity of birth, or it may succeed chronic debilitating diseases—as gastro-intestinal catarrh, enteritis, pulmonary collapse or broncho-pneumonia, congenital heart disease, hydrocephalus, or meningeal apoplexy. It undoubtedly occurs in syphilitic children. Whatever be the cause, the result is grave disturbance of the peripheral cutaneous circulation, leading on to the pathological conditions described.

TREATMENT.—Hygiene must be attended to, and proper feeding of the child, with a wet-nurse, if necessary. Warm clothing and friction of the surface are also indicated.

Œdema Neonatorum presents a different picture to sclerema. The skin is œdematous, from fluid infiltration of the connective tissue. It pits, although often with difficulty and on deep pressure. The swelling generally begins in the lower limbs, and extends up to the body or to the arm and face. Henoch describes the œdema as often observed on the calves of the legs when there is none on the feet, or it may be noticed only

on the dorsum of the hands or feet. The disease generally begins within two or three days after birth. The general condition of the child is very like that of sclerema—depression, as evidenced by apathy and somnolency, slow pulse, and sub-normal temperature. Similar internal complications are often met with as in sclerema. The two conditions are similar in many respects, although different in others. When examined after death the skin in œdema presents no induration, nor is it adherent, as in sclerema, to the tissues beneath. The swelling is most marked in dependent parts. The subcutaneous connective tissue is infiltrated with yellowish-coloured serum, and the fat, although consolidated, is not so much atrophied as in sclerema, and is of a reddish or yellowish-brown colour.

The *etiology* of œdema would appear to be similar in many respects to that of sclerema. A debilitated condition of the system generally precedes it. Thus collapse of the lung, congenital heart disease, erysipelas, or nephritis, have all been noted as precedent states, so also prematurity of birth, defective hygienic conditions, as regards temperature, ventilation, or feeding. In a case lately reported by Dr. J. W. Ballantyne, he found marked changes in the kidneys, “the cortex being greatly congested, with cloudy swelling of the cells of the tubules, and small cell infiltration of the Malpighian bodies—in short, tubular and glomerular nephritis.”

TREATMENT.—œdema is not such a hopeless disease as sclerema. The treatment must be conducted with reference to hygiene and diet, warmth, and minute doses of brandy, and, in some cases, digitalis in suitable doses. In hospital such children are generally treated in the incubator.

GANGRENE.

SYMMETRICAL OR SPONTANEOUS GANGRENE — *Raynaud's Disease.*—This, although a rare disease in children, requires passing notice. Its pathology is not yet well understood. It seems to affect, by spasm or otherwise, the arterioles of the

extremities or other parts, probably from some affection of the trophic spinal centres. Some pathologists believe that a peripheral neuritis is the essential factor of the disease. From whatever cause, the clinical features of the complaint are superficial symmetrical gangrene of corresponding parts of the extremities, more rarely the disease may be unilateral. Occasionally it has been found to be associated with paroxysmal hæmatinuria in the same child. The disease has been termed a "local asphyxia" affecting the extremities, in the same way as the corresponding kidney affection may be termed "renal asphyxia." Children affected with the disease may be in apparent good health, but more frequently are in a cachectic condition, very often convalescing from one or other of the acute febrile diseases. Measles seem to predispose to it, also scarlatina or variola. Insanitary and defective hygienic conditions, and insufficient or bad feeding, are also noted as potent factors in causation.

The PROGNOSIS is generally unfavourable.

TREATMENT must be directed to keep the parts warm. Barlow recommends friction with cold water. Galvanism to the spine has been recommended, the positive pole being applied to the cervical spine, and the negative to the skin lower down. When applied to the legs, the positive pole should be placed over the sacrum, and the negative to the legs. Dry friction and massage are often of service. The child should be fed with the most nourishing digestible diet, and a suitable quantity of wine, either port or good claret. The limbs should be wrapped in cotton-wool.

CHAPTER XLV.

DIABETES MELLITUS.

ALTHOUGH some American writers maintain the contrary, diabetes mellitus is, in this country at least, a comparatively rare disease in children. The report of the Registrar-General for England for the year 1889 shows that the total number of deaths at all ages from this ailment was 1754. The following table indicates what number of these occurred in children :—

	AGES AT DEATH.							
	Under 1 year.	1-2	2-3	3-4	4-5	Total under 5 years.	5-10	10-15
MALES	3	2	1	2	1	9	11	19
FEMALES	—	1	1	2	1	5	11	28

In other words, 4·73 of the recorded deaths, for this particular year, were in children under the age of fifteen. The percentage for the previous year was 5·47. Again, in “eight of the principal towns in Scotland,” during the year 1889, a total of twenty-four deaths was recorded, and of these five were in persons under the age of twenty, and none under the age of five years.

ETIOLOGY.—Very little that is definite can be said. Heredity, gastro-intestinal disease, typhoid fever, tubercular disease of abdominal organs, injuries to the head from blows or falls,

tumours of the brain, have all been mentioned as causes. It is probable that they are more frequently antecedent or concurrent conditions than causes.

MORBID ANATOMY.—In recent years the advances made in histological methods have revealed many changes previously unsuspected in different organs in this disease. The appearances met with in the few cases recorded of post mortem examinations in children, show similar morbid lesions to those met with in adults. The constancy and frequency of pathological changes in many organs in this disease would appear to point to a complex morbid anatomy. The organs showing most constant morbid changes are the pancreas, liver, and kidneys, and central nervous system. The sympathetic ganglia in the abdomen are frequently found enlarged and affected with degenerative changes. The interest attached to the diseased conditions of the abdominal sympathetic is enhanced by the numerous physiological experiments by Pavy, Echard, Lustig, and others, showing that interference by extirpation of the glands or section of the splanchnic nerves was followed by glycosuria and acetonuria. Lancereaux was the first to direct attention to disease of the *pancreas* in diabetes. The changes almost invariably found are atrophy of the organ in various degrees, showing that its functions must be seriously interfered with, the supply of healthy pancreatic ferment being diminished or stopped. Saundby believes that the cirrhotic changes in the organ are the result of inflammation. The *liver* is rarely found to be normal. It is usually enlarged and congested, and fatty degeneration in various stages is often observed. Interstitial hepatitis, ending in cirrhosis, has also been met with. *Spleen* seldom shows much alteration in structure. The *lungs* are frequently affected with tuberculosis or fibroid degeneration. The *kidneys* are described by Windle and Saundby as rarely healthy, their altered anatomical condition probably being due to the increased strain upon their functional activity by the excretion of altered quality and quantity of the urine. The almost constant lesions noted are

fatty changes with hyaline degeneration of the epithelium of the tubules of the cortex. Probably the changes in many of the organs, possibly also in the nervous system, are due to the condition which has been called hyperglycæmia. The brain and spinal cord are rarely found normal in advanced cases. Congestion, œdema, softening, sclerosis, enlarged perivascular spaces, cysts in the white matter, have all been described; but the fact that most of these conditions are met with in other diseases deprives the lesions to a great extent of any special pathological significance. The medulla and spinal cord being portions of the nervous system, by interference with which glycosuria may be produced artificially, have been most carefully examined, but, so far as I am aware, in most cases with negative results as to the existence of any positive or constant organic lesion. Sandmeyer¹ of Marburg, however, has related the case in which he examined the spinal cord of a child dying of diabetes, and found degenerative changes in the spinal cord in the anterior third of the column of Goll in the cervical enlargement, and, in a lesser degree, in the middle third. There can be no doubt that the dim obscurity of diabetic pathology is being broken in upon by rays of light, which may clear up the true nature of the disease, on more extended observation.

OCCURRENCE AS REGARDS SEX.—It would appear from many of the published tables that the number of male and female children affected is about equal up to the age of ten, from ten to fifteen the maximum is on the female side, while after this males predominate more and more as age advances.

DURATION IN CHILDREN.—Diabetes mellitus in most cases pursues a much more rapid course in children, and the younger the child apparently the more rapid the progress. But this is not invariably the rule. The writer has watched a case in a boy for fully four years, and at the end of that time he did not seem in a materially worse condition than at the beginning, save that his growth was stunted, and his moral faculties

¹ *Deutsche Med. Zeit.* 40.

greatly blunted. Dr. Underhill, in the *Edinburgh Medical Journal* for May 1891, cites two rapid cases—one, a boy of four years and three months, died after seven months' illness, the other, a boy of seven years, died after four months' illness. A case in an infant has been reported, of two days' duration, from the time that all the symptoms were fully developed, till death.

PROGNOSIS.—In every case this is grave in children. At least two-thirds, or even a larger proportion, of all the cases go on to a fatal termination. If the disease lasts many months, and becomes confirmed, probably recovery rarely if ever takes place.

SYMPTOMS in no way differ from the disease as met with in adults. Complications, especially of the lung, should be carefully looked for.

TREATMENT.—Its leading principles are well known, and there is no need to modify the practice in the case of children. Dieting is of primary importance. It must be remembered that it is possible to give too much nitrogenous food, and its quantity should be carefully regulated, and the effects watched. In many cases the value of skimmed milk, in children especially, is acknowledged, but its beneficial effects are not always constant, and in some cases, although the amount of sugar excreted may diminish, the general condition of the patient becomes deteriorated, and the treatment must be abandoned. Hygiene is of much value. Well-ventilated rooms; exercise in the open air, carefully regulated, short of fatigue. In those cases where active exercise seems inadmissible, massage is of great value. It not only helps to keep up a healthy nutrition of the muscular system, but favours secondary digestion, and assists the excretory function of the skin, which is generally dry and parched. Drugs are comparatively valueless as curative agents, but yet undoubtedly modify in many cases the progress of the disease. Thus opium, or opium with belladonna, which answers better in children, are often very decided in their effects in reducing both the quantity of urine and the amount of

sugar. As opium requires to be given cautiously in children, and in some cases is not well tolerated, sulphonal has been used and found an efficient substitute. Both antipyrine and salicylate of sodium have also been found useful; strychnine is strongly recommended by Jacobi. Dr. Martineau speaks highly of the value of arsenicated lithia water, and Dujardin-Beaumetz also praises the treatment, which he carries out by giving two or three grains of lithium carbonate in a wine-glassful of Vichy water, to which one or two drops of liquor arsenicalis are added. Martineau gives the lithium carbonate with arseniate of sodium. Jambol, in doses of one to two grains, has been tried and found useful by Saundby and Fenwick. In threatened diabetic coma the intravenous injection of dilute alkaline solutions has been tried.

APPENDIX.

FOOD AND MEDICINES.

THE rules for feeding infants artificially during the lactating period are laid down in the chapters on Infant Feeding. It must be remembered that babies are little men or women, and no hard and fast rule can be laid down for artificial feeding, idiosyncrasy in regard to food being the same in children as in adults. The same dietetic principles must be borne in mind and adhered to as strictly as possible.

Diet after weaning.—At the end of the first year the child should be weaned from the breast or bottle, and allowed to get pure sterilised cow's milk from a cup at every meal, milk still being the staple article of food. As the child is now provided with its incisor and some of its molar teeth, and the secretion of saliva is beginning to be established, it may get a proportion of solid food at each meal. In whatever way prepared, one or other of the natural farinæ—wheat, barley, or oat flours—are the safest and best foods. They must all be well cooked, so as to burst the starch granules and render the food digestible. Wheat meal may be given in the shape of bread, made preferably with second flour, steeped in water for two or three hours, then squeezed and boiled for twenty minutes, a proportion of milk being added during the last ten minutes. Rusks may be prepared in a similar manner. Chapman's whole meal is another good food, which must be carefully cooked according to direction. Barley flour, of which Robinson's is always a safe preparation, must be carefully blended

with cold water, and then cooked, and milk added a few minutes before the boiling is over. Oat flour is prepared in a similar manner.

From eighteen months to two years.—Animal food may be given once a day, in the shape of chicken soup or beef-tea (without fat). A lightly boiled egg may be mixed with bread jelly, and forms an excellent dinner for a child of this age. Boiled whiting, breast of chicken, or finely-powdered meat, may be mixed with mashed mealy potato, and also form a suitable food once a day.

After two years, the diet should be something as follows:—

Breakfast (eight o'clock).—Milk, bread and butter; or milk and well-boiled porridge.

Dinner (noon).—Breast of chicken, or small boiled whiting or haddock, or roast beef or mutton (lean), mashed potato and gravy, followed by a little farinaceous pudding—rice, corn-flour, or sago.

Tea (four o'clock).—Milk and bread and butter, or toast or biscuits.

Supper.—Gruel of oats, wheat, or barley, with a biscuit or bread.

PEPTONISED FOODS.

Milk.—To one pint of milk mixed with half a pint of water is added five grains of extractum pancreatis, and fifteen grains of sodium bicarbonate. The milk is kept warm for one hour, and then boiled for a few minutes to arrest the process. Forty-five minutes is usually sufficient time for all practical purposes. By this process the caseine is converted into soluble peptone, and the milk rendered more digestible. Two drachms to one pint of milk of Benger's liquor pancreaticus serves the same purpose. In like manner gruels and animal soups and food may be peptonised.

BREAD JELLY.

Soak bread, made from second flour, for three or four hours

in cold water. Squeeze off the water from a muslin cloth, boil the bread slowly in water for half-an-hour, and it is ready for use with milk.

BARLEY WATER.

Two ounces of finest pearl barley are allowed to stand in cold water for an hour, and thereafter the water is poured off. A pint and a half of water is then added, and boiled slowly down to one pint; sugar or squeezed lemon-juice may be added to taste.

RICE WATER.

One ounce of rice of finest quality is macerated for two hours in water kept pretty warm, then boiled slowly for an hour, and strained.

OAT, WHEAT, OR BARLEY GRUEL.

The flour is blended carefully with cold water into a thin paste, more water is added, and the mixture slowly boiled, stirring all the while for half-an-hour. Milk is then added, or it may be cooked with milk, if preferred.

BEEF-TEA.

One pound of good beef minced small, free from fat, is placed in an earthen pot, with one pint of cold water, and allowed to stand for one hour and a half. The jar is then placed in a saucepan and slowly boiled for one hour. Strain through a sieve and allow to cool; skim off the fat, and then warm.

RAW MEAT.

The finest lean meat, minced very finely or grated, should be well pounded in a mortar into pulp; or finest lean meat finely minced may be pressed through a sieve; another way is to

scrape the meat with a knife. In either case the meat may be given alone in small teaspoonfuls, or spread upon thin slices of bread.

RAW MEAT JUICE.

Finely minced beef, free from fat, is allowed to stand in an earthen vessel for three or four hours, and then strained through muslin.

WHEY.

One pint of milk is kept warm, at about a hundred degrees, a teaspoonful of artificial rennet having been previously added.

WHITE WINE WHEY.

Milk (one pint), brought to the boil; three ounces of sherry wine is then added, and the boiling continued for a few minutes; the curd is then strained off; sugar added to taste.

BRANDY AND EGG MIXTURE.

One egg beaten into froth, two ounces of water or cinnamon water added, and beaten again with half-an-ounce of brandy. The yolk may be used alone,—two yolks are beaten up with one ounce of water and half-an-ounce of brandy. In either case pounded loaf-sugar may be added to taste.

POULTICES.

Linseed Poultice.—Boiling water in a bowl, the meal sprinkled in, stirring all the while until the consistency of porridge. The poultice is then spread half-an-inch thick on old linen, the edges being turned over. In children, special care must be taken not to put the poultice on too hot, the back of the hand being used as an index; the poultice is then covered with jaconet, and kept on by a domette flannel bandage.

Mustard Poultice.—Made in a similar manner,—one part of mustard and three or four parts of meal.

Flannel Poultice.—Fine soft flannel is basted on to jaconet, with the edges turned over. The whole is soaked in boracic hot water and applied to the chest, flannel braces being fastened over the shoulders, with safety pins to keep in position. This is the ordinary warm poultice I use for young children. It is lighter and easier kept on, and does not require changing.

Charcoal Poultice.—One part of charcoal is mixed with two parts linseed meal, and made as already directed.

Starch Poultice.—Add cold water to the starch, and mix; sufficient boiling water is then added to make the proper consistency.

Yeast Poultice.—Half-a-pint of yeast is added to about a pound of linseed meal. The whole is treated with constant stirring, and spread on linen.

COLD SPONGING.

The child is laid on a blanket, and sponged all over with cold or tepid water for five minutes. He is then rubbed gently over with a soft towel, rolled in blanket, and put to bed.

PACKING.

Roll the child in a wet sheet, wrung out of cold water. Over all roll it in a blanket which is closely pinned up to the neck.

HOT AIR BATH.

Special apparatus is required—a cage to cover the child, over which the bed-clothes are placed, and a spirit lamp made for the purpose.

VAPOUR BATH.

Also requires special apparatus.

COLD BATH.

Place the child in a bath, at about a hundred degrees, and gradually reduce with cold water. It is useful, especially in typhoid, measles, and pneumonia—never in diphtheria, on account of the tendency to cardiac depression, and the generally low nerve tone of the patient. In scarlatina there is, in many cases, a similar risk, and the wet pack is always preferable, and generally useful in hyperpyrexia.

DRUGS.

The therapeutic principles regulating the administration of drugs in children are the same as those applicable to adults, with certain exceptions regarding dose and idiosyncrasy. Many of the diseases and functional derangements of infancy and childhood may be treated successfully by hygienic and dietetic means alone. The drugs used should be few and simple. The prescription should be compounded in such a way as to make the mixture as tasteless, or as pleasant to the taste as possible, adding to it, if it is necessary to cover the taste of the drug, syrup, glycerine, or fluid extract of liquorice, or other bland and pleasant substances. Pilules sugar-coated, or small powders, are often better taken than mixtures. The dose of each drug must be regulated according to age—

At 6 months, one-tenth of adult dose.

At 1 year, one-eighth ,, ,,

At 4 years, one-fourth ,, ,,

At 8 years, one-half ,, ,,

At 15 years, three-fourths ,, ,,

It may be stated generally that children are more sensitive to the action of drugs than adults, but this does not always hold good, as in some cases they are much more tolerant of the action of powerful remedies than grown-up people. This

obtains with regard to calomel and grey powder, both of which are extremely useful and well borne by children, whom, it may also be observed, it is very difficult to salivate. Children tolerate belladonna better than adults. The reverse holds good with regard to opium, to the action of which they are unusually sensitive. Blisters should be used cautiously, and should never be large, as sloughing of the skin, vital depression, convulsions, or kidney irritation may be set up. The liquid blister is always preferable to the emplastrum. Bleeding is not well borne by children, either by leeches or venesection.

GENERAL TONICS AND NUTRIENTS.

Iron.—Ferrum tartaratum, ferri ammoniæ citras, ferri et quiniæ citras, ferri iodum, ferri carbonas saccharata, ferri phosphas, ferri lactophosphas, liquor ferri dialysati, syrupum ferri phosph. co., syrupum ferri phosph. quiniæ et strychniæ, are the best preparations, should be given after food, and only when there is absence of gastric catarrh. *Manganese salts* agree well with children, the sulphate being the best. *Oleum morrhuæ*, a nutrient tonic of great value; often prescribed in too large doses, and when the digestion will not admit of it; therefore caution is required in prescribing. It is best given pure and alone. If the child will not take it, an emulsion may be given, or a mixture with malt extract. *Glycerine* is often a good substitute for oil, or *arachis nut oil*, or failing any of these *fresh cream*.

Antacids.—Liquor potassæ, alkaline bicarbonates, citrates or tartrates, creta præparata, are all very useful.

Alkaline Purgatives.—Magnesia, sulphate of magnesia, carbonate of magnesia, sulphate of soda, soda tartarata, potassæ tartras acidum.

Astringents.—Alum, acetate of lead, hæmatoxylon, catechu, kino, bael, hamamelis, acidum gallicum, acidum tannicum.

Acids. — The ordinary mineral and vegetable acids are useful under the same conditions as in adults.

ALTERATIVES AND SPECIAL TONICS.

This class is a large one, and includes such remedies as iodine and bromine compounds, of which the most important are potassii iodidum, sodii iodidum, ammonii iodidum, ferri iodidum, potassæ chloras, ammonii hydrochloras, compounds of arsenic and mercury. All this class of remedies act powerfully, and are well borne by children, especially arsenical and mercurial preparations.

REMEDIES ACTING ON THE BRAIN AND SPINAL CORD.

Nux vomica and *strychnia*, very active remedies, requiring careful dosage in children. *Conium* and *gelsemium*, both useful drugs and well tolerated, often beneficial in chorea and other nervous derangements. *Potassium bromide*, very useful in children, as in adults, in convulsive disorders. *Opium*, a powerfully active drug, very useful, but requiring cautious administration and dosage. *Belladonna*, a very useful remedy, of which children are tolerant; it may be given in average doses. *Hyoscyamus* is also a useful drug, and well borne. *Cannabis indica*, an anodyne and antispasmodic, useful in spasmodic affections and neuralgia. *Hydrate of chloral*, a drug which acts, like gelsemium and potassium bromide, powerfully in spasmodic nervous disorders. *Chloroform*, a valuable drug in children; it is well tolerated. *Lobelia*, also a useful remedy.

VASCULAR SEDATIVES.

Digitalis, *strophanthus*, *aconite*, *colchicum*, *convallaria*, *prunum virginianum*, *antimonium*, all suit children well. *Colchicum*, however, is seldom given except in older children.

NERVE TONICS AND ALTERATIVES.

Quinine, salicin, zinc, copper, silver. Members of the aromatic series, as antipyrin, antifebrin, or of the methane and aldehyde series, as sulphonal. Children tolerate these remedies in proportionate doses as well as adults.

STOMACHICS.

Bitter Tonics, as gentian, calumba, chiretta, quassia, cusparia, aurantium, are very useful, especially those which may be combined with alkalies. *Sedatives*, as bismuth and oxalate of cerium, or liq. calcis.

EMETICS.

The most useful are sulphate of zinc or copper, ipecacuanha or mustard. Tartar emetic is not well borne by children, and should rarely be used. *Apomorphia hydrochlorate*, in doses of one-twentieth to one-fortieth of a grain, in older children often produces emesis when emetics by the mouth have failed.

LAXATIVES AND PURGATIVES.

Laxatives.—Magnesia, sulphur, manna, prunum, tamarind, treacle, are all mild laxatives and not unpleasant to take.

Purgatives.—Oleum ricini, cascara, rhubarb, aloes, senna—all very suitable for children.

Salines.—Sulphates of potash, soda and magnesia, tartrates of potash or soda, phosphates of soda, suit children well; but the natural saline mineral waters, such as Victoria, Hunyadi, or Friedrichshall, are much to be preferred for most purposes.

Drastic Purgatives.—Scammony and jalap are the most suitable; gamboge and colocynth, less so; croton oil and elaterium rarely used. *Cholagogues*.—Calomel the most certain,

useful, and efficacious of all—very suitable in children of any age; podophyllin also acts well.

DIURETICS.

Potash and, less so, soda, salts, scoparium, juniper, copaiba, uva ursi, buchu.

DIAPHORETICS.

Liquor ammoniæ acetatis, the most useful of all, acts well; citrate of potash, guaiacum, opium with ipecacuanha; hydrochlorate of pilocarpin, one-eighth to one-twelfth of a grain, sometimes produces cardiac depression, requires caution in administration.

EXPECTORANTS.

Stimulating.—Ammonia, squill, aromatic volatile oils, resinous and balsamic remedies,—all useful in the chronic form of catarrhal bronchial affections.

Sedatives, Alkalies, and Iodides are most useful in children, as facilitating expectoration by favouring fluidity of secretion. Antimony and ipecacuanha act in a similar manner, but in addition have a powerful sedative action on the circulation. Compared with adults, children do not bear their administration so well, and caution is required in their use. Their routine use, so common in bronchial catarrh, must be deprecated. How few prescriptions do we see for bronchitis without ipecacuanha or antimony! Their use in a large class of cases, in children who are in a debilitated condition, is objectionable.

Remedies acting on the vagus system and respiratory centre.—Stimulants increasing the force of nerve discharge are strychnia, belladonna, stramonium, hyoscyamus, alcohol, and ether,—all useful for this purpose. Depressants of nerves and nerve centre—opium, codeia, physostigmina, and conium.

Demulcents.—Althæa, acacia, tragacanth.

The value of expectorant remedies, given with discriminating care in children, is great, and the therapeutic response to their action is very marked, yet no class of remedies is prescribed with less care and more empiricism in routine expectorant prescriptions. Too many practitioners have a stock prescription, with ipecacuanha or antimony and squills, often combined with a sedative, such as tinct. camph. co., which they give in all cases of bronchitis. The practice is greatly to be deprecated, especially in children.

The first part of the question is to find the area of the rectangle. The length is 12 cm and the width is 8 cm. The area is given by the formula: Area = Length \times Width. So, Area = 12 \times 8 = 96 cm².

The second part of the question is to find the perimeter of the rectangle. The perimeter is the total distance around the rectangle. It is given by the formula: Perimeter = 2 \times (Length + Width). So, Perimeter = 2 \times (12 + 8) = 2 \times 20 = 40 cm.

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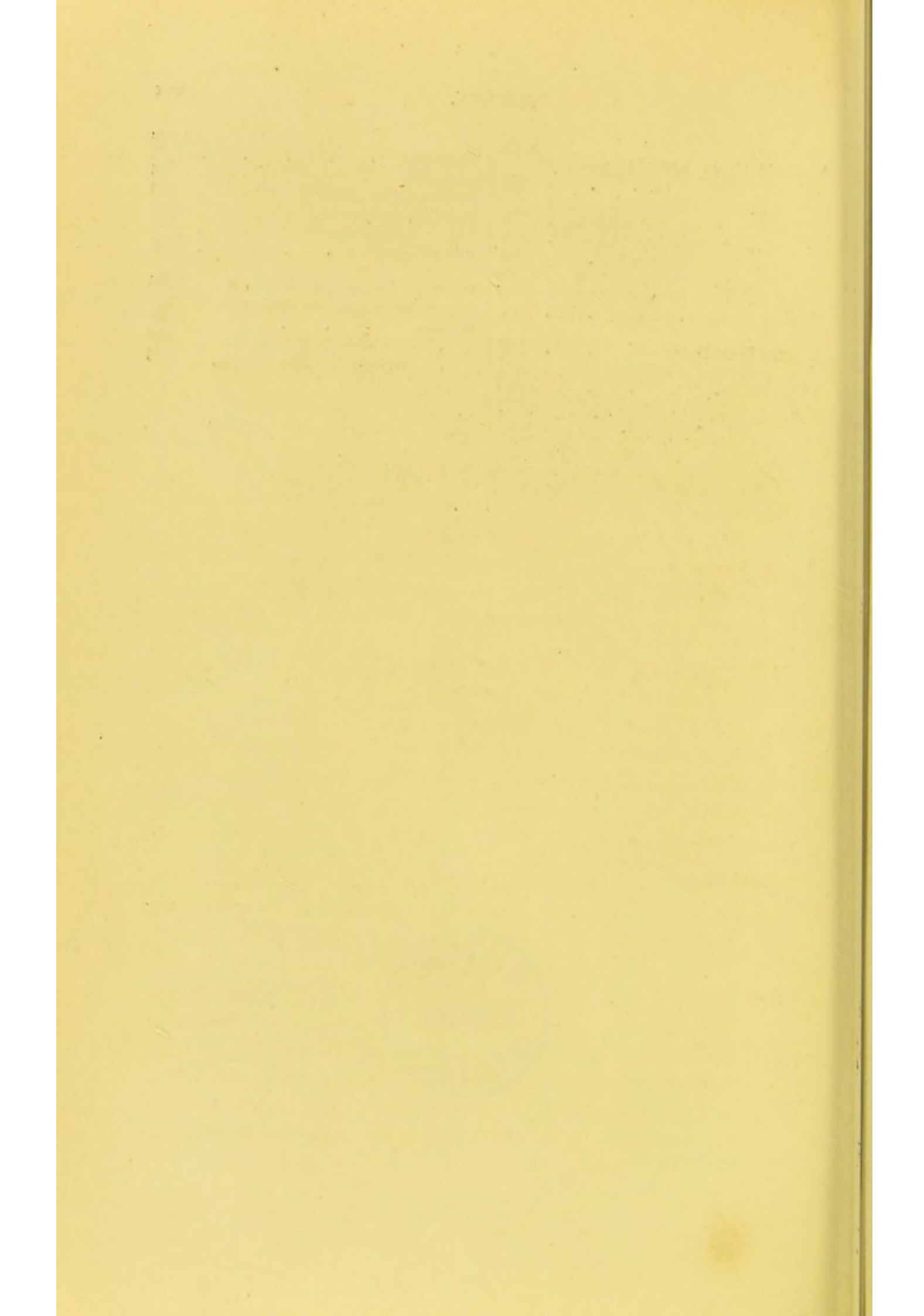
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